Final Environmental Impact Report

Santiago Creek Dam Improvement Project

SCH No. 2023050097

Prepared for

Irvine Ranch Water District
Fiona Nye, Director of Water Resources
15600 Sand Canyon Avenue
Irvine, California 92618

Prepared by

Psomas
Jennifer Marks, Principal-in-Charge
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707

October 2025

TABLE OF CONTENTS

Section **Page**

Section 1.0 Introduction and Summary 1-1
1.1 Introduction 1-1
1.2 Public Review Process 1-1

Section 2.0 Response to Comments 2-1
2.1 List of Written Commenters 2-1
2.2 Comments and Responses 2-1

Section 3.0 Corrections, Clarifications, and Additions to the Draft EIR 3-1

TABLES

Table **Page**

2-1 Comment Letters 2-1

ATTACHMENTS

Attachment

A Santiago Spadefoot Report
B Santiago CBB Report

SECTION 1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

This Final Environmental Impact Report (Final EIR) has been prepared by the Irvine Ranch Water District (IRWD), for the Santiago Creek Dam Improvement Project (Project). This document has been prepared consistent with the California Environmental Quality Act (CEQA) (Cal. Pub. Res. Code, Sections 21000 et seq., as amended) and implementing guidelines (Cal. Code Regs., Title 14, Sections 15000 et seq.) ("CEQA Guidelines").

Before approving a project, the Lead Agency must prepare and certify a Final EIR pursuant to CEQA Guidelines Section 15090. As Lead Agency, IRWD is principally responsible to approve the Project. CEQA Guidelines Section 15132 requires the Final EIR to include:

- The Draft EIR or a revision of the Draft EIR;
- Comments and recommendations received in response to the Draft EIR, either verbatim or in summary;
- A list of persons, organizations, and public agencies commenting on the Draft EIR;
- The responses of the Lead Agency to significant environmental points raised in the review and consultation process; and
- Any other information added by the Lead Agency.

1.2 PUBLIC REVIEW PROCESS

A summary of the public review process for the Project is provided below. IRWD performed additional outreach beyond that required for CEQA compliance, but that additional effort is not included below.

Notice of Preparation

As part of the Draft EIR process, IRWD released a Notice of Preparation (NOP) for the Draft EIR on May 4, 2023—which began the 30-day public scoping period for the Draft EIR. The scoping period ended on June 5, 2023. During the NOP scoping period, IRWD received five written comments.

IRWD held a scoping meeting on May 16, 2023. A public comment meeting was also held on May 21, 2025, but no interested parties attended that meeting.

The Draft EIR incorporated the comments received from the public and public agencies in response to the NOP.

Public Review of the Draft EIR

The Draft EIR was first made available for public review and comment on April 28, 2025 pursuant to CEQA Guidelines Section 15087. The 45 calendar day review period ended on June 11, 2025.

The Draft EIR was available to the general public for review at the following locations:

Heritage Park Library[1]
14361 Yale Avenue
Irvine, CA 92604

Library of the Canyons
7531 East Santiago Canyon Road
Silverado, CA 92676

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

The Draft EIR was also available for review online at the Project website:

https://www.irwd.com/construction/santiago-creek-dam-improvement-project

Electronic files related to this Project were also made available for download at the Project website. Written comments on the Draft EIR were required to be submitted no later than June 11, 2025 at 4:00 p.m., and could be submitted in-person, by mail and by e-mail. Two late comment letters were received and accepted by IRWD on June 25, 2025.

On April 28, 2025, at the beginning of the public review period, an electronic copy of the Draft EIR with appendices was submitted to the State Clearinghouse located in the Governor's Office of Land Use and Climate Innovation along with a Notice of Availability (NOA) of a Draft EIR (Appendix A), Notice of Completion & Environmental Document Transmittal (NOC) form, and a Summary Form for Electronic Document Submittal (i.e., SCH Summary Form). On that same day, the NOA was mailed to public entities and interested parties and was filed with the Orange County Clerk-Recorder and remained posted throughout the public review period. The NOA described where the Draft EIR was available and how to submit written comments on the Draft EIR. A public meeting was held on May 21, 2025 at IRWD to receive public comments on the Draft EIR; no attendees from the public were present.

[1] Heritage Park Library closed for regular operations on May 15, 2025, and was reopened in August 2025. The NOA was available at the other noted locations for the entire public review period.

SECTION 2.0 RESPONSE TO COMMENTS

The following is a list of public agencies, organizations, and persons that submitted comments on the Draft EIR. Comments have been numbered, and responses have been developed with corresponding letters/numbers. Appendix B, Comment Letters, contains all comments received from public agencies, persons, and organizations.

2.1 LIST OF WRITTEN COMMENTERS

The list of the public agencies, persons, and organizations that submitted written comments on the Draft EIR is provided in Table 2-1. Public agency comments and responses are provided below in Section 2.2.

TABLE 2-1
COMMENT LETTERS

Comment Letter	Date	Name
Public Agencies, Persons, and Organizations That Submitted Written Comments on the Draft EIR		
1	June 6, 2025	Sam Wang, South Coast Air Quality Management District
2	June 11, 2025	Virginia Gomez, County of Orange
3	June 11, 2025	Tiffany Lin, City of Irvine
4	June 11, 2025	Sandra Jacobson, California Trout South Coast Region
5	June 11, 2025	Joel Robinson, Santiago Creek Watershed Preservation and Restoration Project
6	June 25, 2025	Jonathan Snyder, US Fish and Wildlife Service
7	June 25, 2025	Glen M. Lubcke, California Department of Fish and Wildlife

2.2 COMMENTS AND RESPONSES

All comment letters received by IRWD during the 45-day public review period, as well as those received and accepted late by IRWD, for the Draft EIR have been included and responded to in this Final EIR. Only comments raising environmental issues have been addressed in these responses. Comments that do not require a response include those that: (1) do not address the adequacy or completeness of the Draft EIR; (2) do not raise substantive environmental/CEQA issues; (3) do not address the Project; or (4) request the incorporation of additional information not relevant to environmental issues.

Section 15088 of the CEQA Guidelines requires lead agencies to respond to comments as follows:

a) The Lead Agency shall evaluate comments on environmental issues received from persons who reviewed the Draft EIR and shall prepare a written response. The Lead Agency shall respond to comments raising significant environmental issues received during the noticed comment period and any extensions and may respond to late comments;

b) The Lead Agency shall provide a written proposed response, either in a printed copy or in an electronic format, to a public agency on comments made by that public agency at least 10 days prior to certifying an environmental impact report;

c) The written response shall describe the disposition of significant environmental issues raised (e.g., revisions to the proposed project to mitigate anticipated impacts or objections). In particular, the major environmental issues raised when the Lead Agency's position is at variance with recommendations and objections raised in the comments must be addressed in detail giving reasons why specific comments and suggestions were not accepted. There must be good faith, reasoned analysis in response. Conclusory statements unsupported by factual information will not suffice. The level of detail contained in the response, however, may correspond to the level of detail provided in the comment (i.e., responses to general comments may be general). A general response may be appropriate when a comment does not contain or specifically refer to readily available information, or does not explain the relevance of evidence submitted with the comment; and

d) The response to comments may take the form of a revision to the Draft EIR or may be a separate section in the Final EIR. Where the response to comments makes important changes in the information contained in the text of the Draft EIR, the Lead Agency should either:

    1. Revise the text in the body of the EIR; or

    2. Include marginal notes showing that the information is revised in the response to comments.

IRWD has identified individual comments within the comment letters, aside from certain courtesy statements, introductions, and closings, by bracketing and numbering. A copy of each comment letter is included in Appendix B. Brackets delineating the individual comments and a numeric identifier have been added to the right margin of each letter in Appendix B. IRWD's responses to each applicable comment are included in this section. Responses are delineated to match the numeric identifier of each comment letter. In the process of responding to the comments, IRWD made minor revisions to the text of the Draft EIR as shown in this section and in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, of this Final EIR. None of the comments or responses constitute "significant new information", and none of the comments or responses would require recirculation of the Draft EIR pursuant to CEQA Guidelines Section 15088.5. Therefore, this Response to Comments section, the Corrections, Clarifications and Additions to the Draft EIR section, and the Mitigation Monitoring Program section are included as part of this Final EIR along with the Draft EIR for consideration by the IRWD Board of Directors.

Comment Letter 1

Sam Wang, Program Supervisor
South Coast Air Quality Management District
June 6, 2025

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

June 6, 2025

SENT VIA E-MAIL:
sanchezf@irwd.com
Fiona Sanchez, Director of Water Resources
Irvine Ranch Water District
P.O. Box 57000
Irvine, California 92619-7000

Draft Environmental Impact Report (EIR) for
Santiago Creek Dam Improvement Project (Proposed Project)
(SCH No: 2023050097)

South Coast Air Quality Management District (South Coast AQMD) staff appreciate the opportunity to review the above-mentioned document. The Irvine Ranch Water District is the California Environmental Quality Act (CEQA) Lead Agency for the Proposed Project. To provide context, South Coast AQMD staff has provided a brief summary of the project information and prepared the following comments which are organized by topic of concern.

Summary of Proposed Project Information in the Draft EIR

Based on the Draft EIR, the Proposed Project proposes to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities and to modify the embankment to permit operation of the facilities for a long-term water resource benefit. The Project includes construction of a new inlet/outlet works, including an inclined inlet/outlet structure, intake riser pipelines and platforms, bifurcation valve vault, emergency outlet pipeline, and emergency outlet valve vault. The existing spillway would be replaced with a new side-channel spillway, and a portion of the Irvine Lake pipeline would be upsized and relocated to below ground beneath the proposed spillway structure. The Project includes improvements to the dam crest, removing the dam face, installing a filter drain system within new embankment shell material, widening the dam crest, raising the elevation of the dam crest by up to one foot, and installing protective railings. Ancillary site improvements are also proposed for the Project, including a new inlet/outlet access roadway, spillway bridge, dam control building, and emergency access walkway and stairs. The Project also includes raising the spillway by six feet to approximately 797.9 feet, which is two feet higher than the existing maximum water storage elevation with the flashboards installed. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow for storage of an additional approximately 1,600 acre-feet of water.

Based on a review of aerial photographs, South Coast AQMD staff found that the nearest sensitive receptor (e.g., residential development) is located about 1.8 miles to the west of the Proposed Project site.

Construction of the Proposed Project is anticipated to occur in Fall 2027 and lasts for 4 years.

The Proposed Project is located on the at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. The Proposed Project site is located south of State Route 261 and east of State Route 241 and Santiago Canyon Road.

South Coast AQMD Comments

South Coast *AQMD Air Permits and Role as a Responsible Agency*

1-1

If implementation of the Proposed Project would require the use of new stationary and portable sources, including but not limited to emergency generators, fire water pumps, boilers, etc., air permits from South Coast AQMD will be required. The Final EIR, should include a discussion about the potentially applicable rules that the Proposed Project needs to comply with. Those rules may include, for example, Rule 201 – Permit to Construct,[1] Rule 203 – Permit to Operate,[2] Rule 401 – Visible Emissions,[3] Rule 402 – Nuisance,[4] Rule 403 – Fugitive Dust,[5] Rule 1110.2 – Emissions from Gaseous and Liquid Fueled Engines,[6] Rule 1113 – Architectural Coating,[7] Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil,[8] Rule 1179 – Publicly Owned Treatment Works Operations,[9] Regulation XIII – New Source Review,[10] Rule 1401 – New Source Review of Toxic Air Contaminants,[11] Rule 1466 – Control of Particulate Emissions from Soils with Toxic Air Contaminants,[12] Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines,[13] etc. It is important to note that when air permits from South Coast AQMD are required, the role of South Coast AQMD would change from a Commenting Agency to a Responsible Agency under CEQA. In addition, if South Coast AQMD is identified as a Responsible Agency, per CEQA Guidelines Sections 15086, the Lead Agency is required to consult with South Coast AQMD.

CEQA Guidelines Section 15096 sets forth specific procedures for a Responsible Agency, including making a decision on the adequacy of the CEQA document for use as part of the process for conducting a review of the Proposed Project and issuing discretionary approvals. Moreover, it is important to note that if a Responsible Agency determines that a CEQA document is not adequate to rely upon for its discretionary approvals, the Responsible Agency must take further actions listed in CEQA Guideline Section 15096(e), which could have the effect of delaying the implementation of the Proposed Project. In its role as CEQA Responsible Agency, the South Coast AQMD is obligated to ensure that the CEQA document prepared for this Proposed Project contains a sufficient project description and analysis to be relied upon in order to issue any discretionary approvals that may be needed for air permits.

[1] South Coast AQMD. Rule 201 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-ii/rule-201.pdf
[2] South Coast AQMD. Rule 203 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-ii/rule-203.pdf
[3] South Coast AQMD. Rule 401 available at: https://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-401.pdf
[4] South Coast AQMD. Rule 402 available at: https://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-402.pdf
[5] South Coast AQMD. Rule 403 available at: https://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403
[6] South Coast AQMD. Rule 1110.2 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1110_2.pdf
[7] South Coast AQMD. Rule 1113 available at https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf
[8] South Coast AQMD. Rule 1166 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1166.pdf
[9] South Coast AQMD. Rule 1179 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1179.pdf
[10] South Coast AQMD. Regulation XIII available at: https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/regulation-xiii
[11] South Coast AQMD. Rule 1401 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-xiv/rule-1401.pdf
[12] South Coast AQMD. Rule 1466 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-xiv/rule-1466.pdf
[13] South Coast AQMD. Rule 1470 available at: https://www.aqmd.gov/docs/default-source/rule-book/reg-xiv/rule-1470.pdf

For these reasons, the final CEQA document should be revised to include a discussion about any and all new stationary and portable equipment requiring South Coast AQMD air permits, provide the evaluation of their air quality and greenhouse gas impacts, and identify South Coast AQMD as a Responsible Agency for the Proposed Project as this information will be relied upon as the basis for the permit conditions and emission limits for the air permit(s). Please contact South Coast AQMD's Engineering and Permitting staff at (909) 396-3385 for questions regarding what types of equipment would require air permits. For more general information on permits, please visit South Coast AQMD's webpage at https://www.aqmd.gov/home/permits. 1-2

Conclusion

As set forth in California Public Resources Code Section 21092.5(a) and CEQA Guidelines Section 15088(a-b), the Lead Agency shall evaluate comments from public agencies on the environmental issues and prepare a written response at least 10 days prior to certifying the Final EIR. As such, please provide South Coast AQMD written responses to all comments contained herein at least 10 days prior to the certification of the Final EIR. In addition, as provided by CEQA Guidelines Section 15088(c), if the Lead Agency's position is at variance with recommendations provided in this comment letter, detailed reasons supported by substantial evidence in the record to explain why specific comments and suggestions are not accepted must be provided. 1-3

Thank you for the opportunity to provide comments. South Coast AQMD staff is available to work with the Lead Agency to address any air quality questions that may arise from this comment letter. Please contact Zoya Banan., Ph.D., Air Quality Specialist, at ZBanan@aqmd.gov should you have any questions.

Sincerely,

Sam Wang

Sam Wang
Program Supervisor, CEQA IGR
Planning, Rule Development & Implementation

SW:ZB

ORC250502-05
Control Number

Response to Comment Letter 1

Sam Wang, Program Supervisor
South Coast Air Quality Management District
June 6, 2025

Response 1-1

The commenter notes that if implementation of the proposed Project would require stationary and portable sources, including but not limited to emergency generators, fire water pumps, boilers, etc., air permits from South Coast Air Quality Management District (SCAQMD) would be required. While the comment is noted, the Project does not propose the use of new stationary and/or portable sources requiring SCAQMD permits.

The commenter also stated that the Final EIR should include a discussion about the potentially-applicable rules with which the Proposed Project must comply. As discussed in Section 4.2, Air Quality, of the Draft EIR, "The Project will be required to comply with existing SCAQMD rules for the reduction of fugitive dust and criteria pollutant emissions". Section 4.2, Air Quality specifically states that Rule 402, Nuisance, and Rule 403, Fugitive Dust, are most applicable. As discussed below, additional language has been added to Section 4.2, Air Quality.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.2, Air Quality, Page 4.2-10

> The Project will be required to comply with **all applicable** existing SCAQMD rules, **including those** for the reduction of fugitive dust and criteria pollutant emissions. The following rules are most relevant to the proposed Project:

Response 1-2

The commenter states that, in light of the prior comments, the final CEQA document should be revised to include a discussion about any and all new stationary and portable equipment requiring SCAQMD air permits, provide the evaluation of their air quality and greenhouse gas impacts, and identify SCAQMD as a Responsible Agency for the Proposed Project because this information would be relied upon as the basis for the permit conditions and emission limits for the air permit. As discussed in Response 1-1, the Project does not propose the use of new stationary and/or portable sources requiring SCAQMD permits.

Response 1-3

The commenter states that, as set forth in California Public Resources Code Section 21092.5(a) and CEQA Guidelines Section 15088(a-b), the Lead Agency shall evaluate comments from public agencies on the environmental issues and prepare a written response at least 10 days prior to certifying the Final EIR. The comment is noted and SCAQMD would be provided with written responses at least 10 days prior to certifying the Final EIR.

Comment Letter 2

Virginia Gomez, Senior Planner
County of Orange
June 11, 2025

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

County Administration South
601 North Ross Street
Santa Ana, CA 92701

P.O. Box 4048
Santa Ana, CA 92702

(714) 667-8800

info@ocpw.ocgov.com

OCPublicWorks.com

Administrative Services

OC Development Services

OC Facilities Design & Construction Management

OC Facilities Maintenance & CUF

OC Fleet Services

OC Construction

OC Environmental Resources

OC Operations & Maintenance

OC Infrastructure Programs

OC Survey

ORANGE COUNTY OC Public Works

June 11, 2025

Attn: Fiona Sanchez, Director of Water Resources
Irvine Ranch Water District
Water Resources & Policy Department
P.O. Box 57000
Irvine, CA 92619-7000

Subject: NCL-25-0003 – Notice of Availability of a Draft Environmental Impact Report (SCH No. 2023050097) for the Santiago Creek Dam Improvement Project

Dear Ms. Fiona Sanchez,

Thank you for the opportunity to comment on the Notice of Availability of a Draft Environmental Impact Report (EIR) (SCH No. 2023050097) for the Santiago Creek Dam Improvement Project. The County offers the following comments:

OC Infrastructure Programs – Flood Programs:

1. Section 4.9.3: While the report briefly mentions that a potential failure of the Santiago Creek Dam may lead to a sequential failure at the downstream Villa Park Dam, there is no other discussion in this report of how this situation could be mitigated or the probability that this scenario could occur during the construction period. Reduced capacity in the Santiago Reservoir during construction can affect the peak flows passed from the reservoir to Villa Park Dam. The County's Hydrology Reports for Santiago Creek and Villa Park Dam rely on Santiago Reservoir reducing the peak flows from Upper Santiago Creek during a 100-year storm event. The EIR needs to provide discussion on the impacts to the downstream Villa Park Dam since capacity in the Santiago Reservoir is expected to be reduced during construction. Would the proposed diversion system be able to pass similar peak flows from a 100-year event downstream or is there expected to be an increase?	2-1
2. The detailed hydrology and hydraulic analyses referenced should be included as attachments or appendices to support the information being requested in the EIR report above. The County has reviewed and recently added comments to those documents that have information that would be applicable to include in the body/text of this EIR.	2-2
3. Notifications to Orange County Flood Control District (OCFCD) on the timing, magnitude, and durations of discharges into its channels and facilities should be made in advance and per the County's Discharge Notification Application. Orange County Public Works (OCPW) needs to ensure that Villa Park Dam can manage and contain any additional discharge from the Santiago reservoir into this facility.	2-3

OC Waste & Recycling (OCWR):

The Closed Santiago Canyon Landfill is located immediately adjacent to the project boundaries. The 112.5-acre Santiago Canyon Closed Landfill, which contains buried	2-4

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

municipal solid waste, is owned by OCWR and was actively operated from 1968 – 1993, with reduced operations for an additional three years. The Closed Santiago Canyon Landfill ceased accepting waste in mid-1996 but continues to be maintained and monitored by OCWR to protect public health and safety. OCWR continues to routinely maintain landfill cover; landfill gas collection, monitoring and destruction systems; and monitor ground and surface water quality. 2-4 cont.

Proximity to Landfill

Proposed spillway replacement, access road/ ramp and retaining wall, emergency access walkway and stairway, and stilling basin – The project proponent specifies demolition of the existing spillway and replacement with a new side-channel spillway in a rock cut on the left abutment of the dam (immediately adjacent to the landfill flare facility); a new access road and ramp to provide vehicle access to the new inclined/outlet structure necessitating a shotcrete tie-back retaining wall to cut the roadway into the existing slope; and a new emergency access walkway and stair system to provide access to the inlet/outlet structure and dam crest from the adjacent Closed Santiago Canyon Landfill during a reservoir spillway event. 2-5

These proposed facilities may pose an impact to the Closed Santiago Canyon Landfill. Overall, the project may interfere with OCWR's ability to comply with the forementioned landfill post-closure maintenance and monitoring activities mandated by environmental regulations.

1. *Potential Impacts to Groundwater & Groundwater Monitoring System at the Closed Santiago Canyon Landfill* – The proposed project has the potential to introduce sources of water pollutants that could have the potential to interfere with ground and surface water quality regulatory compliance OCWR maintains a system of groundwater monitoring wells in and surrounding the property limits of Santiago Canyon Closed Landfill. The draft EIR should evaluate potential impacts to groundwater from relocation of the spillway and revised stream course. Increased water releases or changes in flow direction that could result in additional impacts to the landfill's groundwater monitoring system. In addition, permanent and temporary project impacts must avoid disturbance to ground water monitoring wells and extraction wells and allow OCWR access for as-needed maintenance and monitoring to the ground water monitoring system. Protections such as orange snow fencing and silt fencing should be utilized to prevent any effects from permanent impacts occurring in very close proximity to monitoring well MW-A near the proposed stilling basin, monitoring well MW-10 near the proposed emergency access stairs, and monitoring well MW-15 near the proposed tie-back retaining wall. Similar fencing should be utilized for proposed temporary impacts which may affect MW-U, MW-X, MW-6, MW-8, MW-9, MW-11, MW-12, MW-12a, MW-14, EW-1, EW-2, EW-3, EW-4, and EW-5. These listed monitoring and extraction wells should be clearly identified on the proposed construction design for avoidance and protection. Refer to the attached Santiago Canyon Landfill Dam Reservoir Improvement Impacts Map (Exhibit A) that displays potentially impacted landfill infrastructure. Mitigation measures should be required to provide avoidance and protections for the landfill's ground water and ground water monitoring system. If avoidance measures are not feasible, Irvine Ranch Water District (IRWD) may propose relocation of impacted ground water monitoring wells, at IRWD's cost, and with the approval of California Regional Water Quality Control Board – Santa Ana Region. 2-6

2. *Potential Impacts to the Integrity of the Closed Santiago Canyon Landfill Waste Prism and Cover* – The draft EIR should analyze any potential damage that will result to the waste prism and landfill cover as a result of excavation activities. Secondary impacts to the closed landfill associated with geotechnical 2-7

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

stability, landslide, soil expansion and liquefaction potential, runoff and erosion should be analyzed. Mitigation measures should be required to protect the integrity of the closed landfill cover. 2-7 cont.

3. *Potential Impacts to Landfill Gas Monitoring System at the Closed Santiago Canyon Landfill* – OCWR maintains a system of gas monitoring probes to monitor landfill gas migration. Gas probes are located on and within the immediate vicinity of the landfill property. Permanent and temporary project impacts must avoid disturbance to the landfill gas infrastructure. Protections such as orange snow fencing and silt fencing should be utilized to prevent any permanent impacts occurring in very close proximity to gas probe MP-15, near the proposed tie-back retaining wall. Proposed temporary impacts on the landfill must allow OCWR access to perform as-needed maintenance and monitoring to the landfill gas monitoring system, specifically gas probe MP-14. Mitigation measures should be required to provide avoidance and protections for the landfill's gas monitoring system. If avoidance measures are not feasible, IRWD may propose relocation of impacted gas probes, at IRWD's cost, and with the approval of the County of Orange Health Care Agency/Local Enforcement Agency. 2-8

4. *Potential Impacts to Landfill Gas Collection System and Flare Facility at the Closed Santiago Canyon Landfill* – OCWR maintains a gas collection system consisting of above ground and below ground gas lines and a flare facility. Temporary impacts are proposed to affect the eastern portion of the flare facility and may interrupt the function of this facility. Project Construction should not prevent access to the flare facility and its immediate perimeter road at any time, this includes interruption of electricity and access to electrical panels throughout the landfill, specifically an electrical panel near MW-10 near the proposed emergency access stairs. Mitigation measures should be required to provide avoidance and prevent interruption or disturbance to the landfill gas collection system and flare facility. 2-9

5. *Potential Impacts to Landfill Stormwater Quality Control Basins at the Closed Santiago Canyon Landfill* – OCWR maintains two stormwater quality detention basins. The draft EIR should evaluate uninterrupted function of the detention basins. Temporary impacts may potentially affect access to these two basins and OCWR must be provided access for as-needed maintenance and monitoring of detention basins, including silt removal and post rain event inspections. 2-10

6. *Potential Impacts to Public Services at the Closed Santiago Canyon Landfill* - There could be a potential impact to public services if the stability of the landfill, the landfill cover, or landfill gas collection system are compromised. 2-11

7. *Access through the Landfill* – Any access through the landfill property as part of construction of the project or to utilize the new emergency access walkway via the landfill should be coordinated directly with OCWR and in accordance with a proposed easement. 2-12

Habitat Protection

8. The draft EIR provides a thorough biological analysis with proposed habitat restoration for coastal sage scrub habitat and several protected species as listed in MM BIO-1A, MM BIO-1B, MM BIO-2A, MM BIO-3, MM BIO-4, and MM BIO-8. Proposed habitat restoration sites, in particular Restoration Site G, should not occur within the Santiago Canyon Closed Landfill property boundary. In addition, habitat restoration should not occur near monitoring wells MW-A, MW-X, and MW-11 on OC Parks property, as habitat restoration may severely restrict post closure landfill maintenance, monitoring, and regulatory compliance. 2-13

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

OC Parks:

General Comments

1. Clarification is needed on exactly how the project area is defined and if County and or OC Parks property are included as part of the 'project area' since construction-related activity is proposed on OC Parks property per the reimbursement agreement.
    - Exhibit of the project area including underlying parcel numbers and ownership would be beneficial.

2-14

2. Clarification is needed on where the easements proposed on OC Parks property by IRWD fall within the project area as currently defined by the draft EIR.
    - Understanding impacts associated with the proposed easements on OC Parks property is needed for evaluating easement requests.

2-15

3. Clarification is needed on the temporary and permanent impacts associated with the temporary domestic water pipeline scope of work.

2-16

4. Limestone Canyon is listed multiple times as the nearest Open Space facility; however, Fremont Canyon Nature Preserve and Saddleback Wilderness directly abut the spillway, and Red Rock Wilderness borders Irvine Lake to the south. OC Parks requests clarification on project impacts to these areas.

2-17

5. On pages 2-11, 3-1, 4.1-4, 4.3-17, 4.3-26, 4.8-5, 4.10-6, 4.13-5, 4.13-8, and 4.17-6, 'Limestone Canyon Regional Park' is referenced, but there is not a Limestone Canyon Regional Park. Please clarify if the reference should be Limestone Canyon Nature Preserve, which is a part of OC Parks' Irvine Ranch Open Space.

2-18

6. Page 4.3-17 Physical Environmental Setting: 'Limestone Canyon Regional Park' is part of Irvine Ranch Open Space and is not referred to as a regional park. Please confirm if you are referring to Limestone Canyon Nature Preserve.

2-19

7. Table 3-3 'Discretionary Permit or Approvals Required' table is missing 'easements' and 'licenses' needed from the County.

2-20

8. Access: More information is needed for OC Parks to better understand impacts to Haul Road, Fremont Canyon Staging Area, and the Dam Road behind the spillway, all located on OC Parks property. Haul and Dam Roads are used for public access and as a critical emergency access route for OC Parks.

2-21

9. Section 3.12 Construction Detail Construction Access and Staging page 3-12: The secondary staging area as described in this section and in Exhibit 3-18 shows an impact to the Dam Road. This is a critical artery for OC Parks staff, including OC Parks Park Rangers performing incident response duties, as well as numerous other agencies and contractors to access OC Parks property in Fremont Canyon Nature Preserve. Moreover, it is an access point into Fremont from the Fremont Canyon Staging Area for public programs. Continuous access through that area needs to be maintained and clarified in the project description.

2-22

10. Emergency Access Walkway and Stairs page 3-9: it is stated that "The primary emergency access route during a reservoir spill event would be from the adjacent closed Santiago Canyon Landfill Facility." Please clarify if this emergency access route also goes through OC Parks property. If it does, OC Parks needs to better understand any potential impacts associated with the proposed emergency access route.

2-23

Biological Resources

11. Clarification is needed on whether the Biological Study Area (BSA) is limited to IRWD-owned property or if it includes surrounding OC Parks property as well.
    - An exhibit of the BSA that includes the underlying parcel numbers and ownership would be useful.

2-24

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

12. Any replacement of trees removed as part of the project, as well as any off-site mitigation (short- or long-term) required as part of the Project shall occur on IRWD-property unless a separate agreement with OC Parks has been entered into for off-site mitigation occurring on OC Parks property. 2-25

13. Night lighting and noise during nighttime project construction activities within the OC Parks open space areas could be of concern. Please clarify what the construction work schedule is anticipated to be, the duration of any nighttime construction, whether generators for the lighting will be used, and how impacts will be mitigated. 2-26

14. 2.3.4 Section of Bio Technical Report: Western Spadefoot focused survey report is unavailable for review as part of review of the draft EIR. Please provide the focused survey report for OC Parks' review once it is available and confirm whether the results of the focused survey report impact the analysis in the draft EIR. 2-27
    - Please also provide copies of any other reports currently unavailable as part of the draft EIR public review process.

15. Page 4.3-26: "OC Regional Parks" should be changed to 'OC Parks' as the areas surrounding the BSA are not limited to OC Parks regional parks. 2-28

16. Table 4.3-5 Vegetation Acreage Impacts of the Project: Please clarify where the permanent and temporary impacts and associated acreages are occurring in relation to OC Parks property. 2-29

17. Mitigation Measure (MM) BIO-1A: In addition to notifying and allowing the Natural Communities Coalition (NCC) to collect seed and/or salvage special status plants that will be impacted by the Project, OC Parks formally requests to also be notified and allowed to collect and/or salvage special status plants that will be impacted by the Project and that seed collection/salvage be coordinated with OC Parks as well. 2-30

18. Project Design Feature (PDF) BIO-9: OC Parks formally requests copies of the monthly surveys to be conducted by IRWD for non-native invasive plant species on the OC Parks target list. 2-31

19. MM BIO-3: OC Parks requests a copy of the draft Habitat Mitigation and Monitoring Plan (HMMP) for review and approval (if mitigation is proposed on OC Parks property) prior to submitting to the resource agencies. 2-32

20. PDF BIO-6 Speed Limit During Construction: Clarify PDF to specify that if there is travel on access roads located on OC Parks property, the speed limit observed shall be consistent with OC Parks regulations (limited to 10 MPH for Dam Road, 25 MPH for Haul Road). 2-33

Recreation Section

21. Table 4.13-2: Saddleback Motocross Park closed in 1984. The former location is now an OC Parks facility that opened in 2023 as 'Saddleback Wilderness.' 2-34
    - Similar to Oak Canyon Park being leased from OC Parks, Orange County Modelers Association (OCMA) also operates via a license from OC Parks for model aircraft flying on OC Parks-owned land. Please update the text accordingly.

22. Page 4.13-8: Temporary Construction Impacts paragraph states, "The nearest public recreational facilities to the proposed Project include Oak Canyon Park, Saddleback Motocross Park, Irvine Regional Park, OCMA flying site, Fremont Canyon Nature Preserve, Black Star Canyon Wilderness Park, Limestone Canyon Regional Park, and Peters Canyon Regional Park" however, Oak Canyon Park is a private park. Additionally, Fremont Canyon Nature Preserve, Black Star Canyon Wilderness Park, and Limestone Canyon Regional Park are not operated as separate parks and should be listed as Irvine Ranch Open Space as described in Table 4.13-2. 2-35

23. Construction Detail page 3-13: this section states that grading operations shall be curtailed during high wind conditions in accordance with applicable South Coast Air Quality Management District (SCAQMD) rules and regulations. OC Parks formally requests that grading operations be ceased altogether during high wind events due to the increased wildland fire risk in this area. 2-36

601 North Ross Street, Santa Ana, CA 92701 www.OCPublicWorks.com
P.O. Box 4048, Santa Ana, CA 92702-4048 (714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

- OC Parks also requests that IRWD consult with the local fire agency for grading best practices within wildland areas and include such practices as part of the project construction. 2-36 cont.

24. Noise Exposure at Nearby Park Uses page 4.11-13: States: "The nearest parks located proximate to the Project's construction activities include Oak Canyon Park, Irvine Lake, and Irvine Regional Park." However, the closest park areas are Fremont Canyon Nature Preserve, Red Rock Wilderness, and Saddleback Wilderness. Please clarify if noise impacts to these areas were considered. 2-37

25. Fire Protection page 4.12-5: OCFA Station 8 is listed however, Stations 14, 15, and 16 may be closer than Station 8. OC Parks recommends that IRWD consult and engage the proper fire protection agency to confirm closest station. 2-38

26. Table 4.13-1 OC Parks Facilities: Irvine Ranch Open Space is listed as six miles away from the site boundary; however, please be aware that the project site is surrounded entirely by the Irvine Ranch Open Space. 2-39

27. 4.13.5 Impact Analysis Threshold 4.13-1 Temporary Construction Impacts page 4.13-8: OC Parks has concerns related to temporary construction impacts on recreation and it is unclear how these impacts will be mitigated. Shoreline fishing will be the most impacted by the project, and neighboring parks may not have sufficient shoreline space or fish stocking to supplement the loss of the shoreline fishing activity. Additionally, if hiking, biking, and equestrian programs are disrupted at the Fremont Staging Area and consequently, Fremont Canyon Nature Preserve, OC Parks has concerns that nearby open space properties may not be able to accommodate those programs due to managed access land restrictions. 2-40

28. Threshold 4.13-2 page 4.13-9: The draft EIR states "No impacts related to demand or use of recreational facilities would occur, and no mitigation is required." This project will have an impact on OC Parks recreational facilities included in the project footprint, including fishing at Irvine Lake, and public access from Fremont Staging Area into Fremont Canyon Nature Preserve via the Dam Road, as well as the increased traffic impact to the OCMA leased area. 2-41
    - Clarification is needed on any potential permanent or temporary impacts on OC Parks property and/or OC Parks operations resulting from the above.

29. 4.14.5 Impact Analysis Threshold 4.14-1 page 4.14-6: The draft EIR states "Additionally, the proposed Project does not involve any activities that would conflict with non-vehicular modes of transportation. Impacts would be less than significant, and no mitigation is required." OC Parks anticipates the proposed secondary staging area on the Dam Road would impact public biking and pedestrian activities, as well as an access road for OC Parks staff, contractors, and other agencies' access to Fremont Canyon Nature Preserve. 2-42
    - Clarification is needed on any potential permanent or temporary impacts on OC Parks property and/or OC Parks operations resulting from the above.

30. Thresholds 4.14-4 Would the Project result in inadequate emergency access? page 4.14-7: OC Parks has concerns that access to the Dam and Hall Roads may be impacted by the secondary staging area and increased project traffic along both roads. Haul and Dam Roads are used for public access and as a critical emergency access route for OC Parks and other agencies. 2-43
    - Clarification is needed on any potential permanent or temporary impacts on OC Parks property and/or OC Parks operations resulting from the above.

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

OC Environmental Resources:

1. New development projects that create 10,000 square feet or more of impervious surface require the development of a Water Quality Management Plan (WQMP). Specific mention should be made of whether the project qualifies as a Priority Development Project under the County's municipal stormwater permit (Santa Ana Regional Board Order R8-2009-0030), or as a Non-Priority Project which would require preparation of a Non-Priority Water Quality Project Plan. 2-44
2. The draft EIR identifies and discusses surface water beneficial uses for Irvine Lake. The draft EIR should also identify and discuss surface water beneficial uses for Santiago Creek, located downstream of the project location. 2-45
3. Exhibit 3-10, titled Conceptual Emergency Outlet Pipe Plan and Profile, shows a vegetated swale and infiltration trench adjacent to the proposed emergency outlet basin, however, no information regarding these structures was found in the draft EIR narrative. Additional information should be included in the draft EIR narrative regarding these structures, particularly if they are associated with a project specific Water Quality Management Plan. 2-46
4. Section 3.9 and 4.9.1 reference the need for dewatering of the lake and groundwater to complete construction. It should be noted that the project would need to obtain coverage under Order R8-2020-0006 for the proposed dewatering activities. 2-47
5. Table 3.3 lists discretionary permit/approvals potentially required for the project. Suggest including the following under the "State Water Resources Control Board; Regional Water Quality Control Board" section: 2-48
   - Santa Ana Regional Water Quality Control Board Order R9-2009-0030
   - General Water Discharge Requirements for Discharges That Pose an Insignificant (De Minimis) Threat to Water Quality, Order No. R8-2020-0006
   - General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, Order No. WQ 2022-0057-DWQ.
6. OC Environmental Resources currently owns and operates the following hydrologic equipment within the project construction area: a rain gauge, water level gauge, and bubbler line that stretches to the lake, located on the bridge above the spillway. The Contractor for the dam improvements and IRWD, will need to coordinate with OC Environmental Resources to plan to retrieve or protect the monitoring equipment prior to or during construction. 2-49

OC Infrastructure Programs – Regulatory Permitting:

1. OCPW was contacted by IRWD last year to see if the County would store the water released from the Irvine Dam in Villa Park Dam. This has not been analyzed in the draft EIR and given that the Villa Park Dam is managed to be generally free draining, the expansive riparian woodland that has established in the basin invert would be devastated by a prolonged period of inundation. If IRWD is proposing to store water in Villa Park Dam then this needs to be analyzed in the draft EIR as this would double the environmental impacts of the project. 2-50

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

OC Development Services:

1. OCPW provided comments on the Notice of Preparation (NOP) of a Draft EIR on June 5, 2023. Please confirm that all comments provided for the NOP were also addressed in addition to the comments provided in this letter for the draft EIR. Attached for your reference, is a copy of the previous comment letter (Exhibit B). 2-51

Thank you again for the opportunity to review the draft EIR. If you have any questions regarding these comments, please contact Nick Zamarripa at (714) 647-3985 for OC Infrastructure Programs – Flood Programs, Leila Barker at (714) 834-4013 for OC Waste & Recycling, Cynthia Malko at (949) 923-3796 for OC Parks, Matt Tucker at (714) 955-0669 for OC Environmental Resources, Giles Matthews at (714) 647-3933 for OC Infrastructure Programs – Regulatory Permitting, or Virginia Gomez at (714) 667-1614 for OC Development Services.

Please continue to keep the County of Orange on the distribution list for future notifications related to the Project.

Sincerely,

DocuSigned by:
Virginia Gomez
ED76DCA58AD94B6...

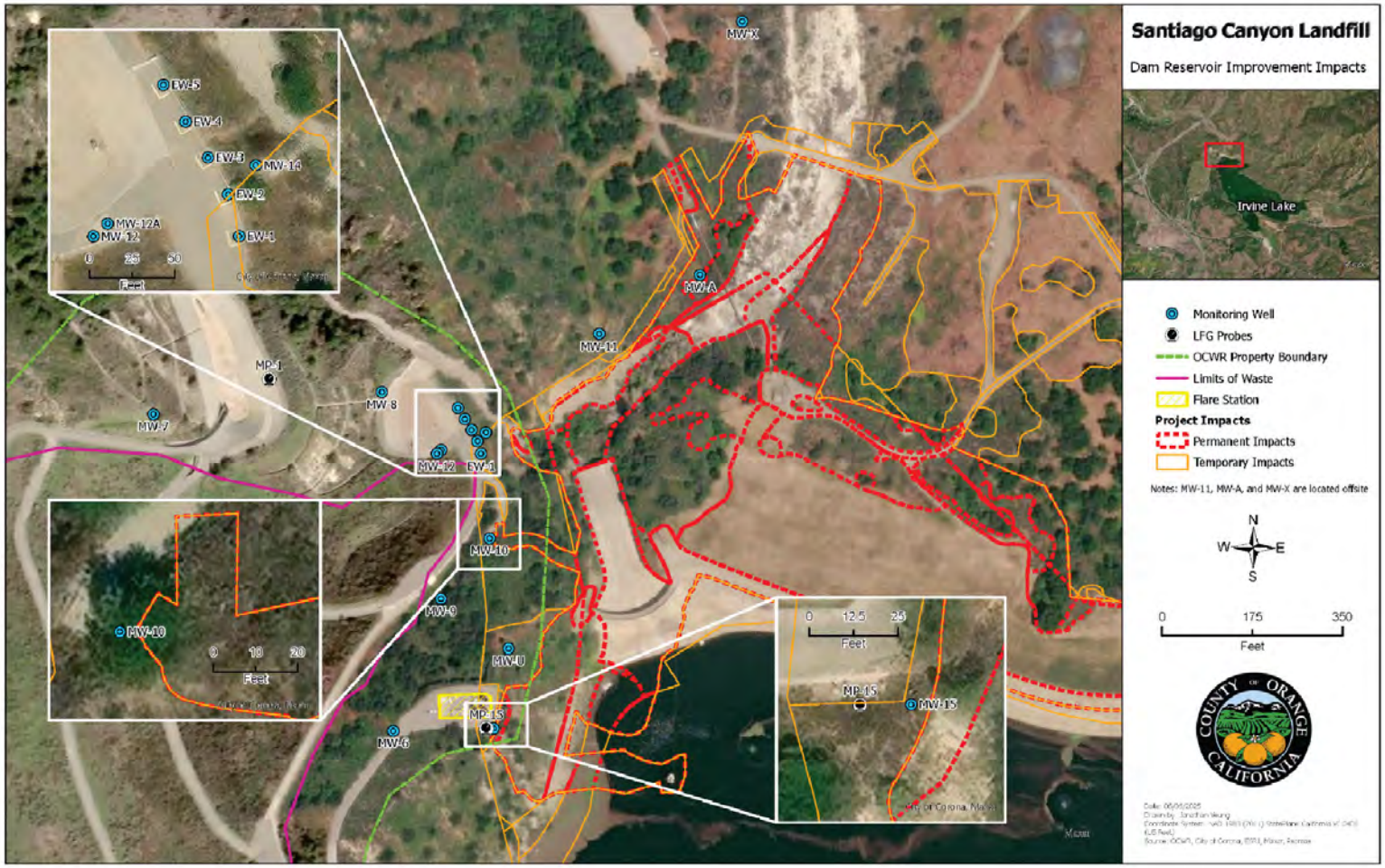
Virginia Gomez, Senior Planner
OC Public Works /OC Development Services
601 North Ross Street
Santa Ana, California 92701
Virginia.Gomez@ocpw.ocgov.com

cc: Cindy Salazar, Planning Division Manager, OC Development Services
Giatho Tran, Senior Civil Engineer, OC Infrastructure Programs
Nick Zamarripa, Civil Engineer, OC Infrastructure Programs
Giles Matthews, Regulatory Permitting Manager, OC Infrastructure Programs
Leila Barker, CEQA & Habitat Program Manager, OC Waste & Recycling
Brian Kurnow, Entitlement Division Manager, OC Parks
Cynthia Malko, Entitlement Project Manager, OC Parks
Tracy Ingebrigtsen, Countywide Compliance Manager, OC Environmental Resources
Matt Tucker, ERS II,OC Environmental Resources

Exhibit A – Santiago Canyon Landfill Dam Reservoir Improvement Impacts Map
Exhibit B – OCPW Notice of Preparation Comment Letter – June 5, 2023

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DB8C0AB179

Exhibit A



Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

Exhibit B

County Administration South
601 North Ross Street
Santa Ana, CA 92701

P.O. Box 4048
Santa Ana, CA 92702

(714) 667-8800

info@ocpw.ocgov.com

OCPublicWorks.com

Administrative Services

OC Development Services

OC Facilities Design & Construction Management

OC Facilities Maintenance & CUF

OC Fleet Services

OC Construction

OC Environmental Resources

OC Operations & Maintenance

OC Infrastructure Programs

OC Survey

2-51 cont.

June 5, 2023

Andy Uk
Environmental Compliance Analyst
Irvine Ranch Water District Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, CA 92618

Subject: Notice of Preparation and Initial Study for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report

Dear Andy Uk,

Thank you for the opportunity to comment on the Initial Study (IS) for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report (EIR). The County offers the following comments for your consideration.

OC Infrastructure/Traffic Engineering

1. Please provide a timeline for the proposed project (start year, end year, major points, etc.).

2. Page 13, Exhibit 3, of the IS, the project's proposed work and construction seems to extend outside Irvine Ranch Water District (IRWD) property line and into Unincorporated County of Orange jurisdiction. Confirm that has this been approved and permitted.

3. Page 23 of the IS, the project will potentially have a significant impact on inadequate emergency access. Will the proposed project be presented to the Orange County Fire Authority (OCFA) for approval?

4. Will Santiago Canyon Road be the primary road for construction workers and management to access the project? If so, please provide a traffic impact analysis/study to OC Traffic Engineering for review.

5. In the traffic impact analysis/study, please account for any changes in Level Of Service and Vehicle Miles Traveled within County roadway segments and intersections. Orange County's roadways are adjacent to the project site and should be considered.

6. County of Orange has a Capital Improvement Project (CIP) on Santiago Canyon Road planned construction for Fiscal Year 2025-2026. Will the project conflict with County of Orange's CIP? Please contact Sonica Kohli (714- 647-3910,

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

Sonica.Kohli@ocpw.ocgov.com) for more information regarding the County CIP project.

OC Flood Programs/Floodplain Management

1. Page 3-12, Section IX. Hydrology and Water Quality, Impact Analysis, Item C-i to C-iii is to analyze if the proposed project will alter the existing drainage pattern in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner in which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

   The response provided in the IS has categorized the impact as "Potentially Significant." However, the explanation provided in this section discusses potential impacts related to groundwater supplies and groundwater recharge. The IS does not adequately address the potential impacts to the existing drainage pattern, potential for erosion, or impacts to existing or planned stormwater drainage systems. Further details shall also be provided if the change of the outlet tower will alter the existing maximum discharge from Irvine Lake, and if there would be any impacts downstream.

2. The project should provide a detailed hydrology and hydraulic analysis for Orange County Public Works (OCPW) to review as this project would have impact to downstream facilities, especially Villa Park Dam, which is an OCPW maintained and operated facility.

OC Development Services/Planning

1. Provide a more in-depth project description. Include construction activities (i.e., construction staging and lay-down areas, phasing/construction schedule, on-site and off-site improvements), site improvement (i.e., site plan of area being improved, landscaping plans, signage, walls/fences, vehicular access, parking), and infrastructure characteristics (storm water, access easements, utilities, etc.)

2. Page 3-16, Section XV. Public Services, additional analysis should be included to confirm fire, police, and emergency services can maintain acceptable service ratios, response times, or other performance objectives during the construction phase.

OC Parks

Access Road:

1. Exhibit 3, Site Plan, indicates an access road from Irvine Regional "(Not for Construction)." Clarify whether this access road will be used in conjunction with the project, clarify where access to the project will be taken, and ensure all access points are shown on Exhibit 3.

2. Provide more information on whether access is needed through Irvine Regional Park as that will have an impact on recreation users at the park.

3. Page 1-4, Section 1.4 says "Ancillary site improvements are also proposed for the Project, including a new access road and ramp to provide vehicle access to the new inclined/outlet structure..." Clarify if this new access road is proposed to be on IRWD property or County property. A "proposed" or "new"

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

access road is not marked on the Site Plan. Relatedly, proposed improvements should be marked on the Site Plan/Exhibit.

Hours of Operation:

1. Clarify hours of operation for the project.

Impacts:

1. Page 3-16, Section XIV. Public Services and Section XV. Recreation impacts need to be evaluated in greater detail for potential impacts to the park areas in the vicinity of the Project. Potential impacts to the Recreation Lease Area need to be discussed and included in the evaluation as this is a known future project.

2. Evaluate whether the proposed spillway project will have an impact to future recreation at Irvine Lake as this recreation area is supposed to facilitate shoreline fishing.

3. Page 3-16 Section XV. Recreation states there will be no recreational impacts, but the lake will be drained (no fishing).

4. The draining of the lake and other disruptions caused by the project (noise, dust, construction traffic, etc.) may increase public demand and use of other competing recreational facilities as the public seeks alternate recreational facilities while Irvine Lake is impacted by the project. The following questions need to be addressed and evaluated in the Draft EIR: What alternate recreational facilities can the public use? Will these other facilities be able to support an increase in hikers, fishers, bikers, RVs, etc.? Will these recreational users come back to Irvine Lake when the project is completed? Will interruptions of recreational activities have an adverse physical effect on the environment?

5. Page 1-2, Section 1.2 states that, "The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area." The Project Boundary Map/Exhibit 2, which follows Page 1-2 (Page 10 of the PDF document), shows that the Project Boundary encompasses the County's Recreation Parcel (including our RV Storage Area), and portions of the James License Parcel which offers recreational opportunities.

6. Another consideration is whether impacts to the Orange County Modelers Association (OCMA) model airplane flyer hobby group has been considered. The Draft EIR needs to evaluate if access to the airfield will be impacted. It should also clarify that the group's recreational access will be preserved along Blue Diamond Road during the project as this group is another stakeholder in the area. Clarify whether OCMA has been consulted by IRWD and Serrano Water District regarding this project.

7. There are The Nature Conservancy/OC Parks Foundation conservation easement protections on the north, east and south side of the project area. Draft EIR needs to evaluate whether sound and dust related to the project construction through could impact surrounding habitat and Conservation Easement areas, as well as areas along the truck route. Project has the potential to impact nesting birds in proximity to the project.

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

8. Page 3-10 Section VIII. Hazard and Hazardous Material Section sub-heading "b)" since the lake is used for recreational fishing, the impact on fish/fishing this should be considered with the evaluation of the potential of hazardous materials impacting the reservoir.

9. Page 3-16 Section XIV. Public Services, although this will not result in the provision of new public services, the lake currently is used to provide public recreation (shoreline fishing) and since the project will require draining the reservoir for an extended period this will likely have an impact on public park/recreation services.

10. Page 3-20 Section XIX. Wildfire, although the site is not within a VHFHSV zone, if the reservoir is used for firefighting purposes (water drops), it could have an impact on recreational and habitat areas since the project requires draining the reservoir for an extended period of time.

11. Post-project impacts in the form of invasive weeds brought in or spread via trucks and movement of material that are not apparent for a year or even a few years after project initiation often occurs. This could be remediated by having the project include surveys and weed treatment obligations during and, for a time period, after the project to make sure project impacts post-project are accounted for. Following preventative measures for weed seed spread and requiring surveys, weed treatment, and communication for priority nonnative, invasive species should be included in conditioning for the project. As the project approaches, OC Parks will provide:
    - OC Parks' Best Management Practice guidelines for sanitation practices to prevent invasive weed seed spread.
    - A current list of OC Parks' target invasive species.
    - The OC Parks Integrated Pest Management (IPM) Plan and practices that must be followed for chemical control
    - Training in Calflora to map identified target weed populations and record treatment.
    - An OC Parks contact for communication.

12. Prior to project initiation, OC Parks requests to review detailed plans specific to remediation of temporary habitat impacts, including plant material palettes, installation and maintenance methods and timelines, and success criteria.

13. The Fremont Canyon Staging area is used by OC Parks to launch guided public hikes and is located along the dam road very close to the project area. The project will impact CE recreational values by detracting from user experience via sound, viewshed impacts and maybe dust; however this is a lightly used staging area (scheduled activities occurring about twice a week on average).

14. The Airfield Staging area and the Red Rock Wilderness area will be coming online for public access before or during the Irvine Lake Improvement process (on the south side of Irvine Lake). Analyze potential temporary impacts during construction related to recreational values specific to truck trips along access route and viewshed impacts.

Typographical and Exhibit Edits:

1. Page 1-1 Project Location: Info on surrounding land uses needs to be added; such info is included in the Air Quality Impact Analysis section in c).

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

2. Recreation Lease Area located at the southeastern side of the lake needs to be included as a surrounding land use in the Project Location section.

3. Page 1-2, 4th paragraph in Environmental Setting: "Surrounding land uses...SR-241" move up to after the first paragraph in the Environmental Setting section. Recreation Lease Area as an open space facility also needs to be included.

4. Page 1-2: The Project is within the Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) area.

5. Special Linkage located southeast of the lake –Footnote needed to clarify "Special Linkage".

6. Page 1-3 in Section 1.2 Environmental Setting, the words "fluctuating shoreline" is repeated.

7. Exhibit 2: Label Irvine Lake.

8. Exhibit 3: Label the Recreation Lease Area located at the southeastern side of the lake.

9. Page 1-4: Spell out "ILP" acronym prior to first use of acronym.

10. Page 1-5 in Section 1.5 Construction Activities, in addition to the number of years to complete, should identify the overall estimated frequency of truck trips.

11. Section 3.0 Discussion of Environmental Checklist Questions is missing the section on "Agriculture and Forest Resources" and has modified the numbering sequence (II, III, IV, etc.) for the remaining checklist topics in this section.

OC Waste & Recycling

Proximity to Landfill:

1. Proposed access and retaining wall via the landfill - The Santiago Canyon Closed Landfill is located immediately adjacent to the project boundaries. The project proposes a new access road and ramp to provide vehicle access to the new inclined/outlet structure. The project proponent also specifies that a new shot-crete tie-back retaining wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above. The project also entails a new emergency access walkway connecting to the new access road which would reach the inclined inlet/outlet structure and dam crest from the adjacent landfill facility during a reservoir spill event.
    - The Draft EIR should provide more detail on this project element to determine how the proposed project can be implemented without affecting the landfill.
    - The details of the improvements that have potential to impact the landfill should be clearly marked on a map.
    - There could be a potential impact to public services maintaining the closed landfill (Section XV. Public Services) if the stability of the landfill or any of the slopes is compromised. The IS identifies no impact.

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

- The Draft EIR should provide information that the project would not interfere with Orange County Waste & Recycling's (OCWR) ability to comply with environmental regulations at the landfill.
- Any access through the landfill property as part of construction of the project or to utilize the new access road via the landfill should be coordinated directly with OCWR. The Draft EIR should include additional detail regarding the access through the landfill, including specification of whether vehicle and/or pedestrian access are permanent or temporary access points.

2. Potential Impacts to the Integrity of the Santiago Canyon Closed Landfill Waste Prism and Cover – the Draft EIR should analyze any potential damage that will result to the waste prism and landfill cover as a result of excavation activities. Secondary impacts to the closed landfill associated with geotechnical stability, landslide, soil expansion and liquefaction potential, runoff and erosion should be analyzed. Mitigation measures should be required to protect the integrity of the closed landfill cover.

3. Potential Impacts to Groundwater & Groundwater Monitoring System at the Santiago Canyon Closed Landfill – Per the IS, the proposed project has the potential to introduce sources of water pollutants that would have the potential to interfere with a water quality control plan or sustainable groundwater management plan. OCWR maintains a system of groundwater monitoring wells in and around the Santiago Canyon Closed Landfill. The Draft EIR should evaluate potential impacts to groundwater that could result in additional impacts to the landfill's groundwater monitoring system.

4. Potential Impacts to Landfill Gas Monitoring System at the Santiago Canyon Closed Landfill – OCWR maintains a system of gas monitoring probes to monitor landfill gas and emissions at the Santiago Canyon Closed Landfill. Gas probes occur on and within the immediate vicinity of the landfill property. The Draft EIR should evaluate any potential impacts to interfere with the landfill's probes and gas monitoring system.

Habitat Protection:

1. The Draft EIR should include a thorough, updated biological survey to determine the extent of biological resources on the site and the associated project impacts. In particular, items of concern should include the following:
   - *Sensitive Upland Vegetation Communities* – Areas in and around the Santiago Canyon Closed Landfill contain coastal sage scrub and other sensitive upland vegetation communities. The Draft EIR should include a thorough, updated biological survey to determine the extent of biological resources on the project site and the associated project impacts both on and off the Santiago Canyon Closed Landfill, particularly including any new infrastructure such as the new emergency access walkway and stair designed for access from the landfill property. The Draft EIR should also include the proposed mitigation measures for all project impacts to biological resources and detail compliance with the Orange County Central Coastal NCCP/HCP, as the project lies within NCCP/HCP areas. The Draft EIR should identify the permits that the project applicant will be required to obtain from both federal and state biological regulatory agencies.
   - *Sensitive Wildlife Species* – As suitable habitat for nesting and/or foraging by the California gnatcatcher is known to exist on the closed landfill and along its periphery, a protocol survey

601 North Ross Street, Santa Ana, CA 92701 www.OCPublicWorks.com
P.O. Box 4048, Santa Ana, CA 92702-4048 (714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

for California gnatcatcher should be included as part of the Draft EIR biological resources analysis. The Draft EIR should provide mitigation measures for any impacts to nesting pairs of California gnatcatchers. The Draft EIR biological resources analysis should also identify any other federal- or state-endangered or threatened plant or animal species that may exist on the project site and quantify the impacts that will occur to these sensitive species from project development. Mitigation measures for these impacts should also be included. The Draft EIR should identify the permits that the project applicant will be required to obtain from both federal and state biological regulatory agencies.

OC Environmental Resources

1. Projects that, as part of a common plan of development, disturb one or more acres are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Order 2009-0009-DWQ (and subsequent Order 2022-0057-DWQ) and implement a Storm Water Pollution Prevention Plan (SWPPP) and monitoring program consistent with permit requirements.

2. Specific mention should be made of whether or not the project qualifies as a *Priority Development Project* under the city's municipal stormwater permit (Santa Ana Regional Board Order R8-2009-0030), or instead is a *Non-Priority Project* which would require preparation of a *Non-Priority Water Quality Project Plan*.

3. New development projects that create 10,000 square feet or more of impervious surface require the development of a Water Quality Management Plan (WQMP). Specific mention should be made of applicable city WQMP requirements for projects to comply with their municipal stormwater permits.

4. Specific mention should be made of the Orange County Stormwater Program's Drainage Area Management Plan (DAMP). The DAMP is Orange County's principal policy and program guidance document for stormwater management and includes a 2017 Technical Guidance Document to be followed in preparing the project's WQMP.

5. Specific mention should be made of the potential water quality impacts from the proposed project and identification of the anticipated pollutants to be generated or mobilized by the project should be provided.

6. Note that OC Environmental Resources (OCER) currently owns and operates the following hydrologic equipment within the project construction area: a rain gauge, waterlevel gauge, and bubbler line that stretches to the lake, located on the bridge above the spillway. The eventual dam improvements contractor, IRWD, and OCER should coordinate a plan in advance to either retrieve or protect the monitoring equipment prior to or during construction.

OC Infrastructure Programs/Regulatory Permitting

1. Section XIX. Wildfire Impact Analysis section applies to areas *in or near* very high fire hazard severity zones. According to the Map of CAL FIRE's Fire Hazard Severity Zones in State Responsibility Areas (https://osfm.fire.ca.gov/media/6737/fhszs_map30.pdf) and the Fire Hazard Severity Zones (FHSZ)

601 North Ross Street, Santa Ana, CA 92701
P.O. Box 4048, Santa Ana, CA 92702-4048
www.OCPublicWorks.com
(714) 667-8800 | Info@OCPW.ocgov.com

Docusign Envelope ID: 12777B05-BE98-4B46-9EBE-D7DBBC0AB179

2-51 cont.

viewer (https://egis.fire.ca.gov/FHSZ/), Irvine Lake is a moderate fire hazard severity zone surrounded by very high fire hazard severity zones.

Section XIX. Wildfire lists that there are no impacts, citing the fact that the lake itself is a moderate fire hazard area. However, the adjacent properties are identified as high-risk areas. The evaluation method used may have neglected to consider the adjacent high-risk area, especially considering the recent rains and heavy vegetation growth, which contribute to the risk of wildfire in the area. It would be advisable to re-evaluate this impact and coordinate with the OCFA for their review.

2. The IS identifies that the project will raise the spillway by two feet, increasing the maximum storage capacity of the facility. OCPW is working with the U.S. Army Corps of Engineers (USACE) to address flood risk on the Santiago Creek.

   Has the project proponent worked with OCPW and/or the USACE to investigate how the facility could better function to reduce flood risk downstream and if additional measures could be incorporated into the design to help alleviate flooding? Measures could include further raising the spillway and/or dam structure, strategic sediment removal from within the basin to maintain greater flood capacity, upgrading technology within this and other dam facilities and flow gages in the Santiago Creek to better manage extreme flows in a more integrated manner. If discussions between the project proponent and the USACE/OCPW Santiago Creek flood team have not already taken place, it is recommended that a working group be established to maximize the flood alleviation benefits of this project.

If you have any questions regarding these comments, please contact Cindy Salazar at (714) 667-8870. Please continue to keep the County of Orange on the distribution list for future notifications related to the Project.

Sincerely,

Cindy Salazar

Cindy Salazar, Land Use Manager
OC Public Works /OC Development Services
601 North Ross Street
Santa Ana, California 92701
Cindy.Salazar@ocpw.ocgov.com

cc: Justin Kirk, Deputy Director, OC Development Services
Nardy Khan, PE/PMP, Deputy Director, OC Infrastructure Programs
Brian Kurnow, Interim Planning & Design Division Manager, OC Parks
Aimee Halligan, Habitat Program Manager, OC Waste & Recycling
Tracey Ingebrigtsen CPESC®, QSD/QSP, Countywide Compliance Program Manager, OC Environmental Resources
Giatho Tran, P.E., C.F.M., Senior Civil Engineer, OC Flood Programs
Alison Camara, Civil Engineer, OC Flood Programs
Giles Matthews, Regulatory Permitting Manager, OC Infrastructure Programs
Paul Lee, Civil Engineer, OC Infrastructure Programs
Arturo Cervantes, Senior Planner, OC Development Services
Yuritzy Randle, Associate Planner, OC Development Services

Response to Comment Letter 2

Virginia Gomez, Senior Planner
County of Orange
June 11, 2025

Response 2-1

The commenter states that there is no discussion regarding how a potential failure at Santiago Creek Dam impacting Villa Park Dam could be mitigated or the probability that this scenario could occur during Project construction and asks if the proposed diversion system would be able to pass similar peak flows from a 100-year storm event.

All dams under the jurisdiction of the Division of Safety of Dams (DSOD) require analysis of potential dam failures and the resulting inundation downstream of the dam if a failure were to occur. In the case of Santiago Creek Dam, the inundation analysis includes the potential failure of Villa Park Dam because a sudden release of a full Irvine Lake, however unlikely, would exceed Villa Park Dam's storage capacity, potentially overtopping the dam and potentially leading to a dam failure. These types of sequential failures for dams that are located in series are used to develop worst case inundation scenarios and to develop Emergency Response Plans, pursuant to the requirements of the California Office of Emergency Services.

Each winter season during construction, Santiago Creek Dam would remain a functional dam that can retain water and pass flows through the spillway under emergency conditions. The hydraulic capacity of the existing spillway is approximately 30,000 cubic feet per second (cfs). During construction, the operational strategy of the reservoir would be modified to minimize the volume of stored water behind Santiago Creek Dam and to maximize a dry environment. Under these circumstances, there would be an increase in available capacity to attenuate flows and IRWD would continue to regulate downstream discharge flows during construction. During construction, an increase in flow rates as compared to current operations is not expected, but rather an increase in the duration of consistent discharges to Santiago Creek downstream of Santiago Creek Dam would occur. While the objective is to minimize storage in Irvine Lake during construction of the Project, the possibility remains, as it would under existing baseline conditions, that significant storm events completely fill the reservoir and the spillway would be used to pass flows resulting from storm events.

To limit the amount of water retained behind Santiago Creek Dam and to maintain a predominantly dry environment in the dry season, two modes of water level management would be deployed throughout construction, which are described in Section 3.9, Dewatering and Stream Diversion, of the Draft EIR. One method is a pumped diversion system. The pump diversion system is anticipated to have an approximately 120 cubic feet per second (cfs) flow rate capacity. Another method is by releasing water through the outlet conduit under the dam and through the existing cone valve. The existing cone valve has an approximate discharge flow rate of 250 cfs depending on the water level in Irvine Lake. These two discharge methods may operate together or independently from one another. In addition to the two modes of water level management, ground water discharge flows may intermittently contribute to the total flow rate that is discharged to Santiago Creek. The contribution of groundwater discharges is anticipated to be approximately up to 400 gallons per minute (0.89 cfs) initially and would taper off to less than 100 gallons per minute (0.22 cfs). Therefore, IRWD has taken water level management into consideration throughout the proposed Project construction process and anticipates peak flows would pass through similar to current operations. The anticipated flow rate and duration would also be similar to current operations and planned conditions.

Response 2-2

The commenter is referencing documentation that was prepared separate from the EIR process, and the analyses noted were not referenced during preparation of the Draft EIR. The commenter is referred to Section 4.9, Hydrology and Water Quality, for an analysis of impacts related to hydrology pursuant to the State-defined thresholds of significance under CEQA.

Response 2-3

The commenter states that notifications to OCFCD should be made in advance of discharges into its channels and facilities. Consistent with standard procedures when future discharges or changes to normal operations occur, IRWD would maintain communication with OCFCD and other impacted agencies to alert them of any planned discharges, including those associated with the initial dewatering of the dam.

Response 2-4

The comment provides background information regarding the Santiago Canyon Landfill. The comment is noted, and no response is required.

Response 2-5

The comment states that the Project may interfere with Orange County Waste & Recycling's (OCWR) ability to comply with landfill post-closure maintenance and monitoring activities. The Project includes improvements on County property, excluding the Santiago Landfill property (APN 545-061-11). Project improvements on the landfill property are not anticipated. IRWD and the respective County entities including Orange County Real Estate, OCWR, Orange County Parks, and Orange County Public Works have coordinated with each other and would continue to do so with respect to all aspects of the Project. Regarding Project improvements that may impact the county property surrounding the landfill property, IRWD and OCWR (and the other impacted County departments) are creating a comprehensive easement and reimbursement agreement to address a variety of easement exchanges between IRWD and the County. The proposed easement and reimbursement agreement would include access rights for IRWD through the Santiago Landfill over existing access roads. IRWD and OCWR are also coordinating and closely reviewing with their respective consultants the dam improvements in relation to existing landfill facilities. These coordination activities support OCWR's ability to comply with landfill post-closure maintenance and monitoring activities.

Response 2-6

The commenter states the Project has the potential to introduce sources of water pollutants that could interfere with ground and surface water quality at the landfill. As discussed in Section 4.9, Hydrology and Water Quality, the Project would require preparation of a Stormwater Pollution Prevention Plan (SWPPP), which would identify appropriate BMPs to control runoff, and minimize erosion and siltation; thus, storm flows would not encounter areas of additional pollutant sources, nor would pollutants interfere with ground and surface water quality at the Santiago Canyon Landfill.

The commenter further requests that groundwater impacts related to the relocation of the spillway and revised stream course need to be evaluated in relation to the landfill's groundwater monitoring system. OCWR would maintain access to the existing monitoring and extraction wells throughout construction of the Project. As part of the Project, it is anticipated that Monitoring Well A (MW-A) may have limited access to groundwater due to groundwater dewatering activities and that MW-A may be damaged.

OCWR is currently coordinating with the Santa Ana Regional Water Quality Control Board to determine if MW-A needs to be maintained as a required monitoring well. If necessary, IRWD would be responsible for funding the installation of a new well as part of the Project should the Contractor be unable to protect the monitoring well in place. A new monitoring well would be similar in depth, size, and location to MW-A and its location and its attributes would be coordinated with OCWR and the California Regional Water Quality Control Board – Santa Ana Region.

The Project may also impact MW-11. OCWR would have access to MW-11, throughout the Project, and that well would be protected in place. However, the temporary groundwater dewatering system is expected to significantly lower the water level in the monitoring well and potentially cause the well to become dry. As part of final Project design, IRWD and OCWR would coordinate to provide, if necessary, a temporary monitoring well to replace MW-A and MW-11 or alternative sampling locations to meet OCWR's regulatory requirements. Because the two wells exist as fully-operational facilities, any replacement or improvement activities would occur within disturbed areas and no additional impacts would occur.

Monitoring wells MW-U, MW-X, MW-6, MW-8, MW-9, MW-10, MW-12, MW-12a, MW-14, MW-15, EW-1, EW-2, EW-3, EW-4, and EW-5 are not anticipated to be impacted by the Project.

Once the Project improvements are complete, the temporary groundwater dewatering system would be removed, and the groundwater conditions at the landfill would return to the existing conditions.

IRWD and the design team would continue to evaluate the groundwater dewatering plan and potential impacts to OCWR's monitoring and extraction wells throughout final design and construction. Should any unanticipated impacts be identified, IRWD would continue to work with OCWR to minimize the temporary impacts associated with the groundwater dewatering activities. Potential impacts to the logistical operations of OCWR would be monitored; however, no revisions to the EIR are required because no physical impacts are anticipated.

Response 2-7

The commenter requests that the EIR analyze potential damage to the waste prism and landfill cover. As discussed in IRWD's Response to Comment 2-5, neither improvements on nor impacts to the landfill property are anticipated. IRWD and OCWR have been and would continue to coordinate on minimizing secondary impacts to the closed landfill. Therefore, the Project is not expected to impact the waste prism and landfill cover. Please refer to Response to Comment 2-5.

Response 2-8

The commenter identifies concerns regarding the landfill gas monitoring system, including gas monitoring probes. Please refer to Response to Comment 2-5.

OCWR has landfill-related facilities, including gas lines, located outside the landfill property. However, based on the location of proposed construction activities in relation to the landfill-related facilities, IRWD does not anticipate the Project impacting the existing gas recovery-related facilities, therefore, no mitigation is required. This is discussed further in Section 3.6 of the Draft EIR. IRWD would take precautions with all construction-related activities to avoid landfill facilities, including gas monitoring probes. Should unforeseen gas monitoring and recovery facilities be encountered through the course of construction, IRWD would contact OCWR to coordinate the protection or temporary relocation of the facilities to OCWR's satisfaction. If the relocation of gas-related facilities is required, IRWD would coordinate the relocation work with OCWR and County of Orange Health Care Agency/Local Enforcement Agency. OCWR would continue to have

access to their gas monitoring and recovery facilities throughout the duration of Project construction and operation.

Response 2-9

The commenter states concerns regarding the landfill gas collection system and flare facility. Please refer to Responses to Comments 2-5 and 2-8.

As previously discussed, IRWD does not anticipate that the Project would impact the existing gas collection system and flare facility, therefore, no mitigation is required. This issue is discussed further in Section 3.6 of the Draft EIR. IRWD would take precautions for all construction-related activities to avoid landfill facilities. Should unforeseen gas collection and flare facilities be encountered through the course of construction, IRWD would contact OCWR to coordinate the protection or temporary relocation of the facilities to OCWR's satisfaction. If the relocation of gas-related facilities is required, IRWD would coordinate the work with OCWR and County of Orange Health Care Agency/Local Enforcement Agency. OCWR would maintain access to their gas collection system and flare facility throughout the duration of Project construction and operation.

As part of the Project, IRWD and OCWR are also jointly working with Southern California Edison (SCE) to relocate the overhead service to the Santiago Landfill property as discussed in Section 3.8 of the Draft EIR. This service relocation may temporarily impact power deliveries to the landfill, however, IRWD would ensure that OCWR is notified.

Response 2-10

The commenter requests that the EIR evaluate the uninterrupted function of the stormwater quality control basins. IRWD does not anticipate the Project to impact the existing stormwater detention basins. Please refer to Response to Comment 2-6.

Response 2-11

The commenter states a concern that the Project could impact public services if the stability of the landfill, landfill cover or landfill gas collection system are compromised. Please refer to Responses to Comments 2-5 and 2-8.

Response 2-12

The commenter states that any access through the landfill property should be coordinated directly with OCWR. Please refer to Response to Comment 2-5.

Response 2-13

The commenter acknowledges the proposed mitigation measures contained in the Draft EIR but states that no habitat restoration should occur within the landfill property or near monitoring wells. The Draft EIR includes comprehensive mitigation measures to reduce or avoid significant adverse impacts to biological resources that require preparation of mitigation plans and habitat mitigation monitoring plans. Each mitigation measure is specific and designed to achieve defined performance standards. Exact habitat restoration sites are not yet defined but no such activity is being considered within the closed Santiago Canyon Landfill property or near monitoring wells MW-A, MW-X, and MW-11 on OC Parks property. IRWD would coordinate with OC Parks and OCWR as appropriate should any such sites be located on the closed landfill property or near the monitoring wells on OC Parks property.

Response 2-14

The commenter requests further information regarding the "project area" definition. The Project site includes property owned by both the IRWD and the County of Orange. IRWD's property extends around the periphery of the reservoir, close to the waterline and encompassing the banks; up a blueline stream that passes through a culvert under Santiago Canyon Road to its confluence with the reservoir; up the Limestone Canyon drainage approximately 820 feet upstream of the Haul Road; over the flat terrace above the inlet of Santiago Creek with the reservoir and including the western portion of Oak Canyon Park; and downstream of the dam to include the dam face, spillway, control house, and energy dissipater structure. Project details, including areas to be impacted, are noted on Exhibits 3-1 through 3-16 included in Section 3 of the Draft EIR. Additionally, Exhibit 3-17 in Section 3 of the Draft EIR illustrates the anticipated physical impact area associated with inundation, which extends beyond the physical improvement area associated with the Project. The Project's impact areas are also illustrated on Exhibits 4.3-1 through 4.3-12c in Section 4.3, Biological Resources, of the Draft EIR.

Response 2-15

The commenter requests clarification on where the proposed easements would be located on OC Parks property. Refer to Response to Comment 2-5.

Response 2-16

The commenter requests clarification of the impacts associated with the temporary domestic water pipeline, also known as the temporary highline, as discussed in Section 3.0, Project Description. Based on modifications to the design, the highline, which was previously proposed to be a temporary construction water line to be routed above-ground along Blue Diamond Road, is now proposed to be placed primarily above-ground along the existing, disturbed Blue Diamond Road route, with sections placed beneath the ground surface where it may conflict with vehicular traffic or as conditions deem necessary. Although direct impacts would be limited to the existing roadway, a supplemental analysis was performed to characterize existing vegetation communities in the immediate area and determine potential impacts. As discussed below, several exhibits and tables in the Draft EIR and Appendix C, Biological Technical Report, have been updated to reflect the new survey boundary.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 3.0, Project Description, Page 3-12, Last Paragraph

IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road, to the staging area. The temporary construction water line would be **primarily** routed above-ground **along the existing, disturbed Blue Diamond Road route. Sections that may conflict with vehicular traffic, or as conditions deem necessary, will be** ~~through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work area for the inlet/outlet structure and spillway construction~~ **placed beneath the ground surface within the existing, disturbed Blue Diamond Road route. The underground sections would be installed via an open trench within the roadway, which would be returned to existing conditions following installation. Following construction, the aboveground section would be removed, and the underground section would be**

abandoned in place. Construction activities may also use untreated water from the ILP as an additional water source.

Section 1.0, Executive Summary, Exhibits 1-1 and 1-2

Exhibits 1-1 and 1-2 to be replaced with the pages included in Section 3.0, Corrections, Clarifications, and Additions.

Section 4.0, Impact Analysis Introduction, Exhibit 4-1

Exhibit 4-1 to be replaced with the page included in Section 3.0, Corrections, Clarifications, and Additions.

Section 4.3, Biological Resources, Exhibits 4.3-1 through 4.3-12

Exhibits 4.3-1 and 4.3-12 to be replaced with the pages included in Section 3.0, Corrections, Clarifications, and Additions.

Section 4.3, Biological Resources, Tables 4.3-1 and 4.3-5

Tables 4.3-1 and 4.3-5 to be replaced with the tables included in Section 3.0, Corrections, Clarifications, and Additions.

Section 4.6, Geology and Soils, Exhibit 4.6-2

Exhibit 4.6-2 to be replaced with the page included in Section 3.0, Corrections, Clarifications, and Additions.

Draft EIR Appendix C, Biological Technical Report, Exhibits 1-15

Exhibits 1-15 to be replaced with the pages included in Section 3.0, Corrections, Clarifications, and Additions.

Draft EIR Appendix C, Biological Technical Report, Tables ES-1, 12, and 17

Tables ES-1, 12, and 17 to be replaced with the tables included in Section 3.0, Corrections, Clarifications, and Additions.

Draft EIR Appendix C – Biological Technical Report, Appendix M, Exhibits D-1, D-2, 1 through 3 and 5 through 12

Exhibit D-1, D-2, 1 through 3 and 5 through 12 to be replaced with the pages included in Section 3.0, Corrections, Clarifications, and Additions.

Response 2-17

The commenter requests clarification on impacts to Fremont Canyon Nature Preserve, Saddleback Wilderness, and Red Rock Wilderness. As discussed in the Response to Comment 2-5, IRWD and the relevant County entities including Orange County Real Estate, OCWR, Orange County Parks, and Orange County Public Works have been and would continue to coordinate with IRWD on all aspects of the Project. IRWD and these County departments are currently coordinating a comprehensive easement and reimbursement agreement to address a variety of easement exchanges between IRWD and the County.

Additionally, the Draft EIR has been modified to include a reference to the recreational facilities identified by the commenter.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.13, Recreation, Pages 4.13-5 – 4.13-7, Table 4.13-1

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Aliso and Wood Canyons Wilderness Park	28373 Alicia Parkway Laguna Niguel, California	23 miles	Bike Trails, Bird Watching, Equestrian Trails, Hiking Trails, Interpretive Programs, Picnic Areas, Restrooms, Scenic Overlook
Carbon Canyon Regional Park	4442 Carbon Canyon Road Brea, California	16 miles	Ball Fields, Barbeques, Bike Trails Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Fishing, Hiking Trails, Historic Dam, Nature Center, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds Shelters, Tennis Courts, Volleyball Courts
Ronald W. Caspers Wilderness Park	33401 Ortega Highway San Juan Capistrano, California	36 miles	Amphitheater, Barbeques Bike Trails, Bird Watching, Camping, Corral, Dump Station Equestrian Camping, Equestrian Trails Fire Rings, Gazebo, Hiking Trails, Historic Windmill, Horseshoe Pits, Interpretive Programs Center, Nature Center, Picnic Areas (Tables, Restrooms), Restrooms, RV Camping, Scenic Overlook, Shelters
Ralph B. Clark Regional Park	8800 Rosecrans Avenue Buena Park, California	23 miles	Amphitheater, Ball Fields, Barbeques, Dogs Permitted on Leashes, Fishing, Hiking Trails Horseshoe Pits, Interpretive Programs Center, Model Boats, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation Playgrounds, Tennis Courts, Volleyball Courts, Weddings Special Events
Ted Craig Regional Park	3300 State College Boulevard Fullerton, California	19 miles	Ball Fields, Barbeques, Basketball Courts, Bike Trails, Bird Watching, Dogs Permitted on Leashes, Fishing, Hiking Trails, Interpretive Programs Center, Model Boats Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Racquetball Courts, Weddings Special Events
Featherly Regional Park	24001 Santa Ana Canyon Road Anaheim, California	14 miles	RV Camping, Wilderness Area
Irvine Lake	4621 E Santiago Canyon Road Silverado, California	0 miles Project site	Shoreline Fishing
Irvine Ranch Open Space	13333 Black Star Canyon Road Silverado, California	~~6 miles~~ **Adjacent**	Biking, Equestrian Activities, Hiking, Wilderness Area (Includes Fremont Canyon Nature Preserve, Limestone Canyon **Nature Preserve**, and Black Star Canyon Wilderness)

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Irvine Regional Park	1 Irvine Park Road California Orange, California	3 miles	Ball Fields, Barbeques, Bike Rentals Bike Trails, Boarding Stables Dogs Permitted on Leashes, Equestrian Trails Fishing, Food Concessions, Hiking Trails, Interpretive Programs Center, Paddle Boat Rentals, Picnic Areas, Picnic Shelters for Reservation, Playgrounds, Pony Rides, Train Rides
Laguna Coast Wilderness Park	18751 Laguna Canyon Road Laguna Beach, California	20 miles	Bike Trails, Bird Watching, Equestrian Trails, Hiking Trails, Interpretive Programs, Nature Center, Picnic Areas (Tables, Restrooms), Restrooms, Scenic Overlook
Laguna Niguel Regional Park	28241 La Paz Road Laguna Niguel, California	24 miles	Amphitheater, Barbeques, Bike Trails Dogs Permitted on Leashes, Fishing Gazebo, Hiking Trails, Horseshoe Pits, Model Glider Area, Pickleball, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Scenic Overlook, Tennis Courts, Volleyball Courts, Weddings Special Events
William R. Mason Regional Park	18712 University Drive Irvine, California	15 miles	Amphitheater, Ball Fields, Bike Trails Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Fitness Par Course Gazebo, Hiking Trails, Horseshoe Pits Interpretive Programs, Model Boats, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playground Tot Lot, Playgrounds, Restrooms, Shelters, Volleyball Courts
Mile Square Regional Park	16801 Euclid Street Fountain Valley, California	18 miles	Archery, Ball Fields, Barbeques, Bike Rentals, Bike Trails, Camping, Dogs Permitted on Leashes, Fishing, Fitness Par Course, Interpretive Programs, Paddle Boat Rentals, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Restrooms, Shelters, Soccer Field, Volleyball Courts, Weddings Special Events
O'Neill Regional Park	30892 Trabuco Canyon Road Trabuco Canyon, California	19 miles	Amphitheater, Bike Trails, Camping Conference Rooms, Dump Station, Equestrian Trails, Hiking Trails, Horseshoe Pits, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Playgrounds, RV Camping, Scenic Overlook, Showers
Thomas F. Riley Wilderness Park	30952 Oso Parkway Coto de Caza, California	25 miles	Amphitheater, Bike Trails Corral, Equestrian Trails, Hiking Trails, Interpretive Programs Center, Restrooms, Scenic Overlook
Peters Canyon Regional Park	8548 E. Canyon View Avenue Orange, California	7 miles	Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Scenic Overlook
Santiago Oaks Regional Park	2145 North Windes Drive Orange, California	6 miles	Barbeques, Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Historic Dam, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Playgrounds, Scenic Overlook, Weddings Special Events
Talbert Regional Park	1298 Victoria Avenue Costa Mesa, California	20 miles	Bike Trails, Dogs Permitted on Leashes, Hiking Trails, Picnic Areas (Tables, Restrooms), Restrooms, Scenic Overlook

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Whiting Ranch Wilderness Park	26701 Portola Parkway Foothill Ranch, California	16 miles	Bike Trails, Equestrian Center, Equestrian Trails, Hiking Trails, Restrooms
Tri-City Regional Park	2301 Kraemer Boulevard Placentia, California	15 miles	Barbeques, Dogs Permitted on Leashes Fishing, Picnic Shelters for Reservation, Restrooms
Upper Newport Bay Nature Preserve	2301 University Drive Newport Beach, California	18 miles	Amphitheater, Bike Trails, Classroom Conference Center, Dogs Permitted on Leashes, Equestrian Trails, Gift Shop, Hiking Trails, Interpretive Programs Center, Restrooms, Scenic Overlook
Harriett M. Wieder Regional Park	19251 Seapoint Avenue Huntington Beach, California	26 miles	Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Picnic Areas (Tables, Restrooms), Playgrounds
Yorba Regional Park	7600 East La Palma Avenue Anaheim, California 92807	15 miles	Ball Fields, Barbeques, Bike Rentals, Bike Trails, Dogs Permitted on Leashes, Equestrian Trails, Fishing, Fitness Par Course, Hiking Trails, Horseshoe Pits, Kite Flying Area, Model Boats, Paddle Boat Rentals, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Volleyball Courts
Source: OC Parks 2024b.			

Section 4.13, Recreation, Page 4.13-7, Table 4.13-2

Name	Location	Distance from the Nearest Site Boundary	Amenities
Oak Canyon Park	5305 Santiago Canyon Road, Silverado, California	0.4 miles	Privately leased park by James Event Productions
Saddleback ~~Motocross Park~~ **Wilderness**	Santiago Canyon Road, Orange, California	1.1 miles	~~Motor playground/motocross~~ **Model aircraft flying**
OCMA (Orange County Modelers Association) Bob Swenson Flying Site	Blue Diamond Haul Road, Silverado, California	0.8 miles	Model aircraft flying

Section 4.13, Recreation, Page 4.13-8, last paragraph, second sentence

The nearest public recreational facilities to the proposed Project include ~~Oak Canyon Park,~~ Saddleback ~~Motocross Park~~ **Wilderness**, Irvine Regional Park, OCMA flying site, **Peters Canyon Regional Park, and Irvine Ranch Open Space areas including** Fremont Canyon Nature Preserve, Black Star Canyon Wilderness Park, Limestone Canyon ~~Regional Park~~ **Nature Preserve**, **and Red Rock Wilderness.**~~and Peters Canyon Regional Park.~~ **The nearest private park is Oak Canyon Park.**

Response 2-18

The commenter requests modifications to correct references to Limestone Canyon Nature Preserve.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (strikeouts) where text has been removed and by bold underlining (underline) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 2.0, Introduction, Page 2-11, Fifth Paragraph, Eighth Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 3.0, Project Description, Page 3-1, Project Location, Fourth Paragraph, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.1, Aesthetics, Page 4.1-4, First paragraph following bullets, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.3, Biological Resources, Page 4.3-17, Physical Environmental Setting, Second Paragraph, Second Sentence

The largest areas in proximity to the BSA include the following: the 1,000-acre NCCP Reserve, Limestone Canyon ~~Regional Park~~ **Nature Preserve**, Whiting Ranch Wilderness Park, Santiago Oaks Regional Park, Irvine Regional Park, and Cleveland National Forest.

Section 4.3, Biological Resources, Page 4.3-26, Third Paragraph, Second sentence

It connects Habitat Reserve areas to the west and north of Irvine Lake to Habitat Reserve areas south of Santiago Canyon Road (i.e., Limestone Canyon **Nature Preserve**).

Section 4.8, Hazards and Hazardous Materials, Page 4.8-5, Surrounding Land Uses, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.10, Land Use and Planning, Page 4.10-6, Land Uses Surrounding the Project Site, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.13, Recreation, Page 4.13-5, Table 4.13-1

Refer to Response to Comment 2-17

Section 4.13, Recreation, Page 4.13-8, Temporary Construction Impacts, Second Paragraph, Second Sentence

Refer to Response to Comment 2-17

Section 4.17, Wildfire, Page 4.17-6, Existing Conditions, Second Paragraph, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Response 2-19

The commenter requests modifications to correct references to Limestone Canyon Nature Preserve. Please refer to Response to Comment 2-18.

Response 2-20

The commenter requests modifications to add easements and licenses to the Permits and Authorizations from County of Orange.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 3.0, Project Description, Page 3-16, Table 3-3, County of Orange

County of Orange (OC Parks, OC Real Estate, OC Public Works, OC Waste & Recycling)

- Division of Drinking Water (DDW) Drinking Water Permit Amendment Update
- Well Permits
- Encroachment Permit
- Noise Ordinance Waiver
- **Easements**
- **Licenses**

Response 2-21

The commenter expresses concern regarding impacts related to public and emergency access along Haul Road, Fremont Canyon Staging Area, and the Dam Road behind the spillway. The Project includes improvements on County property. IRWD and the respective County entities including Orange County Real Estate, OCWR, Orange County Parks, and Orange County Public Works have been and would continue to coordinate on all aspects of the Project. IRWD and impacted County departments are currently coordinating a comprehensive easement and reimbursement agreement to address a variety of easement exchanges between IRWD and the County. IRWD currently maintains an easement through Haul Road and would coordinate access to Dam Road as needed.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.14, Transportation, Page 4.14-7, Threshold 4.14-4

> **Less Than Significant Impact.** The proposed Project would involve improvements to the Santiago Creek Dam outlet works and spillway facility improvements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. During construction, existing access routes would be maintained at the Project site. Furthermore, emergency access routes are already in place at the Project site, and proposed Project actions would not alter access. **IRWD would coordinate with the County throughout the construction process to ensure necessary access routes are maintained or alternative access routes are provided.** Therefore, no **significant** impact to local or regional emergency access routes would occur, and no mitigation is required.

Response 2-22

The commenter states that access to Fremont Canyon Nature Preserve must be maintained throughout construction. As discussed in Response to Comment 2-21, IRWD would coordinate with OC Parks to maintain adequate access to Fremont Canyon Nature Preserve during and after construction.

Response 2-23

The commenter requests clarification if the emergency access walkway and stairs extend through OC Parks Property. The Project includes improvements on County property. IRWD and the respective County entities including Orange County Real Estate, OCWR, Orange County Parks, and Orange County Public Works have been and would continue to coordinate on all aspects of the Project. IRWD and impacted County departments are currently coordinating a comprehensive easement and reimbursement agreement to address a variety of easement exchanges between IRWD and the County, which would be in place before construction commencement. As part of the easement and reimbursement agreement being coordinated between IRWD and the County, IRWD would have an access easement through the landfill and OC Parks property to construct improvements, including the emergency access walkway and stairs, as described in Section 3.0, Project Description, of the Draft EIR. IRWD would continue to coordinate with OC Parks and other entities to ensure emergency access is maintained.

Response 2-24

The commenter requests clarification if the BSA is located on OC Parks Property. Please refer to Response to Comment 2-14. Please also see Exhibit 0, Land Ownership Map.

Response 2-25

The commenter states that any replacement trees or off-site mitigation on OC Parks property requires a separate agreement. The Project includes improvements on County property. IRWD and the respective County entities including Orange County Real Estate, OCWR, Orange County Parks, and Orange County Public Works have been and would continue to coordinate on all aspects of the Project. IRWD and impacted County departments are currently coordinating a comprehensive easement and reimbursement agreement to address a variety of easement exchanges between IRWD and the County. Any replacement of trees or installation of off-site mitigation on OC Parks property would only occur with an agreement in place.

Response 2-26

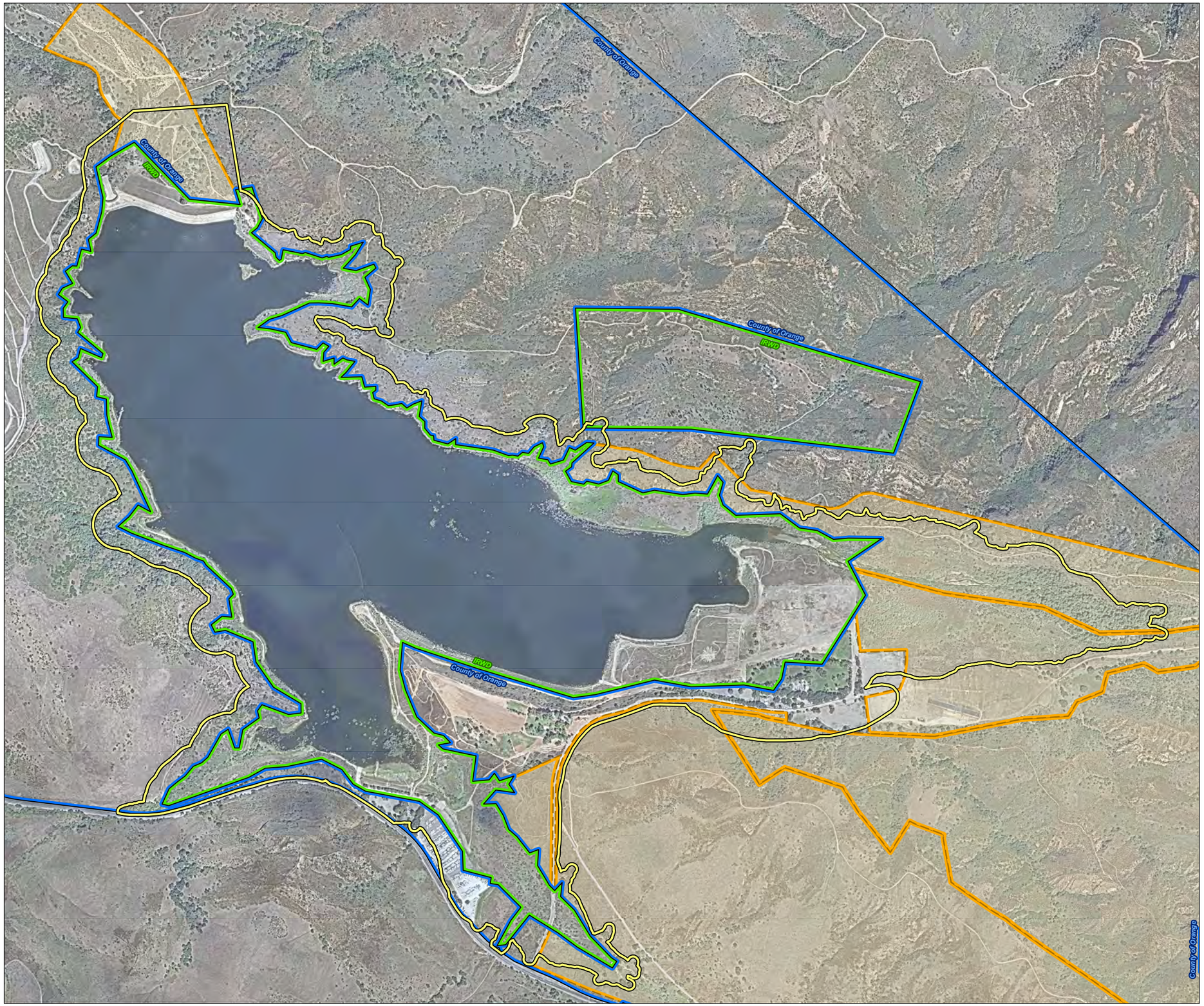
The commenter identifies that construction-related night lighting and noise may be a concern. Section 4.11, Noise, of the Draft EIR provides a full analysis related to noise, including noise during nighttime hours. Specifically, it is stated in Section 4.11 that construction would occur 10 hours per day during the wet season (October-April) and 20 hours per day during the dry season (April to November). Concrete crushing would be expected to occur intermittently up to 20 hours per day for approximately three weeks (sometime between the months of April and November), during the existing spillway demolition phase of the Project. It is assumed that generators would be used to power temporary lighting and other construction activities, and generators were assumed in the mix of construction equipment modeled in Table 4.11-6 of the Draft EIR. As discussed in the Draft EIR, the anticipated noise impacts to sensitive uses (Oak Canyon Park) would not exceed established noise limits.

As discussed in both Section 4.1, Aesthetics, and Section 4.3, Biological Resources, Project construction would involve nighttime work and safety and security lighting. Potential impacts from night lighting would be addressed through PDFs AES-2 and PDF BIO-7, which require night lighting to be focused downward and directed away from sensitive habitat areas.

Response 2-27

The commenter requests copies of the Western Spadefoot-focused survey report and other reports. IRWD would coordinate with OC Parks to provide copies of the requested reports when available.

The results of all focused surveys are reported in Section 4.3 of the DEIR. Focused surveys were performed for Crotch's bumble bee (*Bombus crotchii*), Western spadefoot toad (*Spea hammondii*); Arroyo toad (*Anaxyrus californicus*), Southwestern pond turtle (*Actinemys pallida* [*Emys marmorata*]*), Western yellow-billed cuckoo* (*Coccyzus americanus occidentalis*), Southwestern willow flycatcher (*Empidonax traillii extimus*), Least Bell's vireo (*Vireo bellii pusillus*), and Coastal California gnatcatcher (*Polioptila californica californica*). Survey results were negative for all the above except for Crotch's bumble bee and least Bell's vireo. The 2020 Coastal California gnatcatcher report mentions a breeding pair which has been incidentally seen every year in the same general area over the years. The Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California, dated July 25, 2022 (Appendix J of the Biological Resources Technical Report) identifies one individual detected. The individual was detected just outside of the project boundary, but its occurrence is listed on



Biological Study Area

Conservation Easement Areas

Land Ownership

County of Orange

IRWD

N

W E

S

0 550 1,100

Feet

Aerial Source: Nearmap 2023

Land Ownership Map

Exhibit 0

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 9-30-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\Comments\Land_Ownership_Map.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Restoration.aprx\ex_Land_Ownership_Map

Exhibit 4 and in Table 1 in the report. Additionally, a different Coastal California gnatcatcher pair was incidentally observed within the project boundaries during the 2022 Quino Checkerspot Butterfly surveys and the 2024 Crotch's bumble bee surveys. Surveys for Special Status Plants were also conducted, and those results are reported in Section 4.3 of the DEIR.

All surveys reports are available as appendices to the Biological Resources Technical Report.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Draft EIR Appendix C – Biological Technical Report, Appendices O and P

Results of Western Spadefoot Surveys for the Santiago Creek Dam Improvement Project, Orange County, California dated June 10, 2025 (Attachment A to this Final EIR) and Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for a portion of the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California, dated September 18, 2025 (Attachment B to this Final EIR) are added to Appendix C – Biological Technical Report of the Draft EIR as Appendices O and P, respectively.

Response 2-28

The commenter states that the reference to OC Regional Parks should be changed to OC Parks; the Draft EIR has been modified to correct the reference to OC Parks.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.3, Biological Resources, Page 4.3-26, Second Paragraph, First Sentence

> The BSA is contiguous with large undeveloped open space areas in the NCCP Reserve, OC ~~Regional~~ Parks, and the Cleveland National Forest.

Response 2-29

The commenter requested a breakdown of impacts on OC Parks Property. The table below provides the requested breakdown, but is not relevant to the overall impact discussion contained in the Draft EIR and, thus, is not included as part of Section 3.0, Corrections, Clarifications and Additions to the Draft EIR.

VEGETATION OVERLAY WITH NCCP/LAND USE DESIGNATION IN PROJECT BOUNDARY (IRWD)

Row Labels	Veg Name	PERMANENT IMPACTS (acres)			TEMPORARY IMPACTS (acres)				NOT IN IMPACT AREA (acres)						IRWD Total	Grand Total (acres) (IRWD/OC)
		Non-Reserve Open Space	Reserve	Permanent Total	Non-Reserve Open Space	Reserve	Not in NCCP-HCP	Temporary Total	Conser-vation Easement	Non-Reserve Open Space	Reserve	Special Linkage	Not in NCCP-HCP	Not in Impact Area Total		
1	Sagebrush Scrub	1.258	0.000	1.258	0.797	0.003		0.800	0.296	14.703	0.566	0.065	1.725	17.356	19.414	118.999
2	Disturbed Sagebrush Scrub	0.458	0.019	0.477	0.097	0.002		0.099		0.070	0.003		2.663	2.737	3.313	24.887
3	Sagebrush - Coyote Brush Scrub												0.181	0.181	0.181	10.551
4	Southern Cactus Scrub								0.143	2.883	0.006			3.031	3.031	17.482
5	Disturbed Southern Cactus Scrub										0.105		2.994	3.099	3.099	10.624
6	Disturbed Floodplain Sage Scrub	0.116	0.000	0.116											0.116	0.483
7	Toyon – Sumac Chaparral	1.569	0.003	1.571	0.286	0.005		0.291	0.001	3.481	0.070			3.552	5.414	32.613
8	Annual Grassland	5.524	0.015	5.539	0.030	0.003		0.033					1.880	1.880	7.452	15.593
9	Ruderal	0.254		0.254	5.319		20.273	25.591	0.004	19.097		1.056	31.669	51.826	77.671	100.099
10	Riparian Herb				1.087		0.000	1.087		9.873			2.189	12.062	13.150	13.150
11	Southern Willow Scrub	0.067		0.067	0.051	0.001		0.052		0.306	0.000			0.306	0.425	0.426
12	Mulefat Scrub	0.223	0.012	0.235	0.148	0.001		0.149							0.385	1.499
13	Disturbed Mule Fat Scrub				0.966		3.436	4.402		8.399			10.885	19.284	23.686	26.668
13.1	Southern Sycamore Riparian Woodland															20.478
14	Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest											0.927	0.014	0.941	0.941	5.462
15	Southern Black Willow Forest				1.690		4.882	6.572		5.418	0.023	2.556	19.041	27.038	33.610	83.611
16	Disturbed Southern Black Willow Forest				0.093		0.640	0.734	0.009	30.979	0.000		3.241	34.229	34.963	35.345
17	Southern Black Willow Forest/Riparian Herb				21.315		0.845	22.159		2.991			0.702	3.693	25.853	25.853
18	Coast Live Oak Woodland	0.188		0.188	0.005			0.005		3.637	0.040		3.358	7.035	7.228	39.216
19	Western Sycamore	0.051		0.051											0.051	0.363
20	Cliff	0.024	0.003	0.027	0.060	0.000		0.060		1.140	0.020		0.167	1.327	1.414	1.625
21	Open Water	0.331		0.331	138.838		0.236	139.074		170.186			1.856	172.042	311.446	312.109
22	Fluctuating Shoreline				11.159		1.879	13.037		10.123			3.147	13.270	26.307	26.307
23	Vegetated Fluctuating Shoreline				29.181		1.855	31.037		10.014			4.035	14.049	45.086	45.086
24	Perennial Stream									6.731				6.731	6.731	6.967
25	Ornamental	0.001		0.001	1.136	0.003		1.139		0.559	0.002		4.502	5.063	6.203	29.191
26	Developed	2.152		2.152	1.951	0.001		1.952		2.224		0.160	1.295	3.679	7.783	25.310
27	Disturbed	0.027		0.027	0.702	0.003	2.583	3.288		2.600		0.002	7.479	10.082	13.397	33.749
	Grand Total	**12.244**	**0.051**	**12.295**	**214.910**	**0.024**	**36.628**	**251.561**	**0.453**	**305.415**	**0.835**	**4.766**	**103.022**	**414.491**	**678.348**	**1063.745**

VEGETATION OVERLAY WITH NCCP/LAND USE DESIGNATION IN PROJECT BOUNDARY (COUNTY OF ORANGE)

Row Labels	Veg Name	PERMANENT IMPACTS (acres)			TEMPORARY IMPACTS (acres)				NOT IN IMPACT AREA (acres)						County of Orange Total
		Non-Reserve Open Space	Reserve	Permanent Total	Non-Reserve Open Space	Reserve	Not in NCCP-HCP	Temporary Total	Conser-vation Easement	Non-Reserve Open Space	Reserve	Special Linkage	Not in NCCP-HCP	Not in Impact Area Total	
1	Sagebrush Scrub		0.351	0.351	0.016	3.043		3.059	50.874	0.162	28.759	0.213	16.167	96.175	99.585
2	Disturbed Sagebrush Scrub	0.000	0.879	0.880	0.000	0.359		0.359			2.898		17.437	20.335	21.574
3	Sagebrush - Coyote Brush Scrub												10.371	10.371	10.371
4	Southern Cactus Scrub								13.331	0.037	1.082			14.450	14.450
5	Disturbed Southern Cactus Scrub										7.520		0.005	7.525	7.525
6	Disturbed Floodplain Sage Scrub		0.081	0.081		0.103		0.103			0.183			0.183	0.367
7	Toyon – Sumac Chaparral	0.000	0.389	0.389		1.425		1.425	0.474	0.042	22.609		2.260	25.385	27.199
8	Annual Grassland		0.087	0.087		3.087		3.087			3.886		1.082	4.967	8.141
9	Ruderal								0.886	0.005		10.248	11.289	22.428	22.428
10	Riparian Herb														
11	Southern Willow Scrub					0.001		0.001			0.001			0.001	0.001
12	Mulefat Scrub		0.500	0.500		0.455		0.455			0.159			0.159	1.114
13	Disturbed Mule Fat Scrub								1.224	0.017			1.741	2.982	2.982
13.1	Southern Sycamore Riparian Woodland								14.884				5.594	20.478	20.478
14	Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest								0.759			3.129	0.633	4.521	4.521
15	Southern Black Willow Forest								14.860	0.014	0.127	1.495	33.506	50.001	50.001
16	Disturbed Southern Black Willow Forest								0.188	0.004	0.000		0.189	0.382	0.382
17	Southern Black Willow Forest/Riparian Herb														
18	Coast Live Oak Woodland	0.000	0.270	0.270	0.000	2.747		2.747	5.565	0.097	10.341	0.628	12.338	28.970	31.988
19	Western Sycamore					0.212		0.212			0.100			0.100	0.312
20	Cliff		0.020	0.020							0.190		0.000	0.191	0.211
21	Open Water												0.663	0.663	0.663
22	Fluctuating Shoreline														
23	Vegetated Fluctuating Shoreline														
24	Perennial Stream								0.236	0.000				0.236	0.236
25	Ornamental		0.032	0.032	0.003	0.062		0.065			2.149	2.132	18.609	22.890	22.987
26	Developed		0.024	0.024		0.676		0.676		0.016	0.565	9.483	6.763	16.827	17.527
27	Disturbed					0.586	0.047	0.633		0.014	0.017	0.720	18.968	19.720	20.353
	Grand Total	**0.000**	**2.634**	**2.635**	**0.019**	**12.755**	**0.047**	**12.821**	**103.281**	**0.410**	**80.586**	**28.048**	**157.617**	**369.941**	**385.397**

Response 2-30

The commenter requests modification of MM BIO-1A to include OC Parks in the notification and collection and/or salvage of special status plants that would be impacted by the Project.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.3, Biological Resources, Page 4.3-82, MM BIO-1A, First Paragraph, Second Sentence

However, IRWD will notify the Natural Communities Coalition (NCC) and **OC Parks to** allow the NCC **and OC Parks** to collect seed and/or salvage special status plants that will be impacted by the Project. Seed collection/salvage will be coordinated so that it does not delay the construction schedule.

Response 2-31

The comment includes a formal request for copies of monthly surveys. IRWD will coordinate with OC Parks to provide copies of surveys for non-native invasive plant species on the OC Parks target list.

Response 2-32

The comment includes a request for a copy of the draft HMMP if mitigation is proposed on OC Parks property. IRWD will coordinate with OC Parks to allow opportunity for review and feedback on the HMMP prior to submission to the resource agencies if mitigation is proposed on OC Parks property.

Response 2-33

The commenter requests that speed limits be clarified as part of PDF BIO-6. The Draft EIR has been modified to include OC Parks speed limits.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.3, Biological Resources, Page 4.3-60, PDF BIO-6

Speed Limit During Construction. The speed limit on construction access roads will be no more than 20 miles per hour. Signage will be posted throughout the construction areas and at multiple locations along the access road between the dam and the staging area at the upstream end of the lake. "Wildlife crossing" signage will also be posted along the access road between the dam and the staging area at the upstream end of the lake. Signage will be verified by the Biological Monitor. **For areas within OC Parks property where the speed limit is less than 20 miles per hour, the County's posted speed limit will apply.**

Response 2-34

The commenter states that Saddleback Motocross currently operates as Saddleback Wilderness. The Draft EIR has been modified to include reference to the recreational facilities identified by the commenter. Refer to Response to Comment 2-17.

Response 2-35

The commenter requests modifications to correct references to recreational facilities. Please refer to Response to Comment 2-17.

Response 2-36

The commenter requests that grading operations be ceased altogether during high wind events and that IRWD consult with the local fire agency for grading best practices. IRWD has and would continue to consult with the Orange County Fire Authority as detailed in Section 4.17, Wildfire. Specifically, the Project would comply with all stated project design features and regulatory requirements as detailed in Section 4.17.5, including Orange County Fire Authority requirements and provisions, California Fire Code provisions, and Public Resource Code requirements.

Response 2-37

The commenter asks if the noise analysis considered impacts to Fremont Canyon Nature Preserve, Red Rock Wilderness, and Saddleback Wilderness.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.11, Noise, Page 4.11-14, new paragraph following second paragraph

> **The noise analysis focused on local recreational areas with passive uses. Oak Canyon Park, which would be located adjacent to the primary staging area and is used for various private events, was selected to represent a worst-case scenario of exposure of passive park visitors to construction-related noise sources, including concrete crushing activities. Due to the proximity of Oak Canyon Park to the Project activities and the anticipated intensity of the Project activities at this location, anticipated Project-related noise impacts at Oak Canyon Park would be equal to or greater than those at the other park locations noted by the commenter. Use of the aforementioned parks is generally confined to hiking trails and is transient in nature, where park users generally do not spend extended periods of time at one location. Therefore, exposure to noise from construction would be temporary and variable at Fremont Canyon Nature Preserve, Red Rock Wilderness, and Saddleback Wilderness and is not considered a significant impact.**

Response 2-38

The commenter states that other OCFA Stations may be closer to the Project site than Station No. 8. The information included in the Draft EIR was sourced from direct coordination with OCFA, which indicated via email that Station No. 8 is the closest OCFA Station to the Project site, based on access from Irvine Park Lane. No changes are required.

Response 2-39

The commenter states that Irvine Ranch Open Space surrounds the Project site. The Draft EIR has been modified to correct the distance from the Project site. Refer to Response to Comment 2-17.

Response 2-40

The commenter identifies concerns regarding temporary impacts to recreational activities including shoreline fishing, hiking, biking and equestrian programs. As part of the project, and as discussed in Section 4.13, Recreation, of the Draft EIR, portions of Irvine Lake would be dewatered, and access to portions of Irvine Lake would be restricted. These impacts, including impacts to shoreline fishing and other recreational uses, were identified as a temporary, adverse impact that would occur over a three-year period. The analysis focused on the State-defined thresholds of significance related to 1) the increase of use of neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur or be accelerated, and 2) construction or expansion of recreational facilities which might have an adverse physical effect on the environment. Therefore, the Draft EIR identified that the temporary impacts would not be significant because there are other local recreational facilities located within the region to support the users' recreational needs, including six other facilities with fishing amenities. The number of users would be spread out among multiple facilities, which would prevent physical deterioration to any one facility. In addition, because the impact would be temporary, it is not expected to induce the construction or expansion of recreational facilities to offset the re-directed recreational demand. It is also noted that IRWD would coordinate with OC Parks to maintain adequate access to the Fremont Canyon Nature Preserve during and after construction.

Response 2-41

The commenter disagrees with the finding that no impacts related to demand or use of recreational facilities would occur. As discussed in the Response to Comment 2-40, the finding that the commenter quotes is focused on the State-defined threshold related to construction or expansion of recreational facilities which might have an adverse physical effect on the environment. The discussion included under Threshold 4.13-1 acknowledges and discusses temporary impacts related to local recreation uses, including fishing and site access. However, based on the availability of other recreational facilities in the region and the defined significance threshold, a significant impact was not identified. Additionally, under Threshold 4.13-2, it is discussed that the Project would not induce population growth that would create additional demand for recreational facilities, which focuses on the need for construction or expansion of recreational facilities. Specific impacts to park facilities are discussed throughout the Draft EIR as appropriate, including Section 4.10, Land Use and Planning, Section 4.11, Noise, and Section 4.14, Transportation.

It is also noted that IRWD would coordinate with OC Parks to maintain adequate access to the Fremont Canyon Nature Preserve during and after construction. Further, as discussed in Section 4.14, Transportation, a Traffic Control Plan would be prepared in accordance with County requirements and followed during construction to manage traffic control.

Response 2-42

The commenter expresses concern related to the Project's impacts to biking and pedestrian activities, as well as access to recreational facilities. As discussed in Section 4.14, Transportation, a Traffic Control Plan would be prepared to ensure adequate access to adjacent facilities, including emergency access routes.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.14, Transportation, Page 4.14-16, second paragraph

To facilitate the movement of construction traffic including worker commutes and to minimize potential disruptions, a Traffic Control Plan would be prepared in accordance with County requirements and followed during construction. The Traffic Control Plan would include measures such as requiring an encroachment permit for work in the public right-of-way, limiting heavy truck activity during peak hours, using flaggers to manage short-term traffic control, requiring a formal traffic control plan for lane closures, limiting time and duration of closures, and/or requiring a minimum number of lanes to be open for travel during peak hours. Compliance with the Traffic Control Plan and County requirements would prevent any conflict between the Project and applicable plans, ordinances, or policies; and the Project's impact would be less than significant. **As discussed in Section 4.13, Recreation, these impacts would be temporary and alternative recreational facilities offering hiking, biking, and equestrian opportunities exist in the local region. Because these alternative forms of transportation are primarily for recreational purposes, this would not represent a significant impact related to transportation.**

Response 2-43

The commenter requests clarification regarding impacts on OC Parks property or operations related to inadequate emergency access. Please refer to Response to Comments 2-21.

Response 2-44

The commenter states that the Draft EIR should mention whether the project qualifies as a Priority Development Project or a Non-Priority Project. As discussed in Section 3.0, Project Description, the Project involves improvements to an existing dam facility. Additional areas of impervious surface beyond existing conditions would be greater than 10,000 square feet and a project-specific Water Quality Management Plan would be prepared.

Response 2-45

The commenter requests that the Draft EIR identify and discuss surface water beneficial uses for Santiago Creek. The Draft EIR has been modified to include this information.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.9, Hydrology and Water Quality, Page 4.9-7, Following Third Paragraph "RARE"

Santiago Creek, Reach 1 (below Irvine Lake) has the following surface water beneficial uses:

MUN – Municipal and Domestic Supply waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.

GWR – Groundwater Recharge waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality or halting saltwater intrusion into freshwater aquifers.

REC1 – Water Contact Recreation (Primary Contact Recreation) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs. Although the Irvine Lake (Santiago Reservoir) is listed with a REC1 beneficial use, IRWD does not permit primary contact recreation because the reservoir waters are used for water supply.

REC2 – Non-contact Water Recreation (Secondary Contact Recreation) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing and aesthetic enjoyment in conjunction with the above activities.

WARM – Warm Freshwater Habitat waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

WILD – Wildlife Habitat waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife. (RWQCB 2025)

Section 4.9, Hydrology and Water Quality, Page 4.9-18, References

Santa Ana Regional Water Quality Control Board (RWQCB). 2025 (April). Water Quality Control Plan for the Santa Ana River Basin. Santa Ana, CA: https://www.waterboards.ca.gov/water_issues/programs/basin_plan/docs/2025/chp3_beneficial_uses_5-25.pdf.

Response 2-46

The commenter states that the Draft EIR does not contain information about the vegetated swale and infiltration trench adjacent to the proposed emergency outlet basin. The Draft EIR has been modified to include this information.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts

(~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 3.0, Project Description, Page 3-8, First Paragraph

Emergency Outlet Pipeline

The emergency outlet pipeline would be routed from the bifurcation valve vault to the emergency outlet valve vault **conceptually** as shown on Exhibit 3-10, Conceptual Emergency Outlet Pipe Plan and Profile. The horizontal alignment would parallel the right **or left** gravity wall of the proposed spillway structure, and the pipe would be placed in the backfill for the RCC gravity wall. The pipe would slope to drain to Santiago Creek. **The purpose of the emergency outlet pipe is to release water from Irvine Lake under emergency conditions, to maintain dam safety, and to comply with DSOD requirements. Water released from Irvine Lake through the emergency outlet valve would be released to Santiago Creek with energy dissipation and erosion control features, which may consist of features such as a vegetated swale, infiltration trench, rip rap, cone valve, and armored channel.**

Response 2-47

The commenter requests that the reference to the General Waste Discharge requirements be updated; the reference to the order has been updated.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.9, Hydrology and Water Quality, Page 4.9-12, Second Paragraph

Furthermore, the Project would comply with the General Waste Discharge Requirements issued by the Santa Ana Regional Water Quality Control Board (~~R8-2015-0004, NPDES No. CAG998001~~ **R8-2020-0006, NPDES No. CAG998001**, General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant [De Minimis] Threat to Water Quality) (RWQCB ~~2015~~ **2020 until a new Order is issued**), including provisions requiring notification, testing, and reporting of dewatering and testing-related discharges, which would mitigate any impacts of such discharges.

Response 2-48

The commenter requests the addition of detail regarding permits and authorizations from the State Water Resources Control Board; Regional Water Quality Control Board.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 3.0, Project Description, Page 3-16, Table 3-3, State Water Resources Control Board; Regional Water Quality Control Board

- **General** Waste Discharge Requirements
- **General Permit for Stormwater Discharges**
- Storm Water Pollution Prevention Plan (SWPPP)

Response 2-49

The comment states that hydrologic equipment is currently located within the project construction area. IRWD and the respective County entities have been and would continue to coordinate on all aspects of the Project. IRWD would coordinate with all impacted property owners prior to initiation of construction. The OC Environmental Resources team would be provided the opportunity to remove its equipment located at IRWD's facility.

Response 2-50

The commenter requests additional information related to storage of water in Villa Park Dam. IRWD does not own or operate Villa Park Dam. Orange County Public Works, who owns and operates the dam and associated reservoir, manages the water levels behind the dam. The Project does not prescribe a specific management of Villa Park Dam and its associated reservoir. No further response is required.

Response 2-51

The commenter submitted a comment letter on the NOP for the Draft EIR on June 5, 2023. Issues raised in this comment letter were addressed throughout the preparation of the Draft EIR, as noted in Table 2-1 of the Draft EIR.

Comment Letter 3

Tiffany Lin, Senior Planner
City of Irvine
June 11, 2025

June 9, 2025

Fiona Sanchez
Director of Water Resources
Irvine Ranch Water District Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, California 92618

Subject: Notice of Availability for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report

Dear Fiona Sanchez:

Staff is in receipt of the notice of availability for the draft Environmental Impact Report (EIR) for the proposed Santiago Creek Dam Outlet Tower and Spillway Improvements Project generally located south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project proposes to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities and to modify the embankment to permit operation of the facilities for a long-term water resource benefit. Ancillary site improvements include but are not limited to a new access road and ramp to the new structure, new dam control building, widening and raising of the dam crest, and new emergency access walkway and prefabricated steel bridge structures.

Staff has reviewed the project proposal and has no comments at this time.

3-1

Thank you for the opportunity to review and comment on the proposed project. If you have any questions, please contact me at tilin@cityofirvine.org or 949-724-6361.

Sincerely,

Tiffany Lin
Senior Planner

ec: Alyssa Matheus, Manager of Planning Services
Nick Melloni, Principal Planner

Response to Comment Letter 3

Tiffany Lin, Senior Planner
City of Irvine
June 11, 2025

Response 3-1

The comment confirms receipt of the Draft EIR and states that there are no comments. No response is required.

Comment Letter 4

Sandra Jacobson, Ph.D., Director
California Trout, South Coast Region
June 11, 2025

June 11, 2025

Ms. Fiona Sanchez, Director of Water Resources
via email: sanchezf@irwd.com
Irvine Ranch Water District
Water Resources and Policy Department
P.O. Box 57000
Irvine, California 92619-7000

Subject: Public Comment on Santiago Creek Dam Improvement Project - Irvine Ranch Water District's draft Environmental Impact Report (EIR) State Clearinghouse No. 2023050097

Dear Ms. Sanchez,

This comment is submitted by California Trout's South Coast Director and Steelhead Coalition Manager in response to the call for public comment on the Irvine Ranch Water District's draft EIR for the Santiago Creek Dam Improvement Project, SCH No. 2023050097. California Trout is a statewide 501c3 non-profit organization which works to revitalize waters for resilient wild fish and a better California that benefits the public. The South Coast Steelhead Coalition brings together over 30 federal, state and local agencies, tribal nations, and non-profit organizations to integrate conservation and recovery efforts for the state and federally endangered Southern California steelhead (Southern steelhead) in Orange, San Diego, and Riverside County watersheds. Coalition conservation and recovery efforts focus on identifying, prioritizing and implementing restoration projects in high priority watersheds using a science-based approach to restore steelhead to their native range, conserve their ecological resilience, and protect other watershed beneficial uses.

The proposed Santiago Creek Dam Project will modify the existing dam inlet/outlet structure, spillway, access roads and pipelines; increase the crest width and height; require utility relocation, lake dewatering and diversions, and associated construction activities; and construct a new dam control building. These activities are proposed to meet the five stated objectives of the Project.

Comment 1: Biological Resources section of the draft Environmental Impact Report in TABLE 4.3-4 SPECIAL STATUS WILDLIFE SPECIESREPORTED FROM THE PROJECT VICINITY, Biological Resources, states "*Oncorhynchus mykiss irideus* pop. 10, steelhead–southern California DPS, Not expected to occur; no suitable habitat; outside current known range." This comment is inaccurate on all three counts. The Santiago Creek watershed is historically part of a known range for Southern steelhead and occurrences have been documented including those listed below. Stream reaches through Santiago Creek and tributaries have suitable habitat for *O. mykiss*. The Santa Ana River, of which Santiago Creek is a tributary, has historically supported Southern steelhead (National Marine Fisheries Service, Southern California Steelhead Recovery Plan, 2012, Table 2-1 Historical Presence Steelhead).

The Santa Ana River is well within the historic and current range of steelhead. Southern steelhead and rainbow trout of steelhead lineage are known to exist in Santa Ana River watershed, in high quality

4-1

habitat such as that found proximal to Irvine Lake and upstream in Santiago Canyon and tributaries such as Harding Creek.

4-1 cont.

1. National Marine Fisheries Service (2012) Southern California Steelhead Recovery Plan. Southwest Region, Protected Resources Division, Long Beach.

2. National Marine Fisheries Service (2023) 5-Year Review: Summary and Evaluation of Southern California Steelhead. West Coast Region. Documents O. mykiss of steelhead lineage in tributary to Santa Ana River.

3. Abadia-Cardosa et al (2016) Population genetic structure and ancestry of steelhead/rainbow trout (Oncorhynchus mykiss) at the extreme southern edge of their range in North America. https://caltrout.org/wp-content/uploads/2017/08/Abadia-Cardoso-et-al-2016-So-Cal-O.-mykiss-population-genetic-study1.pdf

Documents the presence of native rainbow trout of steelhead lineage in coastal rivers of Southern California from Santa Clara River in Ventura County to San Luis Rey watershed in San Diego County by population genetic analysis.

4.Becker and Reining (2008) Steelhead/Rainbow Trout (Oncorhynchus mykiss) Resources South of the Golden Sage, California: http://www.cemar.org/SSRP/pdfs/SSRP_textOnly.pdf

Historic documentation of *O. mykiss* in Santa Ana River watershed, including Santiago Creek and tributaries.

5. O'Brien, John (CDFW Biologist) Oct 19, 2006. Reconnaissance Level Stream Survey Report. Observations: Over 30 trout of all size classes observed, and speckled dace in Harding Creek. Genetic analysis by the Garza lab at NOAA Southwest Fisheries Science Center showed that trout tissue collected from Harding Creek in 1999 was of steelhead lineage, not of hatchery origin.

6. Coldwater Canyon Creek in the Santa Ana River watershed: native rainbow trout of steelhead lineage rescued after the Holy Fire 2018 https://www.youtube.com/watch?v=LIR6Nd5CpM4

Coldwater Canyon Creek native rainbow trout of steelhead lineage rescued after Holy Fire, then returned two years later to Coldwater after sediment had washed out, now successfully reproducing and stable population.

7.USFS dam removal in Silverado, Trabuco & San Juan Creeks: https://www.ecowatch.com/dam-removal-california-2645546590.html

National recognition for these efforts to support steelhead recovery in San Juan Creek and Santiago Creek and its exceptional potential to restore threatened and endangered native fish populations is evidenced by its selection as a 2010 Waters to Watch (see https://caltrout.org/news/san-juan-and-

santiago-watershed-selected-as-one-of-2020s-10-waters-to-watch) and the nationally published U.S. FWS Steelhead Story (see https://caltrout.org/news/southern-steelhead-story-recovery).

8.Hovey, Tim. 2004 Current Status of Southern steelhead/rainbow trout in San Mateo Creek. California Fish and Game 90(3), 140-154. https://www.waterboards.ca.gov/water_issues/programs/tmdl/records/region_9/2008/ref3235.pdf

Steelhead observations in San Mateo Creek in the 1990s and early 2000s was pivotal in extending the federal ESA listing for Southern steelhead from Malibu Creek south to the U.S. border with Mexico.

9. San Juan Creek and its primary tributary Trabuco Creek are high priority steelhead recovery streams just to the south of the Santa Ana River. Steelhead historically occupied the San Juan Creek watershed (CDM, 2007; Becker et al 2008, 2010 and references therein). Due to the sharp decline in Southern steelhead populations in the mid-1900s, this ocean-going trout was listed as federally endangered under the Endangered Species Act from the Santa Maria River south to Malibu Creek in 1997, then the ESA listing area extended south to the U.S. border with Mexico in 2002. Southern steelhead was listed as a state endangered species under CA ESA in 2014.

Headwaters of San Juan Creek and Trabuco Creek are spatially close to headwaters of Harding Creek and Coldwater Canyon Creek of the Santa Ana River watershed. Trabuco Creek is designated a high priority Core 1 population in the NMFS Recovery Plan and still has steelhead migrating into the lower river until they are blocked by barriers. For example, in lower San Juan Creek a 24" long steelhead was videotaped by Barry Nerhus in January 2018 within about a mile of the ocean at https://www.youtube.com/watch?v=MjD0oxuKS-o .

Comment 1 Request: Correct inaccurate species presence/distribution/range statements as discussed above, provide adequate analysis of and mitigation measures for threatened and endangered aquatic species including Southern steelhead, Pacific lamprey (2019 observations in Santa Margarita River extended its current range to south of Santa Ana River) and speckled dace.

4-1 cont.

Comment 2: Santiago Dam and Villa Park Dam are downstream total barriers to steelhead migration in Santiago Creek tributary to Santa Ana River and block access to high quality trout habitat in the upper watershed. The impacts these dams have on this ocean-going trout are tightly linked to features of Southern steelhead life history as an anadromous species. Steelhead live in freshwater as juveniles for at least one year before migrating to the ocean where they feed and grow for several months to years before returning to freshwater to spawn. They require passage up and down the main stem of a river and need sites with year-round refuge areas with good water quality, water quantity and habitat. Steelhead are sensitive to environmental alterations including fish passage barriers, non-native species, altered hydrologic regimes and sediment loading, increased urban run-off and impervious groundcover, and water quality/quantity impacts of land use such as those integral to the proposed Project. Now is the time to address these issues.

Comment 2 Request: There is clear evidence that *Oncorhynchus mykiss* are present in this watershed. The Project poses significant impacts to this federally and state endangered species. As such, it may

4-2

result in the Take of a listed species and requires formal consultation with the appropriate agencies under both the federal Endangered Species Act (ESA) and California Endangered Species Act (CESA) to ensure all necessary mitigation measures are in place. Consultation can establish a Biological Opinion and associated RPAs, establish flow releases to keep fish in good condition and habitat supportive of native species, and comply with Take regulations and other measures that protect endangered species.

4-2 cont.

Thank you for the opportunity to comment on the Santiago Dam Improvement Project.

Sincerely,

Sandra Jacobson, Ph.D.
Director, South Coast Region
California Trout
411 Camino Del Rio South, Suite 106
San Diego, California 92108
858.414.1518 m

Response to Comment Letter 4

Sandra Jacobson, Ph.D., Director
California Trout, South Coast Region
June 11, 2025

Response 4-1

The commenter states that the Draft EIR incorrectly states that the Southern steelhead are not expected to occur due to no suitable habitat and being outside the current known range for the species.

While *Oncorhynchus mykiss irideus* pop. 10, steelhead–southern California DPS may have historically occurred in the Santiago Creek watershed, it is not known to currently occur, nor is the species known to occur in Santiago Creek downstream of the Project site. The existing barriers to movement between the ocean and the Project site (i.e., Villa Park Dam) would prevent this species from occurring in the Project site or immediate vicinity under current conditions.

iNaturalist has no observations of southern steelhead in Orange County. According to the California Natural Diversity Database (CNDDB) (accessed on 14 August 2025), The Santa Ana River is described as follows: “Lower river degraded. stocked since the 1930s.” A "good" steelhead run was reported in 1950. No steelhead were reported in California Department of Fish and Game surveys of the mainstream below Prado Dam as reported in 1951 and 1955. It was also reported that the steelhead run was presumed extirpated by 1957. Therefore, the persistence of headwater fish with presumptive steelhead ancestry is not germane to the Project or its impacts. Under CEQA Guidelines § 15125, the analysis in the Draft EIR is based on current existing conditions and available, reputable information.

Santa Ana Speckled dace have been recorded from upper Santiago Creek above Modjeska (CDFW 2025). According to CDFW, “boulders acting as fish barriers” are present in the creek, suggesting that any Santa Ana Speckled dace present in the creek would have difficulty traveling downstream to Irvine Lake. The CNDDB records are from 1998 and 1999. No Santa Ana Speckled Dace are known to occur in Irvine Lake currently, regardless of the potential existence of Santa Ana Speckled Dace populations many miles upstream of the Project site. The Project would not significantly impact riparian and stream resources upstream of the Lake. Refer to Response to Comment 6-5 for more information on riparian vegetation. Section 4.3, Biological Resources of the Draft EIR evaluates potential impacts to speckled dace if CDFW were to implement a translocation of the species. The potential scenarios and potential effects to speckled dace discussed in Section 4.3, Biological Resources, determine that any impacts would be less than significant. According to Section 1.0, Executive Summary, regarding the Draft EIR and CEQA Guidelines § 15125, impacts are only calculated based on changes from existing conditions.

There is one iNaturalist report of Pacific lamprey found in the Santa Ana River in Orange County from January 30, 2017. Santiago Creek Dam is approximately 12.5 river miles from the confluence of Santiago Creek and the Santa Ana River. The existing barriers to movement between the ocean and the Project site (i.e., Villa Park Dam) would prevent this species from occurring on the Project site or in the immediate vicinity. Therefore, this species is not known to occur in the Project vicinity. Additionally, the Santiago Creek Dam and Villa Park Dam are existing features and are considered part of the existing conditions baseline under CEQA. CEQA only requires analysis of impacts results from changes from the existing conditions.

Source: CDFW 2025. California Department of Fish and Wildlife (CDFW) 2025. California Natural Diversity Database. Query for *Rhinichthys Gabrielino* Orange county. Accessed 14 August 2025.

Response 4-2

The commenter states that there is clear evidence that Southern steelhead are present in the watershed and that the Project poses significant impacts to this species. The commenter is referred to Response to Comment 4-1. No steelhead are known to occur in Irvine Lake. The Harding Creek population was reported exterminated by a land slide into the creek (Trout Unlimited 2025). Even if there were steelhead present upstream in Harding Creek, the species would not be affected by the Project because Project impacts would occur at Irvine Lake and potentially immediately downstream. No impacts are expected to occur upstream of the Santiago Creek delta at Irvine Lake.

Furthermore, the existing barriers to movement between the ocean and the Project site (i.e., Villa Park Dam) prevent this species from occurring in the Project site or its immediate vicinity. The Santiago Creek Dam and the Villa Park Dam are both existing features and as such, are considered part of the existing conditions baseline under CEQA. The comment assumes that impacts are calculated based on historic conditions. According to Section 1.0, Executive Summary, of the Draft EIR and CEQA Guidelines § 15125, impacts are only calculated based on changes from existing conditions. The Project does not pose a significant impact to this species, and Take coverage under the federal ESA and CESA is not required.

Source: Trout Unlimited 2025. https://www.tu.org/wp-content/uploads/2020/01/Report-OrangeCounty-SSRP.pdf

Comment Letter 5

Joel Robinson, Director & Naturalist
Santiago Creek Watershed Preservation & Restoration Project
Naturalist For You
June 11, 2025

Santiago Creek Watershed
preservation and restoration project

June 11, 2025

Fiona Sanchez, Director of Water Resources
Via email: sanchezf@irwd.com
Irvine Ranch Water District
Water Resources & Policy Department
P.O. Box 57000
Irvine, California 92619-7000

Subject: Public Comments: Santiago Creek Dam Improvement Project — Draft Environmental Impact Report (EIR) (State Clearinghouse No. 2023050097)

Dear Ms. Sanchez,

The Santiago Creek Preservation & Restoration Project (SCWPRP), a project of Naturalist For You, a 501(c)(3) environmental education non-profit based in Orange, CA, appreciates the opportunity to comment on the Santiago Creek Dam Improvement Project — Draft Environmental Impact Report (EIR).

On behalf of SCWPRP, I request that the scope of the Environmental Impact Report address the following potential significant environmental impacts that may result from the Project: 5-1

Santiago Creek (Irvine Lake) Dam is a barrier to the movement of southern steelhead (Oncorhynchus mykiss irideus) and pacific lamprey (Entosphenus tridentatus). Over the past few years, the US Forest Service systematically removed multiple historic dams in Silverado (a tributary of Santiago), Trabuco, Holy Jim and San Juan Creeks to allow for the movement of resident rainbow trout/southern steelhead and improve habitat for other special status riparian species, including arroyo toad (Anaxyrus californicus).

The Irvine Ranch Water District's (IRWD) Santiago Creek Dam Improvement Project Draft EIR did not consider fish passage and habitat restoration mitigation for the southern steelhead, pacific lamprey, Santa Ana speckled dace and other special status riparian species in the draft environmental impact report for improving the dam.

The communities of Black Star, Silverado Canyon, Williams Canyon, Santiago Canyon, Modjeska Canyon, Orange, Villa Park and Santa Ana are interested in restoring the Santiago

Creek Watershed for the benefit of special status riparian species, water quality and flood resilience. Research and restoration efforts have been in collaboration with the US Geological Survey, US Forest Service, City of Orange, City of Santa Ana, Orange County Water District and OC Parks. One of our priorities is the sensitive removal or modification of barriers to allow for the connectivity of wildlife corridors, including the passage of anadromous fish.

The Santiago Creek Watershed currently supports resident rainbow trout, which may be remnant populations of southern steelhead (found in Harding Canyon), southwestern pond turtles, California newts and other special status riparian species. Historically, the watershed has supported southern steelhead, arroyo toad, red-legged frog, pacific lamprey and Santa Ana speckled dace. Therefore, any proposed improvements to the dam should accommodate the critical habitat and movement of these species.

5-1 cont.

Page 43, TABLE 4.3-4 SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY, Biological Resources, states, "Oncorhynchus mykiss irideus pop. 10, steelhead – southern California DPS, Not expected to occur; no suitable habitat; outside current known range."

5-2

Request: This statement is inaccurate. The Santiago Creek Watershed is historically part of the known range for southern steelhead and occurrences have been recorded within the watershed, including above and below the dam.

1) *Refer to articles/reports provided below*
2) *Work with USGS Western Ecological Research Center (WERC), National Oceanic and Atmospheric Administration (NOAA) Fisheries, CA Dept of Fish & Wildlife (CDFW), US Fish & Wildlife Service (USFWS), California Trout, OC Parks, OC Watersheds, local Native American tribes and community members within the watershed.*
3) *Update the Project with a fish passage and habitat restoration alternative to accommodate southern steelhead.*

I have included 10 articles/reports related to resident rainbow trout/southern steelhead occurring in seasonal, intermittent streams, including Santiago Creek, and the efforts of public agencies and NGOs to restore fish passage for these species in Southern California.

1. *USGS documented up to 40 resident rainbow trout (O. mykiss), which may be remnant populations of steelhead, in Harding Canyon near Harding Falls, 7-24-2024*
   33° 43' 27.372" N 117° 35' 26.8728" W Robert Fisher

5-2 cont.

2. *Harding Canyon Stream Report, O'brien, Hansen, 19 October 2006 - Over 30 trout of all size classes (YOY, juvenile and one adult 8-10 in). Numerous minnows (appeared to be speckled dace):*
   https://www.dropbox.com/scl/fi/jmjmpftqf7cjaxivc8eue/Harding-Stream-Report_OBrien-2006.pdf?rlkey=cyjo6ahvynr8p38tyxks834xt&st=098w6hou&dl=0

3. *Trout Unlimited report - resident rainbow trout (O. mykiss), which may be remnant populations of steelhead, found both downstream and upstream of Santiago Dam:*
   https://www.tu.org/wp-content/uploads/2020/01/Report-OrangeCounty-SSRP.pdf

4. *OC Register Article - trout found in Harding Canyon until 2007:*
   https://www.ocregister.com/2007/12/12/mudslide-wipes-trout-off-orange-county-map/

5. *CalTrout report Coldwater - steelhead trout found in Coldwater Canyon:*
   https://caltrout.org/featured/native-trout-resiliency-in-southern-california

6. *USFS dam removal in Silverado, Trabuco & San Juan Creeks:*
   https://www.ecowatch.com/dam-removal-california-2645546590.html

7. *Trout found in San Mateo Creek, a seasonal, intermittent stream: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=175916*

8. *NOAA conservation page for Southern California Coast Steelhead: https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/southern-california-steelhead*

9. *NOAA status report on Southern California Coast Steelhead, including Santa Ana River Watershed: https://repository.library.noaa.gov/view/noaa/17024*

10. *Ventura River is a seasonal, intermittent stream with a dam removal/restoration project in process: https://matilijadam.org/*

5-2 cont.

Page 43, TABLE 4.3-4 SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY, Biological Resources, states, "Rhinichthys gabrielino [osculus ssp. 8], Santa Ana speckled dace, Not expected to occur; outside current known range."

5-3

Request: This statement is inaccurate. The Santiago Creek Watershed is historically part of the known range for Santa Ana speckled dace and USGS is embarking upon a reintroduction just upstream of the dam. The decline of the Santa Ana speckled dace is part of a greater overall decline of freshwater fishes in Southern California. Dams, water diversions, and urbanization combined with drought have been the primary threats to dace and other Southern California freshwater fish. Dams and water diversions deplete stream flows, sometimes dewater streams, alter natural flow regimes, and isolate dace populations. Reservoirs and dams favor introduced predators and competitors of dace.

1) *Refer to articles/reports provided below*
2) *Work with USGS Western Ecological Research Center (WERC), National Oceanic and Atmospheric Administration (NOAA) Fisheries, CA Dept of Fish & Wildlife (CDFW), US Fish & Wildlife Service (USFWS), California Trout, OC Parks, OC Watersheds, local Native American tribes and community members within the watershed..*
3) *Update the Project with a fish passage and habitat restoration alternative to accommodate Santa Ana speckled dace.*

I have included 2 articles/reports related to Santa Ana speckled dace historically occurring in seasonal, intermittent streams, including Santiago Creek and the Santa Ana River, and the efforts of public agencies and NGOs to restore habitat for these species in Southern California.

1. *CA Dept of Fish & Wildlife Santa Ana Santa Ana Speckled Dace Report: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=104372&inline*

2. *Center for Biological Diversity Petition for Listing Santa Ana Santa Ana speckled dace as Endangered or Threatened: https://www.biologicaldiversity.org/species/fish/pdfs/SASD-petition-5-11-20.pdf*

5-3 cont.

There is no mention of pacific lamprey (Entosphenus tridentatus) in the report.

5-4

Request: The Santiago Creek Watershed is historically part of the known range for pacific lamprey and was documented in the Santa Ana River in 2017.

1) *Refer to articles/reports provided below*
2) *Work with USGS Western Ecological Research Center (WERC), National Oceanic and Atmospheric Administration (NOAA) Fisheries, CA Dept of Fish & Wildlife (CDFW), US Fish & Wildlife Service (USFWS), California Trout, OC Parks, OC Watersheds, local Native American tribes and community members within the watershed.*
3) *Update the Project with a fish passage and habitat restoration alternative to accommodate pacific lamprey.*

I have included 5 articles/reports related to pacific lamprey occurring in seasonal, intermittent streams, including Santiago Creek and the Santa Ana River, and the efforts of public agencies and NGOs to restore fish passage for these species in Southern California.

1. *See Pacific Lamprey Historical Range and Current Distribution - USFWS [ds2673]: https://map.dfg.ca.gov/metadata/DS2673.html*

2. *iNaturalist observation from 2017: https://www.inaturalist.org/observations/7741260*

3. *CA Dept of Fish & Wildlife Pacific Lamprey Species Conservation & Management: https://wildlife.ca.gov/Conservation/Fishes/Pacific-Lamprey*

4. *Pacific Lamprey Conservation Initiative: https://www.pacificlamprey.org/*

5. *US Fish & Wildlife Service Regional Implementation Plan for Measures to Conserve Pacific Lamprey (Entosphenus tridentatus), California – South Coast Regional Management Unit: https://www.pacificlamprey.org/wp-content/uploads/2022/10/2022_CA_South-Coast_RIP.pdf*

The release of the Draft Environmental Impact Report coincided with mass layoffs and budget cuts to federal agencies and prevented key experts from USGS, NOAA and NGOs from submitting comments on this project proposal.

Request: Please extend the comment period or withdraw the project proposal until such time when the appropriate experts and community members are able to provide comments.

5-5

Conclusion

While keeping the dam in place, please provide feasible Project alternatives for fish passage and habitat restoration for southern steelhead, pacific lamprey, Santa Ana speckled dace and other special status riparian species. Without our requested updates to the Project, we support 1.5.1 ALTERNATIVE 1 – NO PROJECT ALTERNATIVE.

5-6

I appreciate the opportunity to comment on the Draft EIR to assist IRWD in identifying and mitigating Project impacts on biological resources.

Sincerely,

Joel Robinson

Joel Robinson
Director & Naturalist
Santiago Creek Watershed Preservation & Restoration Project
Naturalist For You
5907 E Valley Forge Dr.
Orange, CA 92869
714-639-8480
jrobinson@naturalist-for-you.org

Response to Comment Letter 5

Joel Robinson, Director & Naturalist
Santiago Creek Watershed Preservation & Restoration Project
Naturalist For You
June 11, 2025

Response 5-1

The comment requests that the EIR address the existing dam as a barrier to movement of southern steelhead and pacific lamprey. Please refer to Responses to Comments 4-1 and 4-2, regarding the Southern steelhead.

There is one iNaturalist report of Pacific lamprey found in the Santa Ana River in Orange County from January 30, 2017. Santiago Creek Dam is approximately 12.5 river miles from the confluence of Santiago Creek and the Santa Ana River. The existing barriers to movement between the ocean and the Project site (i.e., Villa Park Dam) would prevent this species from occurring on the Project site or in the immediate vicinity. Therefore, this species is not known to occur in the Project vicinity. Additionally, the Santiago Creek Dam and Villa Park Dam are existing features and are considered part of the existing conditions baseline under CEQA. CEQA only requires analysis of impacts resulting from changes from the existing conditions, as discussed in Section 1.0, Executive Summary, of the Draft EIR.

Additionally, the commenter states that the EIR did not consider fish passage and habitat restoration. The Project does not propose development of fish passage, nor do existing conditions at the Santiago Creek Dam allow for fish passage. The baseline condition for evaluating impacts to fish passage in the Draft EIR is the presence of existing barriers that do not allow movement, and the Project does not propose to modify this condition. According to CEQA Guidelines § 15125, impacts are only calculated based on changes from existing conditions. Therefore, the Project is not expected to have a significant impact upon fish passage, and mitigation is not required.

Although not known to occur, if there were steelhead present upstream in Harding Creek, the species would not be affected by the proposed Project because Project impacts would occur at Irvine Lake and potentially immediately downstream. No impacts would occur upstream of the Santiago Creek delta at Irvine Lake because the proposed Project would not curtail natural flows in Santiago Creek upstream of the lake.

The proposed Project would not impact the Santiago Creek watershed other than those effects identified in the Draft EIR as occurring at Irvine Lake and Santiago Creek immediately downstream of Irvine Lake and Santiago Dam. Therefore, any population of wildlife supported in any of the upstream creeks and streams within the upstream watershed would not be impacted by the Project.

Response 5-2

The commenter states that the Draft EIR is inaccurate regarding the lack of southern steelhead in the Project area. Please refer to Response to Comment 4-1

Response 5-3

The commenter states that the Draft EIR is inaccurate regarding the lack of speckled dace in the Project area. Please refer to Response to Comment 4-1

Response 5-4

The commenter states that there is no mention of the pacific lamprey in the report and goes on to reference documents that state that the pacific lamprey was documented in the Santa Ana River in 2017. The Project site is located approximately 12.5 river miles from the confluence of Santiago Creek and the Santa Ana River. The Project is not located in the Santa Ana River, and pacific lamprey are not known to be present in Santiago Creek. Please refer to Response to Comment 5-1.

Response 5-5

The commenter requests an extension of the comment period. As stated in the Notice of Availability, IRWD has committed to a 45-day public review period which is in accordance with Section 15105(a) of the CEQA Guidelines.

Response 5-6

The commenter requests a Project alternative that addresses fish passage and habitat restoration for southern steelhead, pacific lamprey, Santa Ana speckled dace and other special status riparian species. The commenter is referred to Responses to Comments 4-1, 5-1 and 5-4 which address pacific lamprey, southern steelhead, Santa Ana speckled dace, and other special status riparian species. As discussed in Response to Comment 5-1, the Project does not propose development of fish passage, nor do existing conditions at the Santiago Creek Dam include fish passage. The baseline condition for evaluating impacts to fish passage is the presence of existing barriers that do not allow movement. Since the Project does not propose to modify this condition, the Project would not alter fish movement from baseline conditions. Therefore, both the No Project alternative and the proposed Project would have the same effect on fish passage, in that neither would allow for fish passage.

Comment Letter 6

Jonathan Snyder, Acting Field Supervisor
US Fish and Wildlife Service
June 25, 2025

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
2023-0109409-S7-TA-OR

June 25, 2025
Sent Electronically

Fiona Sanchez
Director of Water Resources
Irvine Ranch Water District
Water Resources and Policy Department
P.O. Box 57000
Irvine, California 92619-7000

Subject: Comments on the Draft Environmental Impact Report for the Santiago Creek Dam Improvement Project, Orange County, California

Dear Fiona Sanchez:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Impact Report (DEIR), dated April 28, 2025, for the Santiago Creek Dam Improvement Project (project), in Orange County (County), California (Psomas 2025). The project includes multiple elements with the primary objectives of rehabilitating and replacing the Santiago Creek Dam outlet tower, spillway facilities and dam embankment to meet current Department of Safety of Dams seismic, safety, and design requirements; extend the life of the facility; meet Irvine Ranch Water District's operational requirements; and improve regional water supply reliability while minimizing impacts to the environment and surrounding property owners. 6-1

Our primary concern and mandate is the protection of public fish and wildlife resources and their habitats for the benefit of the American people. We have a legal responsibility for the welfare of migratory birds, anadromous fish, and endangered animals and plants occurring in the United States. Specifically, we administer the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*), the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d), the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703 *et seq.*), and provide support to other Federal agencies in accordance with the provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

The proposed project is located within the boundaries of the Orange County Central and Coastal Subregions Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The NCCP/HCP was adopted by the County of Orange, the IRWD, and other Participating Landowners and Jurisdictions to fulfill the requirements of the Act and provide for the conservation of 39 listed and unlisted Identified Species and 5 Covered Habitats, while allowing for continued economic development within the central and coastal subregions. Subject to the terms of the 6-2

NCCP/HCP, IRWD obtained an incidental take permit that authorizes it to implement Planned Activities,[1] with potential to impact Identified Species and Covered Habitats. Among the Planned Activities addressed by the NCCP/HCP for IRWD is the operation, maintenance, replacement, rehabilitation and upgrading of its water reservoirs; including activities mandated by regulation or law affecting public health, safety and welfare.

We offer the following specific comments and recommendations regarding project-associated biological impacts based on our review of the DEIR, the NCCP/HCP and our knowledge of declining habitat types and species within the County. These comments are provided in keeping with our agency's mission to work "with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

6-2 cont.

1. The project is located within the boundaries of the NCCP/HCP where IRWD is a Participating Landowner that has authorization for take of up to 69 acres[2] and 27 acres, respectively, of CSS within and outside the Reserve System in association with implementation of Planned Activities. As Irvine Lake is primarily located within Non-Reserve Open Space, for analysis of consistency of the project with the NCCP/HCP, please breakdown habitat impacts in relation to the NCCP/HCP land use designations (e.g., Reserve, Non-Reserve Open Space, Special Linkage, other).

6-3

2. Southern California Edison (SCE) is another Participating Landowner that received authorization for 2.4 acres of take in the Reserve. Please describe where the impacts from re-routing the power line will occur in relation to the NCCP/HCP Reserve and if any of SCE's take is to be debited. In addition, please clarify on whose property SCE's new easement will be granted. Will the alignment of the former power pole line and any associated easement be permanently abandoned following decommissioning of the power line?

6-4

3. Please discuss the impact of temporary alteration of the existing drainage pattern from the water diversion and subgrade dewatering system on habitats and species downstream from the dam. Will increased flows downstream from the dam temporarily alter the amount or suitability of riparian and upland vegetation communities for species dependent on these communities downstream from the dam during the diversion period, and what will be the impact to these vegetation communities and species once dewatering stops and bypass measures are terminated?

6-5

4. The DEIR states that the project is not located above or within a groundwater recharge basin and will not increase water demand and, therefore, will not interfere with sustainable management of a groundwater basin. However, the impact of the project to groundwater beneath Santiago Creek downstream from the project is not fully discussed. Please

6-6

[1] Planned Activities are defined as including: (1) development on land or interests in land owned or controlled by the Participating Landowners in the Central and Coastal Subregions outside the Reserve System, including development of communities and infrastructure; and (2) uses and activities permitted within the Reserve System and described in the NCCP/HCP.

[2] Based on the consolidation of IRWD and the Santiago County Water District.

address whether the modifications to the dam, including installation of a filter drain system, will improve water conservation such that seepage and movement of groundwater beneath the dam will be altered. If so, what is the long term anticipated impact to groundwater levels downstream of the dam and will this have potential to alter the amount of riparian vegetation supported or the ability of riparian vegetation to persist within the floodplain of Santiago Creek downstream from the dam? Of particular concern is any alteration in the suitability or availability of riparian vegetation with potential to support the federally endangered least Bell's vireo (*Vireo bellii pusillus*) upstream of and in the vicinity of Villa Park Dam. 6-6 cont.

5. The proposed project will raise the spillway crest of the dam by 2 feet, which under maximum water storage will increase the elevation of the lake from 794 feet to 796 feet. The DEIR uses this elevation change and the projected use of this additional storage capacity for up to 45 days a year during years with high rainfall as the basis for projecting increased inundation impacts on vegetation communities, habitats, and species surrounding Irvine Lake. However, since 2020, restrictions have been in place to maintain the elevation of the lake at no more than 762.5 feet during the winter season. Because implementation of the project will remove this operational restriction, there is potential for the operational impact on the habitats and species surrounding the lake to be much greater than is suggested by the 2-foot elevational change in maximum storage capacity (i.e., up to 33.5 feet increase in the lake elevation). Please disclose the operational impact of the project on habitats and species surrounding Irvine Lake by listing the number of days during the winter operational period that the lake level has met or exceeded 762.5 feet in elevation, and the anticipated frequency and number of feet that the lake will be maintained above this level during future winter operational periods. 6-7

6. Quantification of temporary impacts: The project includes excavating and borrowing soil from within the lakebed to build a construction access road and temporary flood control berm to retain water upstream from the dam while the new dam embankment is being constructed. Some or all of the habitat impacted in this manner is listed as a temporary impact. Excavation within the lakebed may serve the dual purpose of increasing water storage capacity by changing the elevation and hydrology of an area for the foreseeable future. The DEIR should include cross-sectional profiles of before and after project ground elevations in comparison with historical inundation levels. Any areas where there will be an appreciable change in the ground elevation after project implementation should be quantified as a permanent impact. 6-8

7. Drainage of the reservoir for a 4-year period will cause a temporary reduction in available foraging habitat for a resident pair of bald eagles (*Haliaeetus leucocephalus*) nesting in proximity to Irvine Lake. This has potential to cause nest abandonment or a loss of productivity from the draw down of the reservoir. To comply with the Bald and Golden Eagle Protection Act, we recommend the project proponent contact the Service's Migratory Birds Program to determine if an eagle disturbance permit is needed for the project. To minimize impacts on nesting eagles, we recommend the 6-9

	project proponent draw down the reservoir after eagles have concluded breeding for the year and have fledged their young.	6-9 cont.
8.	To help compensate for project-related impacts to the vireo and riparian vegetation, we recommend IRWD include preparation and implementation of a long-term monitoring and management plan for vireo habitat within and around Irvine Lake.	6-10
9.	In association with implementation of the project, we recommend the project proponent monitor and provide annual reporting of the habitat changes surrounding Irvine Lake during the 4-year construction period to document the impact from dewatering the lake for 4 years on the surrounding riparian scrub/woodland community.	6-11

Thank you for the opportunity to review and provide comments on the DEIR for the Santiago Creek Dam Improvement project. Should you have questions or wish to schedule a meeting to discuss consulting on anticipated impacts of the project to the vireo, please contact William Miller[3] of our staff at 760-431-9440.

Sincerely,

Jonathan Snyder
Acting Field Supervisor

cc:
Jennifer Turner, California Department of Fish and Wildlife
Jessie Lane, California Department of Fish and Wildlife
Alison Kalinowski, California Department of Fish and Wildlife

LITERATURE CITED

Psomas. 2025. Draft Environmental Impact Report Santiago Creek Dam Improvement Project SCH No. 2023050097. Dated April 28, 2025. Prepared for Irvine Ranch Water District, Irvine, California.

[3] William_b_miller@fws.gov.

Response to Comment Letter 6

Jonathan Snyder, Acting Field Supervisor
US Fish and Wildlife Service
June 25, 2025

Response 6-1

The comment confirms receipt and review of the Draft EIR and states the primary concern and mandate of the U.S. Fish and Wildlife Service. The comment is noted, and no response is required.

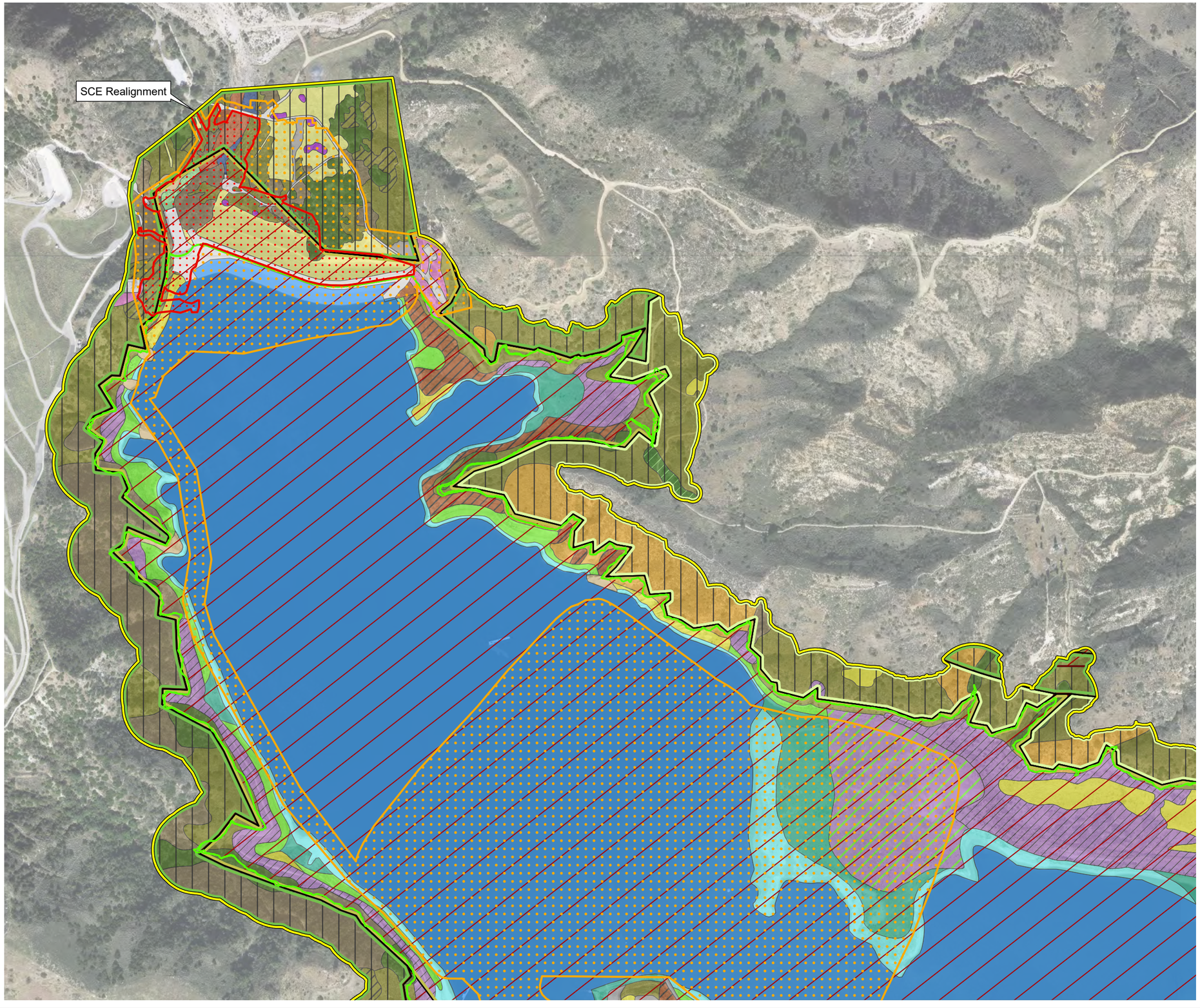
Response 6-2

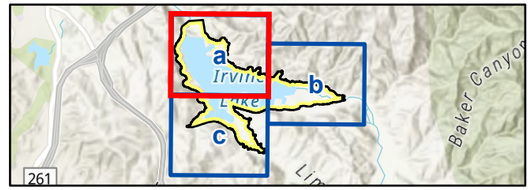
The comment summarizes the Project's relationship to the Orange County Central and Coastal Subregions NCCP/HCP. Specific comments and recommendations referenced by the comment are addressed in Responses to Comments 6-3 through 6-11. The comment is noted, and no response is required.

Response 6-3

The commenter requests that a breakdown of habitat impacts in relation to the NCCP/HCP land use designations be provided. The commenter is referred to Response to Comment 2-29 which includes a table with the requested breakdown. This detail is not relevant to the overall impact discussion contained in the Draft EIR and, thus, is not included as part of Section 3.0, Corrections, Clarifications and Additions to the Draft EIR.

Additionally, refer to new Exhibit 1, which shows the locations of temporary and permanent impacts to conserved lands.





Biological Study Area

Project Impacts
- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area

Ownership
- County of Orange
- IRWD

NCCP/HCP Land Use Designation
- Conservation Easement
- Non-Reserve Open Space
- Reserve

Vegetation Types and Other Areas
- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Vegetation Types and NCCP/HCP Land Use

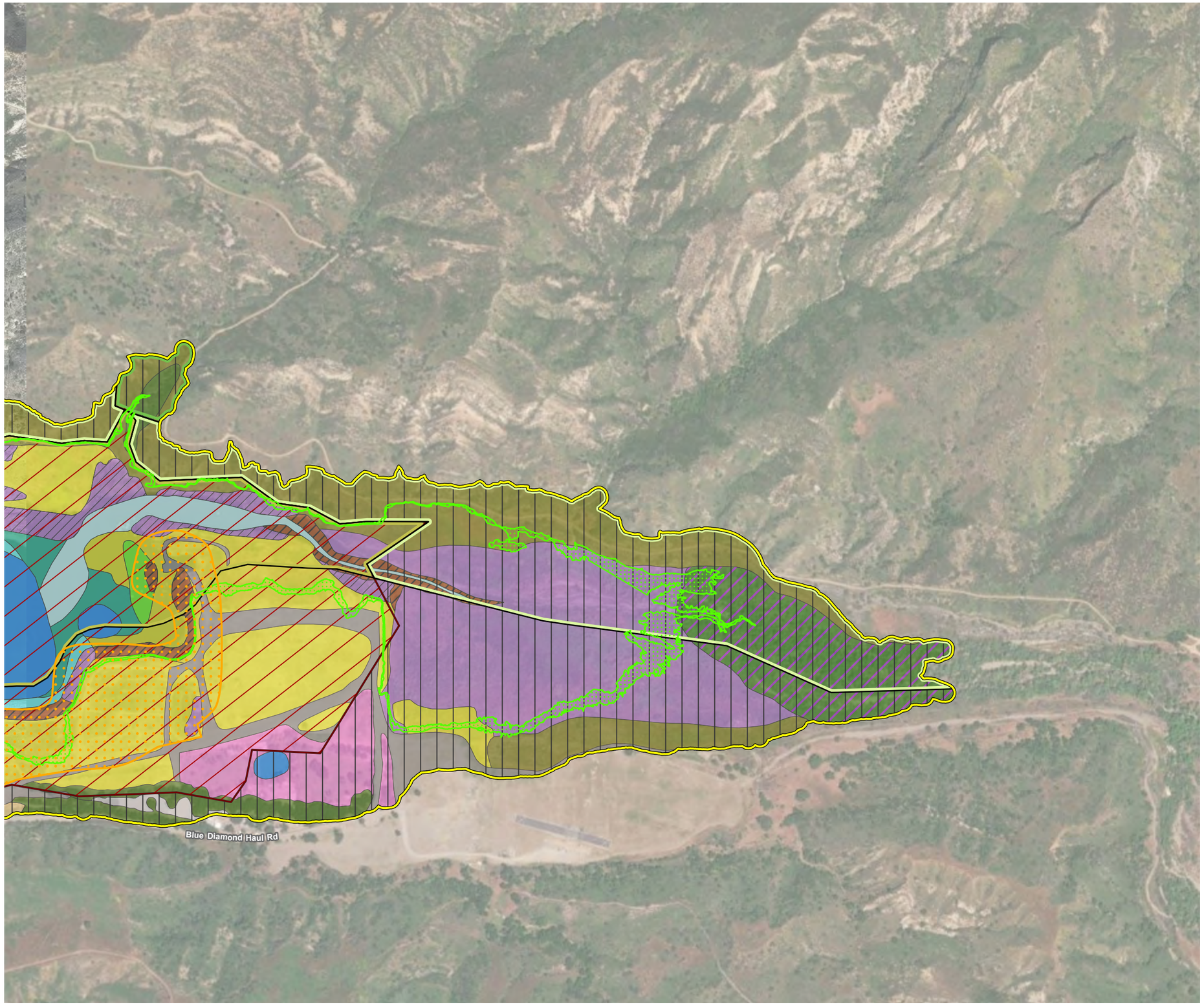
Exhibit 1a

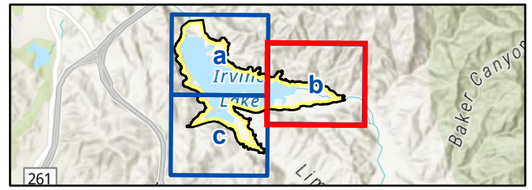
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 07/15/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_NCCP-HCP.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_NCCP_HCP\Santiago_Dam_NCCP_HCP.aprx\ex_NCCP-HCP_Designation





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

Ownership

County of Orange

IRWD

NCCP/HCP Land Use Designation

Conservation Easement

Non-Reserve Open Space

Reserve

Vegetation Types and Other Areas

Sagebrush Scrub (2.3.6)

Sagebrush - Coyote Brush Scrub (2.3.12)

Ruderal (4.6)

Riparian Herb (7.1)

Disturbed Mulefat Scrub (7.3)

Southern Sycamore Riparian Woodland (7.4)

Southern Black Willow Forest (7.7)

Disturbed Southern Black Willow Forest (7.7)

Coast Live Oak Woodland (8.1)

Open Water (12.1)

Fluctuating Shoreline (12.2)

Vegetated Fluctuating Shoreline (12.2)

Perennial Stream (13.1)

Ornamental (15.5)

Developed (15.6)

Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Vegetation Types and NCCP/HCP Land Use

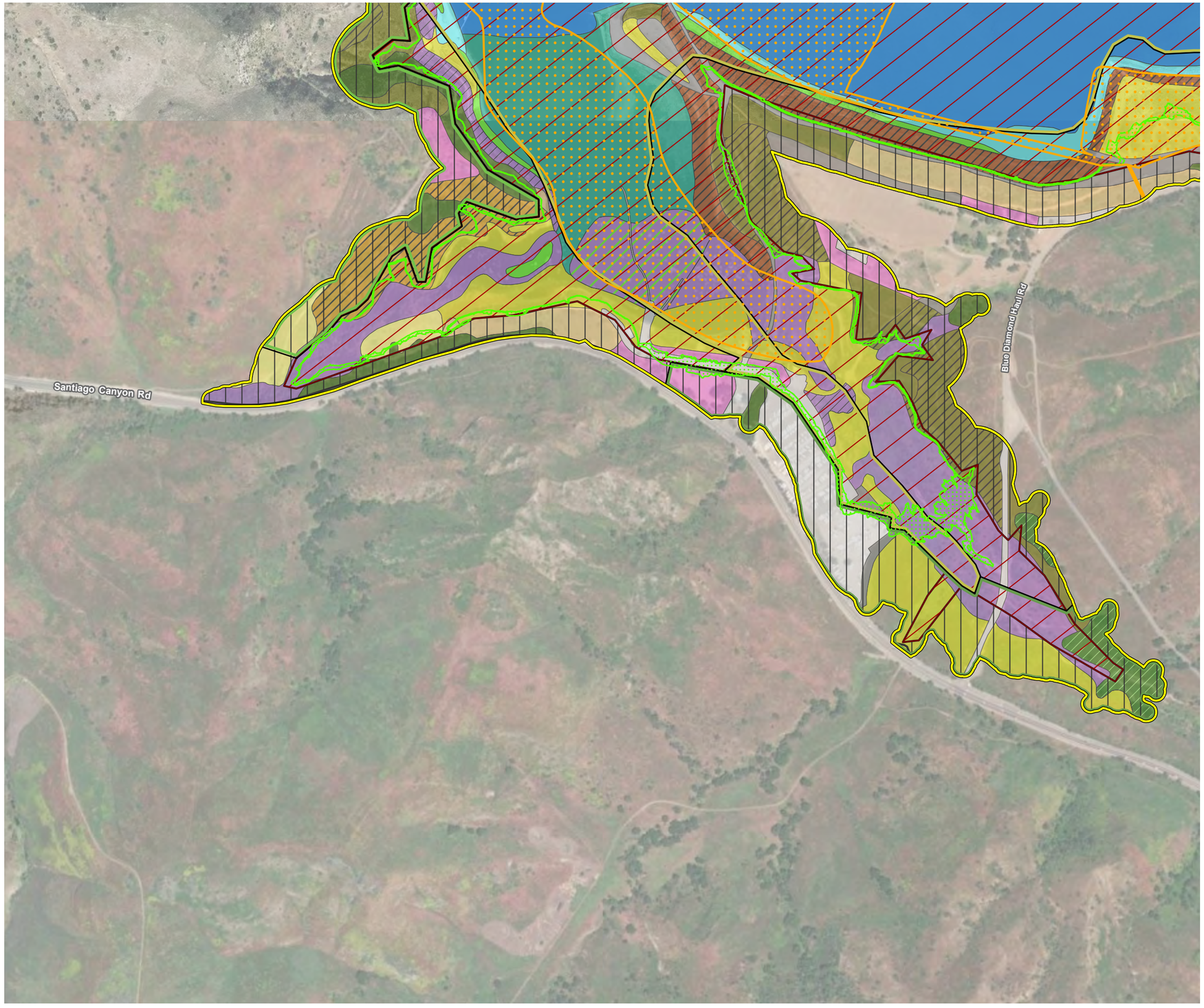
Exhibit 1b

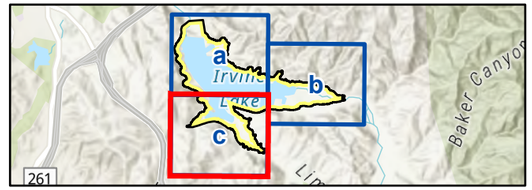
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 07/15/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_NCCP-HCP.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_NCCP_HCP\Santiago_Dam_NCCP_HCP apr\ex_NCCP-HCP_Designation





Biological Study Area

Project Impacts

- Temporary Impacts*
- Additional Inundation Area

Ownership

- County of Orange
- IRWD

NCCP/HCP Land Use Designation

- Non-Reserve Open Space
- Reserve
- Special Linkage

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Vegetation Types and NCCP/HCP Land Use

Exhibit 1c

Santiago Creek Dam Improvement Project

PSOMAS

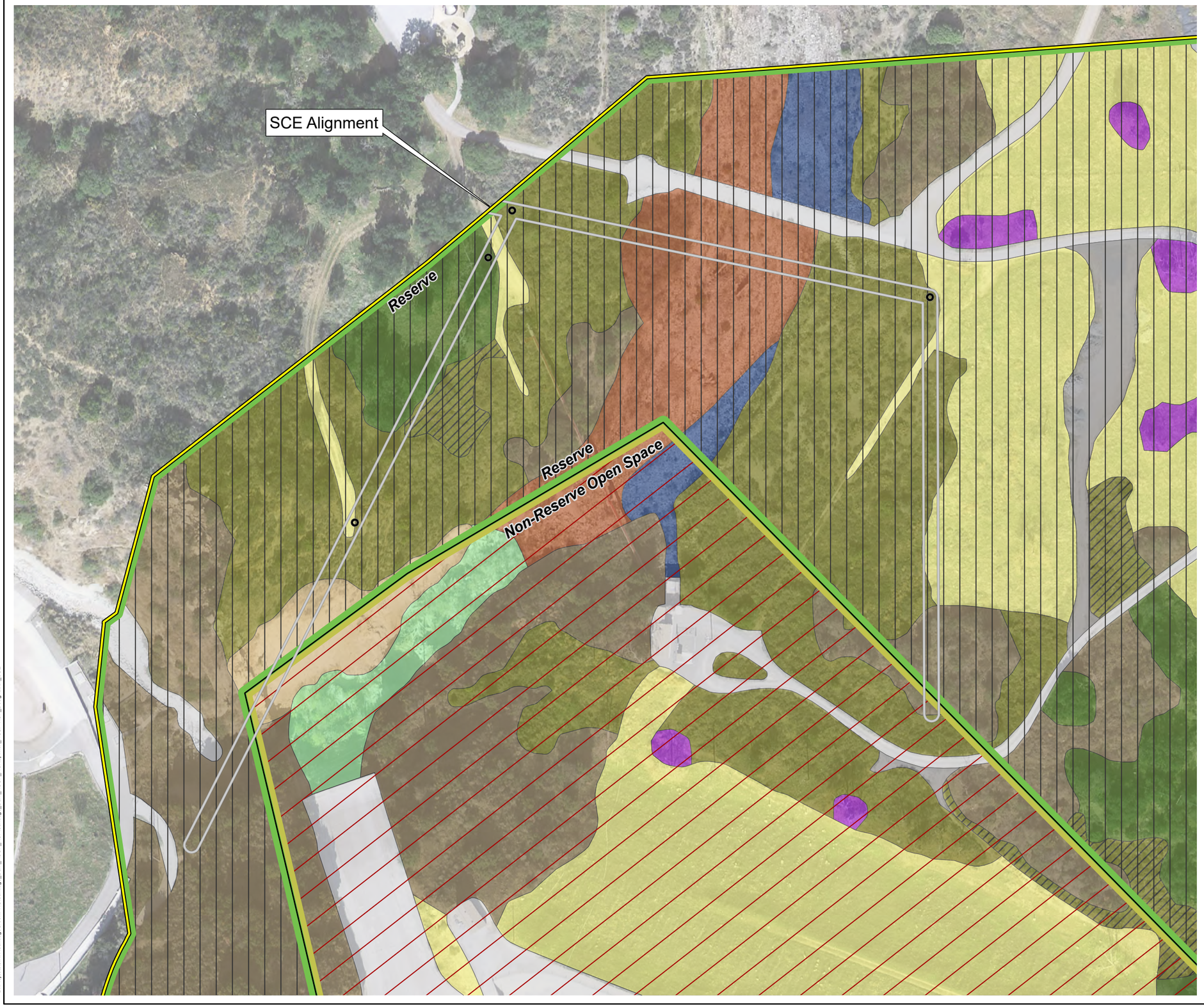
(Rev: 07/15/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_NCCP-HCP.pdf

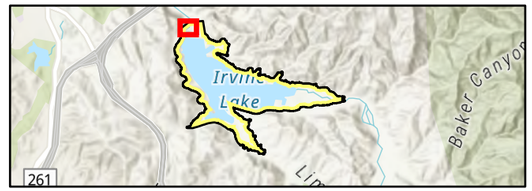
D:\Projects\3IRW\SantiagoCreek\PROJSantiago_Dam_NCCP_HCP\Santiago_Dam_NCCP_HCP.aprx\ex_NCCP-HCP_Designation

Response 6-4

The commenter requests that a breakdown of habitat impacts in relation to the SCE property be provided. The commenter is referred to Response to Comment 2-29 which includes a table with the requested breakdown of impacts within the NCCP/HCP Reserve. This detail is not relevant to the overall impact discussion contained in the Draft EIR and, thus, is not included as part of Section 3.0, Corrections, Clarifications and Additions to the Draft EIR.

Additionally, refer to new Exhibit 2, which shows the locations of SCE alignment and impacted acres for conserved lands by ownership.





Biological Study Area

SCE Realignment
- Permanent Impacts
- Temporary Impacts**

Ownership
- County of Orange
- IRWD

NCCP/HCP Land Use Designation
- Non-Reserve Open Space
- Reserve

Vegetation Types and Other Areas
- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 50 100 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

SCE Vegetation Types and NCCP/HCP Land Use

Exhibit 2

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 07/15/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_NCCP-HCP.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_NCCP_HCP\Santiago_Dam_NCCP_HCP.aprx\ex_NCCP-HCP_Designation_SCE

As detailed in MM BIO-3 included in Section 4.3, Biological Resources, of the Draft EIR, IRWD would use a combination of IRWD's take credits as well as on-site restoration and off-site restoration of coastal sage scrub to mitigate Project impacts within the NCCP/HCP Reserve, as approved by U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. SCE's take credits would not be utilized to address Project impacts, including those associated with the proposed relocation of SCE's overhead power lines and power poles.

SCE holds multiple easements located on the downstream side of Santiago Creek Dam. One portion of the easement travels to the existing Dam Keeper house and provides SCE service to both the Dam Keeper house and a service pipeline for the Metropolitan Water District of Southern California. This easement would remain. Another easement exists that passes through IRWD's property and over the existing spillway structure. This easement was provided to SCE for the benefit of the landfill as part of a "Powerline Relocation Agreement" that IRWD and the County executed in July 2001. The powerline currently serves OCWR. The existing overhead powerline and associated easement serving OCWR conflict with the Project. Pursuant to the existing easement agreement between IRWD and the County, the two parties are actively coordinating to relocate the SCE service and associated easement to County property so it does not impact the Project.

Response 6-5

The commenter requests information related to potential impacts to vegetation communities and species from the water diversion and subgrade dewatering system as well as once dewatering stops and bypass (diversion) measures are terminated.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.3, Biological Resources, Page 4.3-74, Dewatering of the Lake

Dewatering of the Lake

During the Project, the lake would be dewatered for a period of up to four years. When a lake is dewatered, water is not available to seep through the ground to recharge the underground aquifer and the water table under and around the edge of the lake may drop. If this occurs, it could affect the riparian vegetation around the edge of the lake. However, during the winter storm season, precipitation is expected to recharge or partially recharge the underground aquifer/water table. The water table can also recharge through the areas surrounding the lake that are outside the dewatered area, including through several drainages flowing into the lake and sheet flow from the southeastern and eastern sides of the lake. The majority of riparian scrub/woodland vegetation occurs at the upstream end of the lake, upstream of the work area, where recharge would still be occurring naturally (since it is upstream of the area that would be dewatered). Considering both precipitation and recharge from surrounding areas, lowering of the water table is not expected to substantially affect riparian scrub/woodland vegetation around the edges of the lake. **Based on likely lake draining scenarios, the flows required to drain the lake would vary from a negligible flow rate to approximately 370 cfs depending on hydraulic conditions and whether both pumped diversion and the cone valve are utilized. On average, Irvine Lake captures approximately 5,000 acre-feet of native runoff per year. Assuming approximately 5,000 acre-feet of native runoff is captured and only the pumped**

diversion system is utilized to drain the lake, it would require approximately 20 to 30 days to drain the reservoir. These flows would not be maintained long enough to permanently enhance or degrade the riparian and upland habitat and vegetation communities below the lake over the course of the construction period. Historically, IRWD has operated the dam's critical valve, which releases water to Santiago Creek, and discharged up to 250 cfs for weeks at a time. Based on observations during these events, this discharge flow rate is contained within Santiago Creek with additional available capacity in the creek to accommodate increased flows, up to 370 cfs. Once the Project is completed, releases from Irvine Lake would return to normal pre-construction operations. Therefore, this impact is considered adverse but less than significant, and no mitigation would be required.

Response 6-6

The comment raises concerns regarding the impact of the Project to groundwater beneath Santiago Creek downstream of the Project. As stated in the Draft EIR, the Project site is located outside of the Orange County Groundwater Basin. However, an alluvial aquifer is present along Santiago Creek, which is currently replenished from storm flows and releases from Santiago Creek Dam. The modifications to the dam will not change the way the aquifer is replenished. The new filter drain system is designed to be a protective feature of the dam and is not anticipated to be a new downstream water source that could influence the aquifer.

Groundwater levels would return to pre-construction levels shortly after the Project is completed and normal operations resume, resulting in the subsequent refilling of Irvine Lake and a return to existing baseline conditions in which water from the lake seeps into the alluvial aquifer. The proposed dam improvements would not result in additional barriers to the seepage from the lake into the underlying aquifer or the movement of groundwater in the alluvial aquifer beneath the dam as compared to existing baseline conditions.

Therefore, riparian habitat and vegetation along Santiago Creek downstream of the dam is not anticipated to be significantly impacted.

Villa Park Dam is located approximately 3.5 miles downstream of the proposed Project. Given that the proposed Project is not anticipated to have significant impacts to riparian communities immediately downstream of Irvine Lake, no impacts would be anticipated to riparian habitats over 3 miles downstream.

Response 6-7

The commenter raises concerns regarding the elevation of the lake and related Project changes to inundation areas surrounding the lake. Reservoirs, like Irvine Lake, are not static features in the landscape, such as a natural lake. Reservoirs like Irvine Lake are subject to numerous operational conditions that govern the lake level, including water demand from downstream users, drought conditions affecting inflow, and operations and maintenance, which dictate low water levels for repairs. Reservoirs may also serve a flood control function, which means lowering the lake levels in the late fall to accept winter storm flows. Therefore, reservoirs are dynamic systems, and a stated maximum elevation or regulated elevation is not maintained year after year or even day to day. Fluctuations in the reservoir levels and inundated areas represent the baseline condition.

The impacts calculated and reported in the Draft EIR were estimated based on the lower lake levels and include the approximate 30-foot elevation change (Refer to Exhibits 4.3-8a to 8c, 4.3-10a to 10c, 4.3-11a to 11c, and 4.3-12a to 12c).

Therefore, the biological resources analysis in the Draft EIR adequately discloses Project impacts resulting from the proposed additional inundation, accounting for recent limitations on lake elevation, and no reappraisal of impacts is necessary to address the concerns expressed in this comment.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 1.0, Executive Summary, Page 1-7, CEQA Baseline

Section 15125 of the CEQA Guidelines requires that the analysis in the EIR compare the potential impacts against the existing conditions. Therefore, the analysis has been conducted with the baseline of current operations at the Santiago Creek Dam. **Over the course of 20 years of record-keeping, the reservoir level has fluctuated from a high of 800 feet above mean sea level (amsl) (spilling over the spillway crest) in 1999 to a low of below 740 feet amsl in 2016. During this period the reservoir level has not remained static and no two years have been alike. In 2014, the reservoir level started to decrease below 765 feet amsl and has only been above 765 feet amsl twice since then: once in 2017 and once in 2019. In 2020 (when the vegetation surveys were performed in support of the Draft EIR), the reservoir level was below 765 feet amsl, and for the summer was below 750 amsl reaching 740 feet amsl in September. In order to best represent the lake level fluctuations, the exhibits produced and the analysis of impacts in this Draft EIR are based on these lower 2020 reservoir levels.**

Response 6-8

The comment states concerns regarding the ground elevations of the lakebed before and after the Project. The commenter is correct that the lakebed surface would be modified through various excavation activities. As discussed in the text addition below, as part of the construction process, the contractor would return the lakebed back to its original contours to the extent practicable, resulting in no permanent impacts. Therefore, no revisions to the characterization of temporary versus permanent impacts contained in the Draft EIR is warranted.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 3.0, Project Description, Pages 3-13 and 3-14, Fourth Paragraph

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These borrow areas are depicted on Exhibit 3-1. Approximately 12,000 haul truck trips, assuming 30 CY capacity trucks, would be required to haul this material from the borrow sites along the access road to the work area and to the dam. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would also include importing approximately 200,000 CY of material and exporting approximately 315,000 CY of material over the four-year construction period. Project construction is anticipated

to require a total of approximately 28,000 one-way truck trips for the import and export of material. Daily truck trips would vary from approximately 4 to 101 trips per day depending on the stage of construction, with an average of 34 truck trips per day. **As part of the construction process, the contractor would return the lakebed back to its original contours to the extent practicable, resulting in no permanent impacts.**

Response 6-9

The commenter requests that IRWD draw down the reservoir after a resident pair of bald eagles have concluded breeding for the year and fledged their young.

IRWD would avoid conducting initial construction-related dewatering for the lake (i.e., the main phase of dewatering) during bald eagle nesting season to the extent feasible. Following the initial dewatering phase and throughout construction, the objective would be to maintain a dry environment to the extent feasible. Although it is possible there would be fluctuations that could lead to temporary ponding due to weather events that cannot be predicted, efforts would be made to dewater these areas as quickly as feasible to maintain a dry environment. Because of this, it is not expected that a significant food source for bald eagles would be present in the lake throughout the construction period once the initial dewatering phase is completed. IRWD has been and will continue to coordinate with the Service's Migratory Birds Program to determine if an eagle disturbance permit is needed for the project. IRWD will comply with all eagle disturbance permit conditions as required by USFWS.

As further discussed in Section 3.0, Corrections, Clarifications and Additions to the Draft EIR, the following text is modified as part of the Final EIR. The change in text is signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The revisions reflect minor updates or clarifications to the content of the Draft EIR that do not represent material changes or revisions that require modifying the EIR's findings.

Section 4.3, Biological Resources, Page 4.3-87, MM BIO-6

MM BIO-6 **Bald Eagle: Initial dewatering activities shall be scheduled to avoid the bald eagle nesting season (December 1 to August 15) to the maximum extent feasible.** IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW. **IRWD will comply will all eagle disturbance permit conditions should such a permit be required by USFWS.**

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or early April to confirm the nesting stage (i.e., presence of eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing until the young fledge or May 15, whichever comes last. The Biologist will

complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

Appendix C, Biological Technical Report, Page 135, Section 5.7

5.7 MITIGATION MEASURE #7: BALD EAGLE

Initial dewatering activities shall be scheduled to avoid the bald eagle nesting season (December 1 to August 15) to the maximum extent feasible. IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW. **IRWD will comply will all eagle disturbance permit conditions should such a permit be required by USFWS.**

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or April to confirm the nesting stage (i.e., eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing weekly until the young fledge or until May 15, whichever comes last. The Biologist conducting the surveys will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

Response 6-10

The commenter recommends IRWD prepare and implement a long-term monitoring and management plan for vireo habitat. The commenter is referred to Section 4.3, Biological Resources, and a full analysis related to least Bell's vireo, including mitigation measures MM BIO-4 and MM BIO-5, which would reduce impacts on least Bell's vireo to less than significant. As discussed in MM BIO-4, if an on-site or off-site riparian habitat establishment program is selected to mitigate for impacts, long-term monitoring for riparian habitat, which includes least Bell's vireo habitat, would be addressed in the Riparian Habitat Mitigation and Monitoring Plan (HMMP).

Response 6-11

Please refer to Response to Comment 6-10. In addition, the proposed Project is not anticipated to have any significant impacts resulting from the dewatering process because the lake will continue to have inflows from the surrounding 63 square mile watershed.

Comment Letter 7

Glen M. Lubcke, Environmental Program Manager
California Department of Fish and Wildlife
South Coast Region
June 25, 2025

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

June 25, 2025

Fiona Sanchez
Irvine Ranch Water District
Water Resources and Policy Department
P.O. Box 57000
Irvine, CA 92619-7000
sanchezf@irwd.com

Subject: DRAFT ENVIRONMENTAL IMPACT REPORT for the Santiago Creek Dam Improvement Project, SCH No. 2023050097, ORANGE COUNTY, CA

Dear Fiona Sanchez:

7-1

The California Department of Fish and Wildlife (CDFW) reviewed the Draft Environmental Impact Report (DEIR) from the Irvine Ranch Water District (IRWD) for the Santiago Creek Dam Improvement Project (Project) pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines[1].

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (Fish & G. Code, § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

7-1 cont.

CDFW may also act as a Responsible Agency under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law[2] of any species protected under the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.) or the Native Plant Protection Act (NPPA; Fish & G. Code, §1900 et seq.), IRWD may seek related take authorization as provided by the Fish and Game Code.

CDFW also administers the Natural Community Conservation Planning (NCCP) program, a California regional habitat conservation planning program (Fish & G. Code, § 2800 et seq.). The IRWD participates in the NCCP program through its role as a Participating Landowner and Signatory Agency under the County of Orange Central and Coastal Subregional Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The DEIR for the proposed Project must ensure all requirements and conditions of the NCCP/HCP and Implementing Agreement (IA) are met. The DEIR should also address any biological issues not addressed in the NCCP/HCP and IA, such as specific impacts to, and mitigation requirements for, sensitive species not covered by the NCCP/HCP and IA.

PROJECT DESCRIPTION SUMMARY

Proponent: Irvine Ranch Water District

Objective: The Santiago Creek Dam (Dam) is a compacted earth fill embankment constructed in 1933 to provide flood control, water supply, fisheries enhancement, and recreational opportunities within Orange County. Based on recent evaluations of the Dam's structural elements, the Division of Safety of Dams (DSOD) has determined the Dam outlet tower and spillway need to be improved to address seismic safety concerns to meet current DSOD regulatory standards. Project activities include demolishing existing structures, including the outlet tower, spillway, portions of the upstream Dam embankment concrete facing, storage building on the Dam crest, portions of the outlet works, portions of the Irvine Lake pipeline (ILP), catwalks/stairs across Santiago Creek, and piezometers/monitoring wells. New features to be constructed include an inclined outlet structure with an access road/ramp (12 feet wide), concrete side-channel spillway (930 to 1,1000 feet long), Dam control building, upgraded outlet works, and a filter drain system on the Dam embankment. Modifications to the existing Dam crest are also proposed, including widening the crest from 10 feet to between 35 and 45 feet and raising the crest elevation one foot (812.9 ft tall) to improve safety and meet DSOD requirements for maximum flood events. A new 160-foot-long steel bridge would also be constructed to provide maintenance vehicle access from the Dam crest, across the

[2] "Take" is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

spillway channel, and to the inlet/outlet tower. The bridge will be 12 feet wide and supported on piles located on sides of the spillway structure. The new spillway will be raised six feet to 797.9 feet, which is two feet higher than current water storage elevation. A new emergency access walkway and stair system would also be constructed along the left wall of the spillway to reach the inlet/outlet structure and Dam crest during a spillway event. The existing ILP over Santiago Creek (Creek) will be relocated underground and underneath the new spillway structure. As a result of these modifications, IRWD estimates the Lake would hold a maximum of 28,000 acre-foot (AF) (an increase of 4,000 AF) and the upper two feet of the reservoir would be inundated for a longer time period (maximum of 30 to 45 days per year, 18 days currently). Under normal operating conditions, all flows out of the reservoir will be conveyed through the outlet pipeline to downstream customers (e.g. ILP, various treatment plants); however, in the event of emergency water may be released through the critical valve directly into Santiago Creek.

7-1 cont.

Prior to the construction of Dam improvements, Irvine Lake (Lake) will be dewatered of approximately 24,000 AF, and an access road would be graded along the western edge of the lakebed between the southeastern borrow soil/staging area and Dam. Dewatering would be conducted as needed using several methods including standard conveyance downstream via the outlet pipes, temporary pumping using above ground pipes to discharge water along Santiago Creek, and dewatering wells. IRWD would coordinate all downstream releases with impacted agencies and entities. Once the Lake is dewatered and prior to the first dry season, all exposed organic matter will be removed from the reservoir by construction crews. Additionally, a 30-foot-wide temporary diversion berm and access ramp would be installed along the Dam to protect the work area from seasonal storms and provide access to the downstream side of the Dam. The primary staging and equipment storage area would be at the upstream/eastern end of the Lake that is higher in elevation and unlikely to flood during storm events. A secondary staging area will also be located on the downstream toe of the Dam to stockpile materials. During construction, concrete crushing of old materials will occur intermittently during the Project and be situated at the upstream staging area.

Location: The 1,016.85-acre Project site is located at the Santiago Creek Dam at the northwest end of Irvine Lake in Orange County, California. The Project site is south of State Route (SR) 261 and east of SR 241 and Santiago Road. The Creek enters the Lake from the east and continues downstream of the Dam, flowing north and then west, ultimately reaching the Santa Ana River. The Project site is also located within the Central and Coastal Subregion NCCP/HCP and considered “Non-Reserve Open Space”. Surrounding land uses include NCCP/HCP Reserve which includes Irvine Regional Park, Limestone Canyon Regional Park, and Oak Canyon Park. Several conservation easements also occur along the northeastern shoreline edges of the Lake.

Biological Setting: As stated above, the Project site is located within, “Non-Reserve Open Space” designated in the NCCP/HCP plan area. The area surrounding the Lake and Dam is largely undeveloped and encompasses a variety of habitat types including

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

sagebrush scrub (including disturbed), sagebrush-coyote bush scrub, southern cactus scrub (including disturbed), disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal riparian herb, southern willow scrub, mulefat scrub (including disturbed), southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest (including disturbed), southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other land covers include cliffs, open water, fluctuating shoreline, perennial stream, ornamental vegetation, and developed areas. A summary of total acreage by land cover type is included in Table 17 of the Biological Technical Report (BTR; Psomas 2025; Attachment A). Table 13 of the BTR also indicates 669.630 acres of streambed resources subject to CDFW Lake and Streambed Alteration (LSA) permitting occur within the Project area (Psomas 2025; Attachment B).

7-1 cont.

The Project site has the potential to support several sensitive wildlife species, including but not limited to:

Plants: Braunton's milk-vetch (*Astragalus brauntonii*; ESA-listed endangered, California Rare Plant Rank (CRPR) 1B.1), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*; CRPR 1B.2, NCCP/HCP Covered Species), many-stemmed dudleya (*Dudleya multicaulis*; CRPR 1B.2), and Coulter's Matilija poppy (*Romneya coulteri*; CRPR 4.2, NCCP/HCP Covered Species). In 2022, multiple populations of mud nama (*Nama stenocarpa*; CRPR 2B.2), were observed within the southern portion of the Lake that experiences periodic inundation and were estimated to be between 3.5 and 5.5 million plants which is the largest population currently known for this species (Psomas 2025).

Fish: The Lake is stocked with several fish species, including white sturgeon (*Acipenser transmontanus*; CESA-listed candidate threatened), rainbow trout (*Oncorhynchus mykiss*), bass (*Moron spp.*), catfish (*Ictalurus spp.*), common carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis spp.*).

Birds: coastal California gnatcatcher *(Polioptila californica californica*; Federal Endangered Species Act listed-threatened (ESA), California Species of Special Concern (SSC), NCCP/HCP Covered Species; gnatcatcher), least Bell's vireo (*Vireo bellii pusillus*; ESA-listed endangered, California Endangered Species Act (CESA)-listed endangered, NCCP/HCP Covered Species; vireo), bald eagle (*Haliaeetus leucocephalus*; California Fully Protected Species), golden eagle (*Aquila* chrysaetos; California Fully Protected Species, HCCP/HCP Covered Species), white-tailed kite (*Elanus leucurus*; California Fully Protected Species), grasshopper sparrow (*Ammodramus* savannarum; SSC), yellow-breasted chat (*Icteria* virens; SSC), yellow warbler (*Setophaga* petechia; SSC), Cooper's hawk (*Accipiter cooperii*; CDFW Watch List (WL) species), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*; WL, NCCP/HCP Covered Species), and coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*; SSC, NCCP/HCP Covered Species).

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Mammals: mountain lion (*Puma concolor*; CESA-listed endangered), western mastiff bat (*Eumops perotis californicus*; SSC), pallid bat (*Antrozous pallidus*; SSC), pocketed free-tailed bat (*Nyctinomops femorosaccus*; SSC), big free-tailed bat (*Nyctinomops macrotis*; SSC), western red bat (*Lasiurus frantzii*; SSC), and western yellow bat (*Lasiurus xanthinus*; SSC).

Reptiles: coastal whiptail (*Aspidoscelis tigris stejnegeri*; SSC, NCCP/HCP Covered Species), orange-throated whiptail (*Aspidoscelis hyperythra*; WL, NCCP/HCP Covered Species), coast horned lizard (*Phrynosoma blainvillii*; SSC, NCCP/HCP Covered Species), and two-striped garter snake (*Thamnophis hammondii*; SSC).

Amphibians: western spadefoot (*Spea hammondii*; ESA-proposed threatened, SSC).

Invertebrates: Crotch's bumble bee (*Bombus crotchii*; CESA-candidate endangered).

The Project will impact coastal sage scrub, chapparal, grassland, riparian, woodland (including sycamore woodland), cliff, lakes, reservoirs, basins, disturbed, and developed land. Table 17 of the BTR includes a summary of impact acreages by vegetation type (Psomas 2025; Attachment A). The BTR assumes all coastal sage scrub habitats are occupied by gnatcatcher and all riparian habitats are occupied by vireo. Impacts associated with permanent structures are considered permanent and impacts associated with construction staging, borrow sites, and intermittent inundation are considered temporary. Construction of the Project will impact 233.774 acres of streambed resources (3.924 acres permanent, 229.850 acres temporary), and an additional 8.980 acres of streamed within the Lake inundation area will also be impacted as it will be subject to periodic changes in maximum lake level.

Based on the DEIR, the Project will directly impact 10 individuals of 810 many-stemmed dudleya (1.2% of total) and one individual of intermediate mariposa lily located downstream of the Dam. Intermediate mariposa lily is a Covered Species under the NCCP/HCP and impacts for up to 20 individuals are authorized under the plan. Additionally, four populations of Coulter's Matilija poppy will be directly impacted by the Project (three populations downstream (46 total individuals) and one upstream (one individual)); a Covered Species under the NCCP/HCP. Dewatering the Lake will also directly impact a significant population of mud nama located at the southern end of the Lake.

Compensatory habitat mitigation is required to mitigate the loss of coastal sage scrub, riparian, and woodland habitat types, and any western sycamore and coast live oaks removed by the Project will be replaced. The DEIR incorporates nine Best Management Practices (BMPs), also referred to as Project Design Features (PDF) BIO-1 through BIO-9 to avoid impacts to biological resources. The BMPs include clearing vegetation outside of the gnatcatcher/general bird breeding season, pre-construction surveys and monitoring for nesting birds and raptors, construction night lighting that is shielded and directed away from habitat areas, a 20-mph speed limit, and treatment of invasive

7-1 cont.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

weeds detected within work areas. Mitigation Measures (MM) BIO-1 through BIO-9 address impacts to sensitive habitats, special-status plants, special-status birds (gnatcatcher, vireo, bald eagle), Crotch's bumble bee, bats, and western sycamore trees. It is also acknowledged that notification for wetland impacts and CESA-listed candidate species will be pursued. 7-1 cont.

Project History: CDFW previously submitted a comment letter in response to the Notice of Preparation of a DEIR for the Project on June 5, 2023 (CDFW 2023). CDFW and the United States Fish and Wildlife Service (jointly, Wildlife Agencies) also attended a site visit in April 2024.

Timeframe: Construction of the Project is anticipated to occur intermittently over a four-year period, beginning in Fall 2027. The construction window assumes downtime associated with weather restrictions and a minimum of three dry seasons would be needed to build the Project in a phased fashion. The construction schedule also assumes the embankment and spillway improvements will be built concurrently.

COMMENTS AND RECOMMENDATIONS 7-2

CDFW offers the comments and recommendations below to assist the IRWD in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources, and to ensure regional conservation objectives in the County of Orange Central and Coastal Subregion NCCP/HCP would not be undermined by implementation of the Project. Additional comments or other suggestions are also included to improve the document.

COMMENT #1: Updated Baseline Conditions

Issue: The DEIR analyzes impacts to biological resources using an environmental baseline does not accurately reflect existing site conditions.

Specific impact: Section 1.8 of the DEIR states, *"[t]he analysis has been conducted with the baseline of current operations at Santiago Creek Dam*"; however, the analysis relies on maximum reservoir level data from 2020. In 2020, the maximum water storage elevation of the Dam/Lake was 795.9 feet elevation. From communication with IRWD in a project scoping meeting on June 4, 2025, it was clarified that IRWD has been restricted to store water at a lower storage elevation (762.5 feet elevation) than the actual maximum storage elevation (795.9 feet elevation) for the last 5 years. Once the Project improvements are completed, IRWD will be authorized to operate the Dam at a new maximum reservoir level (797.9 feet). This change represents a 35.4-foot increase in reservoir level from the current baseline rather than two feet described in the DEIR. Given the DEIR's environmental baseline does not reflect current operating conditions of the Dam, the impact analysis calculations may not accurately capture the impacts of the additional inundation area on adjacent habitat areas.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Why impact would occur: CDFW disagrees with the DEIR's conclusion that the additional inundation would be similar in duration to the current inundation of Lake edges and therefore will have a less than significant impact on biological resources. Per the BTR, "*[t]he additional inundation of the Lake will occur infrequently as a result of raising the spillway and would occur near the existing waterline (i.e., within two feet)".* Table 17 of the BTR indicates the additional inundation area (two-foot increase) will temporarily impact 3.36 acres of coastal sage scrub, 0.18 acres of chapparal, 3.32 grasslands, 9.66 acres of riparian, and 0.50 acre of woodland habitat types. Additionally, the inundation will temporarily impact two populations of intermediate mariposa lily on the northwestern side of the Lake and mud nama within the lakebed. Given the Project's modifications to the spillway will allow the Dam to impound water up to 797.9 feet elevation year-round, a change in elevation of 35.4 feet rather than two feet from current operating conditions, it is likely the temporary impacts to vegetation will be greater than what is discussed in the DEIR.

7-2 cont.

Evidence impact may be significant: Under CEQA, the DEIR analysis should compare the potential impacts against the existing conditions at the time of the NOP circulation (CEQA Guidelines § 15125). The NOP for the Project was circulated in 2023, and at that time, IRWD was restricted to operating the Dam at the lower Lake elevation level of 762.5 feet elevation. As such, the existing baseline conditions the DEIR uses should be reflective of this stated elevation.

Recommended Potentially Feasible Mitigation Measure(s)

7-3

CDFW requests the following recommendations and mitigation measures are incorporated into the final CEQA document:

Recommendation #1: Updated Baseline Conditions and Additional Inundation Analysis. CDFW strongly recommends the EIR's environmental baseline and analysis be updated to reflect current operating conditions of the Dam (maximum reservoir storage level of 762.5 feet). This update should include a revised impact calculation that considers the impacts of additional inundation on sensitive vegetation communities and species.

COMMENT #2: Project Consistency with Adjacent Conserved Lands

7-4

Issue: The DEIR does not discuss whether Project activities will impact conserved properties adjacent to the Lake (i.e. NCCP/HCP Reserve lands, conservation easements).

Specific impact: Construction and operation of the Project, including but not limited to, access roads, staging areas, dewatering activities, and inundation of the Lake may impact adjacent conserved lands. The DEIR does not address if there will be any Project overlap or encroachment into adjacent conserved lands and if proposed activities are consistent with any prohibitions of the conservation easements (CEs).

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Why impact would occur: Exhibit 4.3-3 of the BTR shows the Project site is surrounded by NCCP/HCP Reserve lands and several conservation easements (Psomas 2025; Attachment C). Santiago Creek Dam is a permitted, existing use under the NCCP/HCP and construction of infrastructure facilities is allowed within the Reserve System provided IRWD's take of coastal sage scrub habitats and incidental take of Covered Species is accounted for. However, given the Project will increase the Lake inundation area from current operational conditions, there may be unforeseeable impacts to sensitive habitats and species within adjacent conserved lands. Therefore, it is important to understand whether the change in Lake inundation level will be consistent with adjacent easements and land use policies of conserved properties.

Evidence impact may be significant: Conserved properties contributing to the NCCP/HCP reserve system are intended to be conserved in perpetuity and are legally protected under conservation easements. Conservation easements are a unique property interest created by statute for the purpose of retaining land "*predominantly in its natural, scenic, historical, agricultural, forested, or open-space condition*" (Civ. Code § 815.1). By statute, a conservation easement is permanent – it runs with the land is binding on subsequent owners of the underlying property. (Civ. Code §815.2).

7-4 cont.

Recommended Potentially Feasible Mitigation Measure(s)

CDFW requests the following recommendations and mitigation measures are incorporated into the final CEQA document:

Recommendation #2: Disclosure of Project Consistency with Adjacent Conserved Lands. CDFW recommends the EIR discuss whether the Project site overlaps with any conservation easement boundaries and whether the Project is consistent with any prohibitions of the existing CEs. Additionally, the EIR should disclose whether Project activities (i.e. construction access roads, staging areas, additional inundation of the Lake) will impact habitat protected under existing CEs that was not anticipated under the NCCP/HCP.

7-5

COMMENT #3: Impacts on Downstream Riparian Habitats and Species

Issue: The DEIR does not address how dewatering the Lake into Santiago Creek will temporally alter vegetation communities and species habitats downstream. Additionally, the DEIR does not analyze how habitat conditions downstream will change once dewatering into the Creek is terminated.

Specific impact: The DEIR does not analyze how Project-related water discharge into the Creek and changes in vegetation community composition will positively or negatively impact sensitive species downstream of the Dam. Additionally, the DEIR does not consider how habitat conditions for species will change once dewatering into the Creek is terminated.

7-6

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Why impact would occur: Page 1-3 of the DEIR states a temporary above-ground pumping system will be implemented to transfer water from the Lake downstream to a discharge point along the Creek as needed. In addition, the DEIR references a critical valve may be used to convey flows downstream into the Creek. The DEIR stipulates all downstream releases would be coordinated with affected agencies and entities; however, the anticipated volume, timing, and frequency of flows into Santiago Creek is unknown. Additionally, it is not clear how dewatering activities will impact habitat conditions for sensitive plant and wildlife species downstream.

7-6 cont.

The dewatering process will convey greater flows into Santiago Creek which can impact stream morphology, soil composition, riparian plant community composition, frequency of flooding events, and peak flow volumes. Per Exhibit 10A of the BTR, several sensitive species are known to occur downstream of the Dam, including but not limited to, gnatcatcher, vireo, coastal cactus wren, southern California rufous-crowned sparrow, mountain lion, many-stemmed dudleya (810 individuals), Coulter's Matilija poppy (46 individuals), intermediate mariposa lily (one individual), and two-striped garter snake. These species may be directly impacted by dewatering due to increased flooding of the creek, habitat loss, or changes in plant community composition (Psomas 2025).

Evidence impact may be significant: Any changes to hydrology from Project activities and their potential impacts on biological resources should be analyzed and disclosed in the environmental document. Adequate disclosure is necessary for CDFW to assist IRWD in adequately identifying, avoiding, and/or mitigating a project's significant, or potentially significant, direct, and indirect impacts on biological resources.

CDFW exercises its regulatory authority as provided by Fish and Game Code section 1600 et seq. to conserve fish and wildlife resources which include rivers, streams, or lakes and associated natural communities. Fish and Game Code section 1602 requires any person, state or local governmental agency, or public utility to notify CDFW prior to beginning any activity that may do one or more of the following:

- Divert or obstruct the natural flow of any river, stream, or lake;
- Change the bed, channel, or bank of any river, stream, or lake;
- Use material from any river, stream, or lake; or,
- Deposit or dispose of material into any river, stream, or lake.

CDFW requires a Lake and Streambed Alteration (LSA) Notification when a project activity may substantially adversely affect fish and wildlife resources. The Project may result in significant impacts on streams and associated natural communities if development of sites identified by the Project or future projects would be near these resources. Without appropriate mitigation, the Project may have a substantial adverse direct, indirect, and cumulative effect, either directly or through habitat modifications, on fish and wildlife resources, including rivers, streams, or lakes and associated natural communities identified by CDFW.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Recommended Potentially Feasible Mitigation Measure(s)

7-7

CDFW requests the following recommendations and mitigation measures are incorporated into the final CEQA document:

Recommendation #3: Disclosure of Project Impacts on Downstream Habitats. CDFW recommends the EIR include a thorough discussion and analysis of how downstream habitat conditions, vegetation communities, and species utilizing those communities will be temporally or permanently impacted by dewatering activities. In addition, we recommend the EIR analyze how habitat conditions will change after dewatering into the Creek has been terminated. If appropriate, mitigation measures should be included in the EIR to reduce the significance of these impacts. Appropriate mitigation may include, but is not limited to, notification under Fish & G. Code § 1600, revegetation, and/or compensatory mitigation for these impacts.

COMMENT #4: Temporary vs. Permanent Impact Quantification for Project Access Features

7-8

Issue: The DEIR impact analysis considers the construction of temporary access roads using excavated soil from the dry lakebed as a temporary impact when pre-Project conditions may not be restored.

Specific impact: After dewatering is completed, the Project proposes to construct a temporary access road between the Dam work area and the southern staging area. The road would be constructed within the dry lakebed on the western side of the Lake and use lakebed soil collected from two borrow sites on the southern end of the Lake. Additionally, the Project plans to excavate 360,000 cubic yards of soil from the borrow sites to use as a source material for the dam embankment itself. The DEIR is not clear if these construction and excavation activities will result in a permanent change in ground-level elevation or whether the lakebed will be restored to pre-Project conditions after construction is completed.

Why impact would occur: Soil excavation pits and construction of access roads within the dry lakebed may result in permanent changes to the ground-level elevation within the Lake. The DEIR quantifies these activities as temporary impacts as they are associated with construction access and staging; however, if the lakebed elevation is modified and not restored to pre-Project conditions, these modifications would be unmitigated permanent impacts.

Evidence impact may be significant: Classification of these impacts as permanent would potentially alter the mitigation obligations of IRWD and will inform the strategy for meeting these obligations, as permanent impacts of this size and scope should be part of the analysis of a Project. If the Project activity results in permanent impacts to the landscape, then that impact is significant, and the Lead Agency should require compensatory mitigation (CEQA Guidelines § 15370(e)). It is important to address permanent impacts in the Project analysis so mitigation can be addressed, if necessary.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Recommended Potentially Feasible Mitigation Measure(s)

7-9

CDFW requests the following recommendations and mitigation measures are incorporated into the final CEQA document:

Recommendation #4: Modifications to Lakebed Ground-level Elevation. CDFW recommends the EIR be updated to clarify whether ground-level elevation of the lakebed will change as a result of construction activities. The discussion and analysis of the nature of these impacts should also include a cross-section figure depicting the existing lakebed ground-level elevation and any anticipated elevation change from the borrow pits and temporary access road. If there is a change in ground-level elevation as a result of construction, then impacts should be quantified as permanent. If appropriate, mitigation measures should be included in the EIR to reduce the significance of these impacts. Appropriate mitigation may include, but is not limited to, notification under Fish & G. Code § 1600, and/or compensatory mitigation.

COMMENT #5: Bald Eagle

7-10

Issue: The Project will temporally impact foraging habitat for bald eagle.

Specific impact: Dewatering the Lake over a four-year timeframe will temporally and directly impact bald eagle by limiting the availability of foraging habitat year-round, especially during the nesting season. Direct impacts to bald eagle may include bald eagles leaving the Lake temporarily or permanently, reproductive suppression during the breeding season, nest abandonment, mortality of eagle chicks, and/or population decline of a special-status species.

Why impact would occur: The DEIR acknowledges a nesting pair of resident bald eagles was observed within a pine tree adjacent to the Project site during focused surveys in Spring/Summer 2022. The nest location has been known since 2016 and is situated approximately 1,200 feet away from the nearest staging area and 1.25 miles away from the Dam. Suitable foraging and wintering habitat for bald eagle are also known to occur throughout the Project area. The DEIR concludes dewatering the Lake will impact 183.53 acres of suitable foraging habitat for bald eagle (i.e. open water, fluctuating shoreline, vegetated fluctuating shoreline; 0.33 acre permanent, 183.20 acres temporary). As a result of dewatering, fish would no longer be available as a food source for the breeding pair and waterfowl prey will also be limited throughout the Project area. Santiago Creek upstream of the Dam would continue to provide some stream habitat that may support fish and/or waterbird prey, however; the temporal loss of bald eagle foraging habitat may be significant absent appropriate minimization measures.

MM-BIO-6 states "*…IRWD will consult with the Wildlife Agencies to determine whether any regulatory approval is necessary to comply with CESA and the federal Bald Eagle Act… [and] the Wildlife Agencies will review and approve the monitoring strategy to be used during construction*". Given the timing of dewatering will directly impact the

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

abundance of prey, the EIR should include an anticipated dewatering schedule and IRWD should ensure the timing of dewatering minimizes impacts to nesting bald eagles. 7-10 cont.

Evidence impact may be significant: Bald eagle is a CESA endangered and California Fully Protected Species and protected under the federal Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. § 668-668d) and the Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703-712). The BGEPA prohibits anyone without a permit from taking either species, including their parts, nests, or eggs.

Recommended Potentially Feasible Mitigation Measure(s) 7-11

CDFW requests the following recommendations and mitigation measures are incorporated into the final CEQA document:

Recommendation #5: Bald and Golden Eagle Protection Act Consultation. CDFW recommends that IRWD directly consult with the USFWS Migratory Bird Permit Office to determine whether a BGEPA permit is needed for the Project.

Mitigation Measure #1: Lake Dewatering Schedule. To avoid impacts to nesting bald eagle, dewatering activities shall avoid the bald eagle nesting season to the maximum extent feasible and ensure some open water foraging habitat remains available within the Project area during each eagle nesting season. Dewatering shall commence after the nesting season has concluded and the qualified biologist has confirmed any eagle chicks have fledged the nest. 7-12

COMMENT #6: Least Bell's Vireo 7-13

Issue: The Project will directly and indirectly impact riparian habitat occupied by vireo.

Specific impact: The DEIR's MM BIO-6 acknowledges the Project's mitigation strategy for vireo will need to be approved by the Wildlife Agencies through Section 7 under ESA and Section 2080.1 under CESA; however, it incorrectly states NCCP/HCP Conditional Coverage can be extended to vireo for the Project. The riparian habitat surrounding the Lake supports nesting vireo and has potentially significant long-term conservation value in the subregion. Conditional Coverage for impacts to vireo cannot be authorized or extended under the Plan.

Why impact would occur: Per the BTR, vireo is known to occur in riparian habitats along Santiago Creek, as well as along the upstream edges of the Lake and within riparian habitat downstream of the Dam. During biological surveys in 2022, 27 breeding pairs of vireo were detected upstream of the Dam and one individual vireo was detected downstream of the Dam (Psomas 2025). Construction of the Project will directly impact 36.73 total acres (1.45 acres permanent, 35.28 acre temporary) of suitable riparian habitat for vireo. Additionally, construction-related noise disturbance (up to 20 hours per day, including night work) will indirectly impact vireo periodically throughout the breeding season for multiple years.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

The NCCP/HCP stipulates, "…*[riparian] habitat that supports migrants or nesting birds [vireo] and has potentially significant long conservation value in this subregion is not covered*" (County of Orange, 1996; Section 4.5, page II-254). Santiago Creek offers long term conservation value for nesting vireo; therefore, to remain consistent with the guidelines of the NCCP/HCP, conditional coverage for vireo would not apply to this Project. 7-13 cont.

Evidence impact may be significant: Consistent with CEQA Guidelines § 15380, the status of vireo as an endangered species pursuant to the federal ESA (16 U.S.C. § 1531 et seq.) and CESA (Fish & G. Code, § 2050 et seq.) qualifies it as an endangered, rare, or threatened species under CEQA. CESA prohibits the take of any species of wildlife designated by the California Fish and Game Commission as endangered, threatened, or candidate species. CDFW may authorize the take of any such species if certain conditions are met. If the Project may result in take of vireo or lead to potential nest abandonment, a CESA permit will be needed. Authorization from CDFW may include an ITP or a consistency determination (CD) (Fish and Game Code §§ 2080.1, 2081, subds. (b), (c)). Requirements to meet the CESA 'fully mitigated standard' may differ from federal requirements, so early consultation is encouraged, as significant modification to a Project and mitigation measures may be required to obtain a CESA Permit.

Recommended Potentially Feasible Mitigation Measure(s) 7-14

CDFW requests the following recommendations and mitigation measures are incorporated into the final CEQA document:

Recommendation #6: Vireo Conditional Coverage. CDFW recommends the EIR be updated to clarify Conditional Coverage for vireo would not apply to the Project. We look forward to coordinating with IRWD on the CESA permitting process for vireo under Fish & G. Code § 2080.

Mitigation Measure #2: Long-Term Monitoring and Management Plan. CDFW recommends IRWD develop a long-term monitoring and management plan for vireo as part of the Project. In addition, we recommend IRWD submit annual monitoring reports to the Wildlife Agencies documenting the changes in riparian habitat conditions and vireo population density throughout the Project term to evaluate Project impacts. 7-15

ADDITIONAL COMMENTS 7-16

Mitigation and Monitoring Reporting Plan. CDFW recommends the Project's environmental document include mitigation measures recommended in this letter. CDFW has provided comments via a Mitigation Monitoring and Reporting Plan to assist in the development of feasible, specific, detailed (i.e., responsible party, timing, specific actions, location), and fully enforceable mitigation measures (CEQA Guidelines, § 15097; Pub. Resources Code, § 21081.6). The Lead Agency is welcome to coordinate

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

with CDFW to further review and refine the Project's mitigation measures. Per Public Resources Code section 21081.6(a)(1), CDFW has provided a summary of our suggested mitigation measures and recommendations in the form of an attached Draft Mitigation Monitoring and Reporting Plan (Attachment D). 7-16 cont.

1. **White Sturgeon**. White sturgeon is a CESA candidate species; however, the population inhabiting the Lake is not protected. The DEIR adequately addresses impacts to white sturgeons as a result of dewatering Irvine Lake, based on IRWD's aquaculture permit and classification of the population as stocked. However, given the size of the white sturgeon population at Santiago Creek Dam, CDFW requests IRWD discuss the dewatering activity with CDFW, with the intent to minimize mortality of white sturgeons as much as possible. 7-17

2. **Lake and Streambed Alteration Notification**. CDFW acknowledges Table 4.3-2 of the DEIR indicates portions of the Lake, Santiago Creek, and 15 drainages throughout the Project area, totaling 669.630 total acres, may be considered streambed resources subject to CDFW wetland permitting. CDFW looks forward to receiving the Project's Lake and Streambed Alteration Notification pursuant to Fish & G. Code, § 1600 et seq.). 7-18

3. **Crotch's Bumble Bee Incidental Take Permit**. CDFW acknowledges MM-BIO-2A-2C discloses IRWD's plan to obtain an ITP for Crotch's bumble bee. CDFW looks forward to receiving the Project's ITP application pursuant to Fish & G. Code § 2080. 7-19

4. **Southern California Edison (SCE) Utility Lines**. Page 3-10 of the DEIR indicates SCE will relocate overhead powerlines and poles from the existing spillway to the downstream toe of the Dam as part of this Project. A 15-foot-wide right-of-way (ROW) easement will be established in the new location for long-term maintenance access. CDFW recommends the EIR include a discussion of how re-routing the powerlines will impact species and how mitigation will be provided. Additionally, we recommend the EIR discuss whether the old ROW easements will be permanently abandoned. 7-20

ENVIRONMENTAL DATA 7-21

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNDDB website[3] provides directions regarding the types of information that should be reported and allows on-line submittal of field survey forms.

[3] https://wildlife.ca.gov/Data/CNDDB

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

In addition, information on special status native plant populations and sensitive natural communities, should be submitted to CDFW's Vegetation Classification and Mapping Program using the Combined Rapid Assessment and Relevé Form[4].

The City should ensure data collected for the preparation of the DEIR is properly submitted.

7-21 cont.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of environmental document filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the environmental document filing fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

7-22

CONCLUSION

CDFW appreciates the opportunity to comment on the DEIR to assist IRWD in identifying and mitigating Project impacts on biological resources. CDFW requests an opportunity to review and comment on any response IRWD has to our comments and to receive notification of any forthcoming hearing date(s) for the Project (CEQA Guidelines, § 15073(e)).

7-23

Questions regarding this letter or further coordination should be directed to Alison Kalinowski[5], Environmental Scientist.

Sincerely,

Signed by:
Glen Lubcke
AD7D070BCB66466...

Glen M. Lubcke
Environmental Program Manager
South Coast Region

ATTACHMENTS

Attachment A: Table 17, Vegetation and Land Cover Acreage Impacts, Biological Technical Report
Attachment B: Table 13, CDFW Jurisdictional Resources, Biological Technical Report
Attachment C: Exhibit 4.3-3 NCCP/HCP Designation of Conserved Lands, Biological Technical Report

[4] https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities/Submit
[5] Phone: 858-775-6320; Email: alison.kalinowski@wildlife.ca.gov

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Attachment D: Draft Mitigation Monitoring and Reporting Program

ec: California Department of Fish and Wildlife
Jennifer Turner, Senior Environmental Scientist (Supervisory)
Jessie Lane, Environmental Scientist
Cindy Hailey, Staff Services Analyst

U.S. Fish and Wildlife Service
Christine Medak, Christine_Medak@fws.gov
William B. Miller, william_b_miller@fws.gov

Office of Planning and Research
State.Clearinghouse@opr.ca.gov

REFERENCES

California Department of Fish and Wildlife. June 2023. Comments on the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Notice of Preparation of a Draft Environmental Impact Report SCH#2023050097.

County of Orange. July 1997. County of Orange Central and Coastal Subregion Natural Community Conservation Plan and Habitat Conservation Plan.

Psomas. April 2025. Biological Technical Report for the Santiago Creek Dam Improvement Project, Orange County, California.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

ATTACHMENTS

ATTACHMENT A: TABLE 17. VEGETATION AND LAND COVER ACREAGE IMPACTS (Psomas 2025).

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	115.81	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	20.11	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.63	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		*175.10*	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	30.35	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		*30.35*	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	92.38	0.25	25.72	0.00	25.97	3.07
Subtotal Grassland		*107.97*	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		*212.65*	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	31.09	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		*31.45*	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.63	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.63*	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.13	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		*383.55*	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	20.77	0.03	1.21	0.00	1.24	0.47
Developed	15.6	20.98	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		*41.75*	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	25.42	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		*25.42*	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**1,016.85**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N.
[b] Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

ATTACHMENT B: TABLE 13. CDFW JURISDICTIONAL RESOURCES (Psomas 2025)

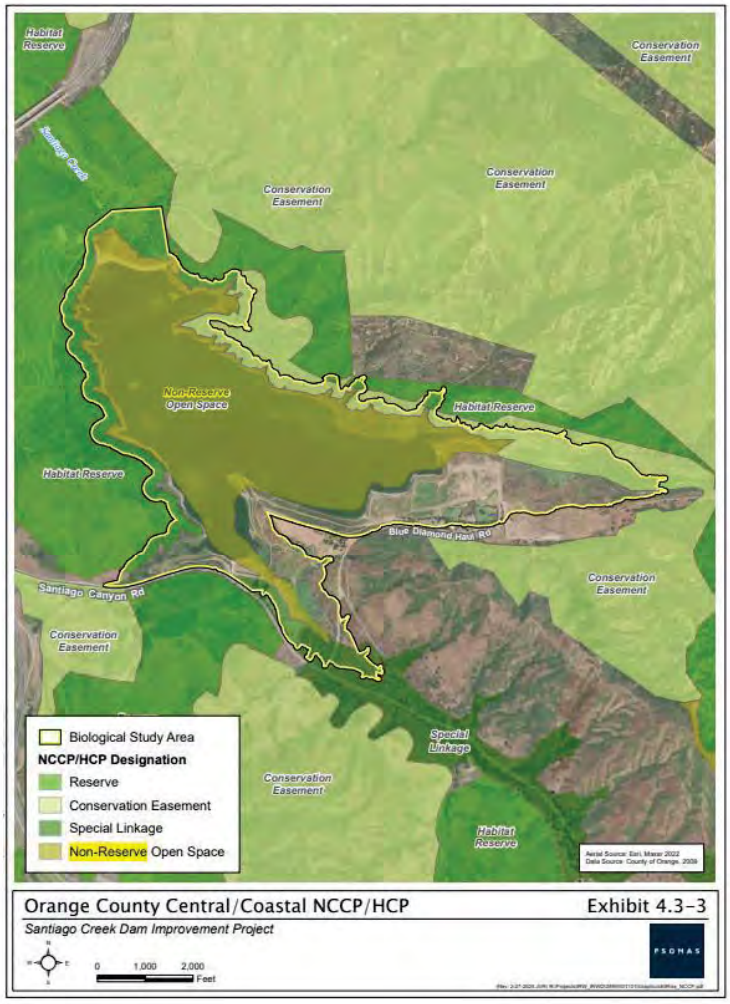
TABLE 13
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

	Jurisdiction (acres)						
	USACE WOTUS			RWQCB Waters of the State			CDFW Jurisdictional Resources
Feature	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Total
Irvine Lake	94.582	312.959	407.541	94.582	312.959	407.541	614.135
Santiago Creek	7.124	13.803	20.927	7.124	13.803	20.927	36.024
Drainage 1	—	0.008	0.008	—	0.008	0.008	0.027
Drainage 2	—	—	—	—	0.025	0.025	0.074
Drainage 3	—	—	—	—	0.071	0.071	0.168
Drainage 4	—	—	—	—	0.048	0.048	0.094
Drainage 5	—	—	—	—	0.144	0.144	0.359
Drainage 6	—	—	—	—	0.369	0.369	0.149
Drainage 7	—	—	—	—	0.100	0.100	0.148
Drainage 8	—	—	—	—	0.024	0.024	0.042
Drainage 9	—	—	—	—	0.066	0.066	1.237
Drainage 10	—	—	—	—	0.167	0.167	0.245
Drainage 11	—	—	—	—	0.114	0.114	0.318
Drainage 12	—	—	—	—	4.894	4.894	13.517
Drainage 13	—	—	—	—	0.039	0.039	0.114
Drainage 14	—	—	—	—	0.235	0.235	0.416
Drainage 15	—	—	—	—	0.433	0.433	2.563
Total	**101.706**	**326.770**	**428.476**	**101.706**	**333.499**	**435.205**	**669.630**

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

ATTACHMENT C: EXHIBIT 4.3-3. NCCP/HCP CONSERVED LANDS (Psomas 2025)



Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

ATTACHMENT D: DRAFT MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

CDFW provides the following language to be incorporated into the MMRP for the Project.

Mitigation Measure	Timing	Responsible Party
Recommendation #1: Updated Baseline Conditions and Additional Inundation Analysis. CDFW strongly recommends the EIR's environmental baseline and analysis be updated to reflect current operating conditions of the Dam (maximum reservoir storage level of 762.5 feet). This update should include a revised impact calculation that considers the impacts of additional inundation on sensitive vegetation communities and species.	Prior to Project Initiation	Lead Agency
Recommendation #2: Disclosure of Project Consistency with Adjacent Conserved Lands. CDFW recommends the EIR discuss whether the Project site overlaps with any conservation easement boundaries and whether the Project is consistent with any prohibitions of the existing CEs. Additionally, the EIR should disclose whether Project activities (i.e. construction access roads, staging areas, additional inundation of the Lake) will impact habitat protected under existing CEs that was not anticipated under the NCCP/HCP.	Prior to Project Initiation	Lead Agency
Recommendation #3: Disclosure of Project Impacts on Downstream Habitats. CDFW recommends the EIR include a thorough discussion and analysis of how downstream habitat conditions, vegetation communities, and species utilizing those communities will be temporally or permanently impacted by dewatering activities. In addition, we recommend the EIR analyze how habitat conditions will change after dewatering into the Creek has been terminated. If appropriate, mitigation measures should be included in the EIR to reduce the significance of these impacts. Appropriate mitigation may include, but is not limited to, notification under Fish & G. Code §	Prior to Project Initiation	Lead Agency

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Mitigation Measure	Timing	Responsible Party
1600, revegetation, and/or compensatory mitigation for these impacts.		
Recommendation #4: Modifications to Lakebed Ground-level Elevation. CDFW recommends the EIR be updated to clarify whether ground-level elevation of the lakebed will change as a result of construction activities. The discussion and analysis of the nature of these impacts should also include a cross-section figure depicting the existing lakebed ground-level elevation and any anticipated elevation change from the borrow pits and temporary access road. If there is a change in ground-level elevation as a result of construction, then impacts should be quantified as permanent. If appropriate, mitigation measures should be included in the EIR to reduce the significance of these impacts. Appropriate mitigation may include, but is not limited to, notification under Fish & G. Code § 1600, and/or compensatory mitigation.	Prior to Project Initiation, After Project Completion	Lead Agency
Recommendation #5: Bald and Golden Eagle Protection Act Consultation. CDFW recommends that IRWD directly consult with the USFWS Migratory Bird Permit Office to determine whether a BGEPA permit is needed for the Project.	Prior to Project Initiation	Lead Agency
Mitigation Measure #1: Lake Dewatering Schedule. To avoid impacts to nesting bald eagle, dewatering activities shall avoid the bald eagle nesting season to the maximum extent feasible and ensure some open water foraging habitat remains available within the Project area during each eagle nesting season. Dewatering shall commence after the nesting season has concluded and the qualified biologist has confirmed any eagle chicks have fledged the nest.	Prior to Project Initiation, During Project Construction	Lead Agency
Recommendation #6: Vireo Conditional Coverage. CDFW recommends the EIR be updated to clarify Conditional Coverage for vireo would not apply to the Project. We look forward to coordinating with IRWD on	Prior to Project Initiation	Lead Agency

Docusign Envelope ID: 47F70176-CFC5-4E1D-8FC2-AA7307F4145D

Mitigation Measure	Timing	Responsible Party
the CESA permitting process for vireo under Fish & G. Code § 2080.		
Mitigation Measure #2: Long-Term Monitoring and Management Plan. CDFW recommends IRWD develop a long-term monitoring and management plan for vireo as part of the Project. In addition, we recommend IRWD submit annual monitoring reports to the Wildlife Agencies documenting the changes in riparian habitat conditions and vireo population density throughout the Project term to evaluate Project impacts.	Prior to Project Initiation, During Project Construction	Lead Agency

Response to Comment Letter 7

Glen M. Lubcke, Environmental Program Manager
California Department of Fish and Wildlife
South Coast Region
June 25, 2025

Response 7-1

The comment provides a summary of the Project, its biological setting, and key impacts. It is noted that it is IRWD's responsibility to meet the conditions of the NCCP/HCP regardless of the status of the proposed Project, and the Draft EIR is designed to be consistent with the requirements. The comment is noted, and no further response is required.

Response 7-2

The commenter raises concerns regarding the elevation of the lake and related Project changes to inundation areas surrounding the lake. Reservoirs, like Irvine Lake, are not static features in the landscape, such as a natural lake. Reservoirs like Irvine Lake are subject to numerous operational conditions that govern the lake level, including water demand from downstream users, drought conditions affecting inflow, and operations and maintenance, which dictate low water levels for repairs. Reservoirs may also serve a flood control function, which means lowering the lake levels in the late fall to accept winter storm flows. Therefore, reservoirs are dynamic systems, and a stated maximum elevation or regulated elevation is not maintained year after year or even day to day. Fluctuations in the reservoir levels and inundated areas represent the baseline condition.

The impacts calculated and reported in the Draft EIR were estimated based on the lower lake levels and include the approximate 30-foot elevation change (Refer to Exhibits 4.3-8a to 8c, 4.3-10a to 10c, 4.3-11a to 11c, and 4.3-12a to 12c).

Therefore, the biological resources analysis in the Draft EIR adequately discloses Project impacts resulting from the proposed additional inundation, accounting for recent limitations on lake elevation, and no reappraisal of impacts is necessary to address the concerns expressed in this comment. Refer to Response 6-7 for minor additions to Section 1.0, Executive Summary detailing the normal fluctuations in the reservoir level.

Response 7-3

The commenter requests adding text regarding updated baseline conditions and additional inundation. As detailed in Responses to Comments 6-7 and 7-2, updated baseline conditions are not necessary as the analysis of impacts reflect the current operating conditions of the reservoir. The Draft EIR impact analyses accurately reflect the proposed changes to reservoir levels and the effects of the temporary additional inundation. No further analysis is warranted.

Response 7-4

The commenter states concern that the Draft EIR does not discuss impacts to conserved properties, including NCCP/HCP Reserve lands. Please refer to Response to Comment 6-3 and 6-4. IRWD has and would continue to communicate with the County of Orange concerning the proposed Project and its effects to County-owned lands, including adjacent conserved lands.

Response 7-5

The commenter requests addition of a mitigation measure related to disclosure of Project consistency with adjacent conserved lands. Please refer to Response to Comment 7-4.

Response 7-6

The commenter expresses concern regarding impacts on downstream riparian habitats and species. Please refer to Responses to Comments 6-5 and 6-6.

Response 7-7

The commenter requests the addition of a mitigation measure addressing downstream impacts. Please refer to Responses to Comments 6-5 and 6-6. No impacts to downstream vegetation communities are anticipated. No mitigation is necessary. A Section 1602 agreement notification will be provided to CDFW as part of the proposed Project.

Response 7-8

The commenter requests the addition of a mitigation measure addressing impacts associated with Project access features. Refer to Response to Comment 6-8. The contractor would backfill the borrow sites so that the lake levels would be recontoured to the extent practical back to the original elevations. No permanent impact would occur. Therefore, no additional mitigation is required beyond what is already in the Draft EIR.

Response 7-9

The commenter requests the addition of a mitigation measure addressing impacts associated with lakebed ground-level elevation. Refer to Response to Comment 6-8. No new mitigation would be required because no new impacts would occur.

Response 7-10

The commenter expresses concern regarding potential impacts to bald eagles. Refer to Response to Comment 6-9. The potential effects to the nesting pair of bald eagles will be discussed with CDFW during the Incidental Take Permit planning phase.

Response 7-11

The commenter requests the addition of a mitigation measure addressing impacts associated with nesting bald eagles. Refer to Response to Comment 6-9.

Response 7-12

The commenter requests the addition of a mitigation measure addressing impacts associated with the lake dewatering schedule. Refer to Response to Comment 6-9. The proposed Project requires a dry work area. Maintaining a small pool is not feasible, as that would entail sustaining a high ground water elevation, which would impact the required work area. IRWD has proposed MM BIO-6, which is intended to reduce potential impacts to nesting bald eagles to less than significant levels.

Response 7-13

The commenter states that the Draft EIR incorrectly states that NCCP/HCP Conditional Coverage can be extended to vireo for the Project.

As discussed in MM BIO-5, the Draft EIR requires IRWD to consult with USFWS and CDFW to determine if the conditional coverage would extend to the least bell's Vireo (LBV) and does not make the assumption that it would be granted. As part of the regulatory permitting process and related consultation with USFWS and CDFW, IRWD would prepare a biological assessment (BA) that would address LBV and provide the BA to USFWS and CDFW. The BA would be used to support an Incidental Take Permit (ITP) application for LBV from both agencies should Conditional Coverage not be granted.

The mitigation measures proposed in the Draft EIR are sufficient to reduce impacts to less than significant levels for the purposes of CEQA. However, IRWD acknowledges that the "fully mitigated standard" under CESA may require additional measures during the ITP process.

Response 7-14

The commenter requests the addition of a mitigation measure addressing impacts associated with LBV. Refer to Response to Comment 7-13.

Response 7-15

The commenter requests inclusion of a new mitigation measure requiring a long-term monitoring and management plan for LBV.

Based on the information known about the Project site and the occurrence of LBV as discussed in Section 4.3, Biological Resources, of the Draft EIR, IRWD does not believe long term monitoring is required to reduce impacts to the species to a less-than-significant level under CEQA and would prepare an End of the Project report instead of reporting on an annual basis. Furthermore, IRWD is responsible for consultation with USFWS and CDFW, as detailed in MM BIO-5 regarding LBV.

Response 7-16

The commenter requests the addition of requested mitigation measures as part of the Mitigation and Monitoring Reporting Plan. As detailed in the Responses to Comment 6-9, IRWD would modify the Draft EIR and Mitigation Monitoring and Reporting Plan to include revised mitigation measures recommended by CDFW, if warranted by the preponderance of scientific evidence. However, as discussed in the above Responses to Comment 7-1 through 7-15, no additional mitigation measures or revisions to existing mitigation measures are warranted.

Response 7-17

The commenter acknowledges that the Draft EIR adequately addresses impacts to white sturgeon; therefore, no revisions to the Draft EIR are requested or required due to this comment. Coordination with CDFW would occur during future permitting activities.

Response 7-18

The commenter acknowledges information contained in the Draft EIR. No specific comment is made and no further response is warranted.

Response 7-19

The commenter acknowledges mitigation measures contained in the Draft EIR. No specific comment is made and no further response is warranted.

Response 7-20

The commenter requests that a breakdown of habitat impacts in relation to the re-routing of powerlines be provided. The commenter is referred to Response to Comment 2-29 which includes a table with the requested breakdown. This detail is not relevant to the overall impact discussion contained in the Draft EIR and, thus, is not included as part of Section 3.0, Corrections, Clarifications and Additions to the Draft EIR.

Additionally, refer to new Exhibit 2 (see Response 6-4), which shows the locations of SCE alignment and impact acres for conserved lands by ownership.

As detailed in MM BIO-3 included in Section 4.3, Biological Resources, of the Draft EIR, IRWD would use a combination of IRWD's take credits as well as on-site restoration and off-site restoration of coastal sage scrub to mitigate Project impacts within the NCCP/HCP Reserve, as approved by U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. SCE's take credits would not be utilized to address Project impacts, including those associated with the proposed relocation of SCE's overhead power lines and power poles.

SCE holds multiple easements located on the downstream side of Santiago Creek Dam. One portion of the easement travels to the existing Dam Keeper house and provides SCE service to both the Dam Keeper house and a service pipeline for the Metropolitan Water District of Southern California. This easement would remain. Another easement exists that passes through IRWD's property and over the existing spillway structure. This easement was provided to SCE for the benefit of the landfill as part of a "Powerline Relocation Agreement" that IRWD and the County executed in July 2001. The powerline currently serves OCWR. The existing overhead powerline and associated easement serving OCWR conflict with the Project. Pursuant to the existing easement agreement between IRWD and the County, the two parties are actively coordinating to relocate the SCE service and associated easement to County property so it does not impact the Project.

Response 7-21

The commenter states that all reportable information must be submitted to the appropriate entities. Pursuant to permit and survey requirements and protocols, all collected data that is reportable has been or would be submitted to the appropriate entities.

Response 7-22

The commenter states the requirement for payment of CDFW filing fees. All appropriate and required fees would be paid by IRWD at the time of Notice of Determination filing with the County Clerk.

Response 7-23

The commenter requests an opportunity to review all responses to comments prior to the hearing date. Pursuant to Section 15088(b) of the CEQA Guidelines, this Final EIR including responses to public comment would be made available at least 10 days prior to consideration of the EIR for certification.

SECTION 3.0 CORRECTIONS, CLARIFICATIONS, AND ADDITIONS TO THE DRAFT EIR

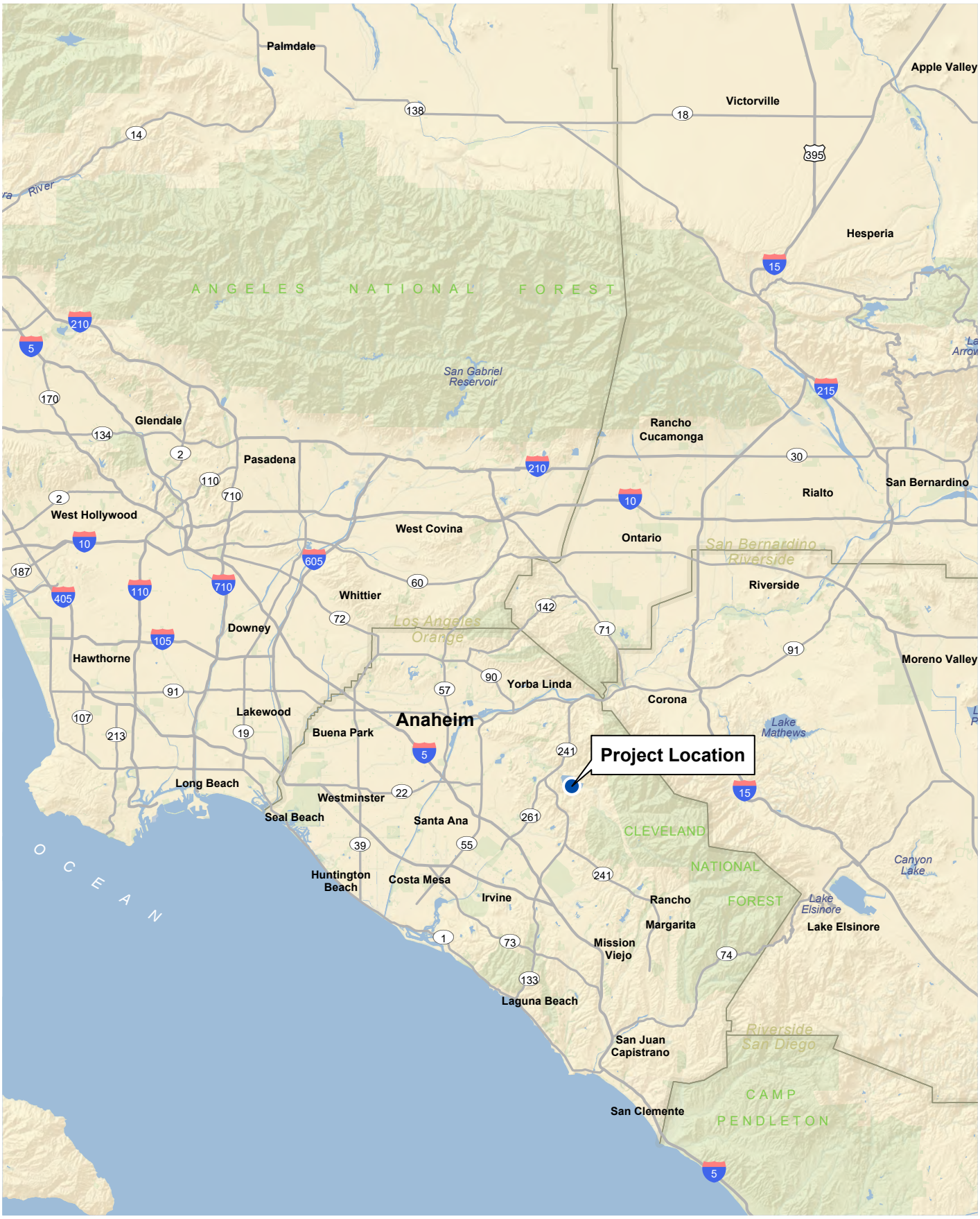
Any corrections, clarifications and additions to the Draft EIR text, tables, and figures generated either from responses to comments or independently by IRWD, are stated in this section. Various corrections regarding figure/table numbers and names, grammatical, punctuation, spelling and typographical errors in the Draft EIR are not called out separately in this document; however, any substantive changes are individually addressed.

These Draft EIR corrections, clarifications and additions are provided to clarify and amplify the Draft EIR. Changes may be corrections or clarifications to the text and tables of the Draft EIR. Other changes to the Draft EIR clarify the analysis based upon the information and concerns raised by comments during the public review period. None of the information contained in these Draft EIR revisions constitutes significant new information or changes to the analysis or conclusions of the Draft EIR. The changes to the Draft EIR included in this section do not constitute "significant" new information. Therefore, recirculation of the Draft EIR is not required pursuant to CEQA Guidelines Section 15088.5 because the new information added to the Final EIR through these revisions only clarify or amplify information already provided or make insignificant modifications to the already adequate Draft EIR.

The revisions contained in the following pages are in the same order as the information appears in the Draft EIR. Changes in text are signified by strikeouts (~~strikeouts~~) where text has been removed and by bold underlining (**underline**) where text has been added. The applicable page numbers from the Draft EIR are also provided where necessary for ease of reference.

Section 1.0, Executive Summary, Exhibits 1-1 and 1-2

Exhibits 1-1 and 1-2 to be replaced with the following pages.



Regional Location

Exhibit 1-1

Santiago Creek Dam Improvement Project

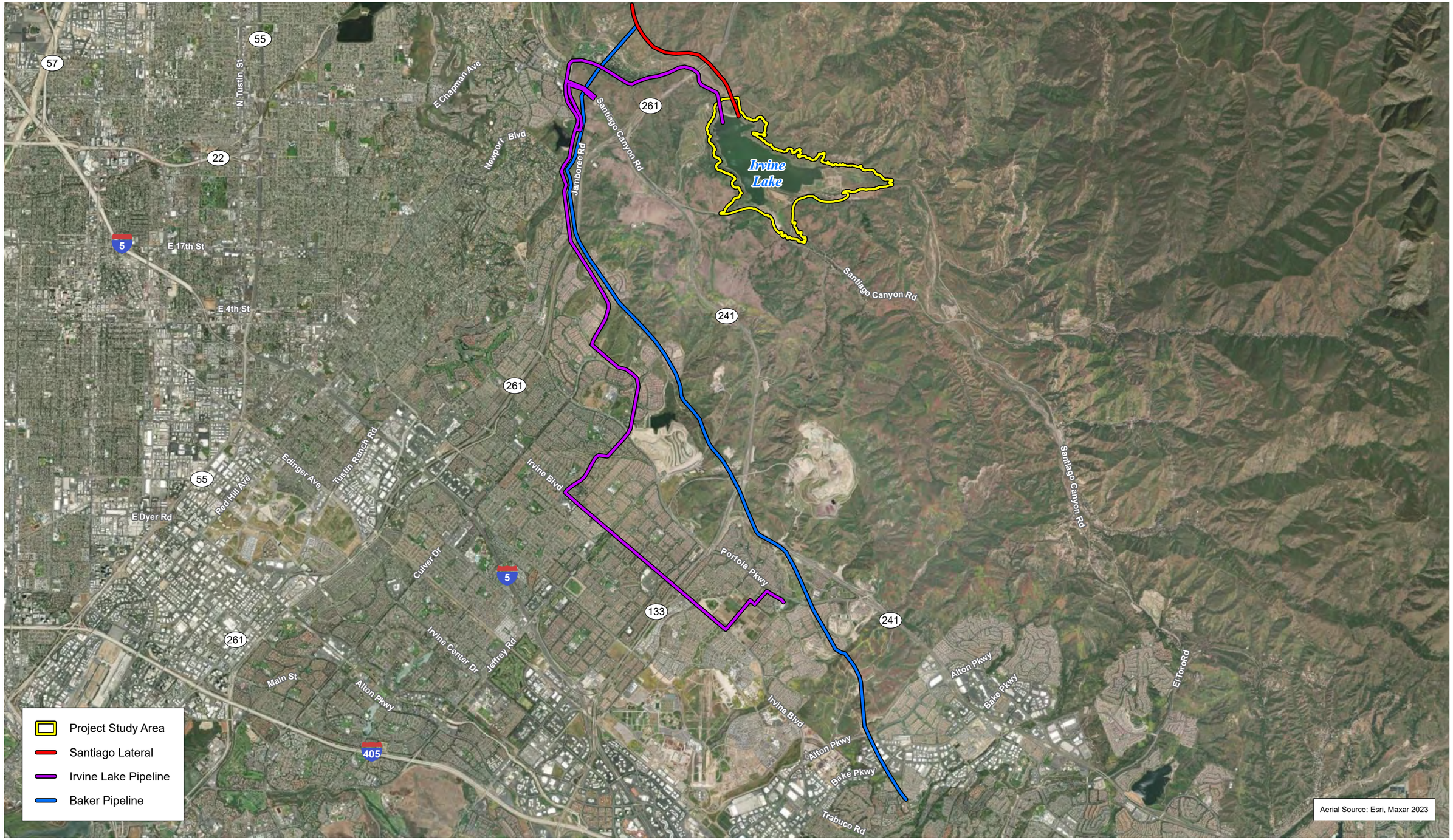
N W E S

0 5 10 Miles

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_RL.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_RL



D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_Aerial_Photograph

Aerial Photograph

Exhibit 1-2

Santiago Creek Dam Improvement Project

N W E S

0 0.6 1.2 Miles

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Aerial.pdf

Section 1.0, Executive Summary, Page 1-7, CEQA Baseline

Section 15125 of the CEQA Guidelines requires that the analysis in the EIR compare the potential impacts against the existing conditions. Therefore, the analysis has been conducted with the baseline of current operations at the Santiago Creek Dam. **Over the course of 20 years of record-keeping, the reservoir level has fluctuated from a high of 800 feet above mean sea level (amsl) (spilling over the spillway crest) in 1999 to a low of below 740 feet amsl in 2016. During this period the reservoir level has not remained static and no two years have been alike. In 2014, the reservoir level started to decrease below 765 feet amsl and has only been above 765 feet amsl twice since then: once in 2017 and once in 2019. In 2020 (when the vegetation surveys were performed in support of the Draft EIR), the reservoir level was below 765 feet amsl, and for the summer was below 750 amsl reaching 740 feet amsl in September. In order to best represent the lake level fluctuations, the exhibits produced and the analysis of impacts in this Draft EIR are based on these lower 2020 reservoir levels.**

Section 2.0, Introduction, Page 2-11, Fifth Paragraph, Eighth Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 3.0, Project Description, Page 3-1, Project Location, Fourth Paragraph, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 3.0, Project Description, Page 3-8, First Paragraph

Emergency Outlet Pipeline

The emergency outlet pipeline would be routed from the bifurcation valve vault to the emergency outlet valve vault **conceptually** as shown on Exhibit 3-10, Conceptual Emergency Outlet Pipe Plan and Profile. The horizontal alignment would parallel the right **or left** gravity wall of the proposed spillway structure, and the pipe would be placed in the backfill for the RCC gravity wall. The pipe would slope to drain to Santiago Creek. **The purpose of the emergency outlet pipe is to release water from Irvine Lake under emergency conditions, to maintain dam safety, and to comply with DSOD requirements. Water released from Irvine Lake through the emergency outlet valve would be released to Santiago Creek with energy dissipation and erosion control features, which may consist of features such as a vegetated swale, infiltration trench, rip rap, cone valve, and armored channel.**

Section 3.0, Project Description, Page 3-12, Last Paragraph

IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road, to the staging area. The temporary construction water line would be **primarily** routed above-ground **along the existing, disturbed Blue Diamond Road route. Sections that may conflict with vehicular traffic, or as conditions deem necessary, will be** ~~through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work area for the inlet/outlet structure and~~

~~spillway construction~~ **placed beneath the ground surface within the existing, disturbed Blue Diamond Road route. The underground sections would be installed via an open trench within the roadway, which would be returned to existing conditions following installation. Following construction, the aboveground section would be removed, and the underground section would be abandoned in place**. Construction activities may also use untreated water from the ILP as an additional water source.

Section 3.0, Project Description, Pages 3-13 and 3-14, Fourth Paragraph

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These borrow areas are depicted on Exhibit 3-1. Approximately 12,000 haul truck trips, assuming 30 CY capacity trucks, would be required to haul this material from the borrow sites along the access road to the work area and to the dam. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would also include-importing approximately 200,000 CY of material and exporting approximately 315,000 CY of material over the four-year construction period. Project construction is anticipated to require a total of approximately 28,000 one-way truck trips for the import and export of material. Daily truck trips would vary from approximately 4 to 101 trips per day depending on the stage of construction, with an average of 34 truck trips per day. **As part of the construction process, the contractor would return the lakebed back to its original contours to the extent practicable, resulting in no permanent impacts.**

Section 3.0, Project Description, Page 3-16, Table 3-3, State Water Resources Control Board; Regional Water Quality Control Board

- **General** Waste Discharge Requirements
- **General Permit for Stormwater Discharges**
- Storm Water Pollution Prevention Plan (SWPPP)

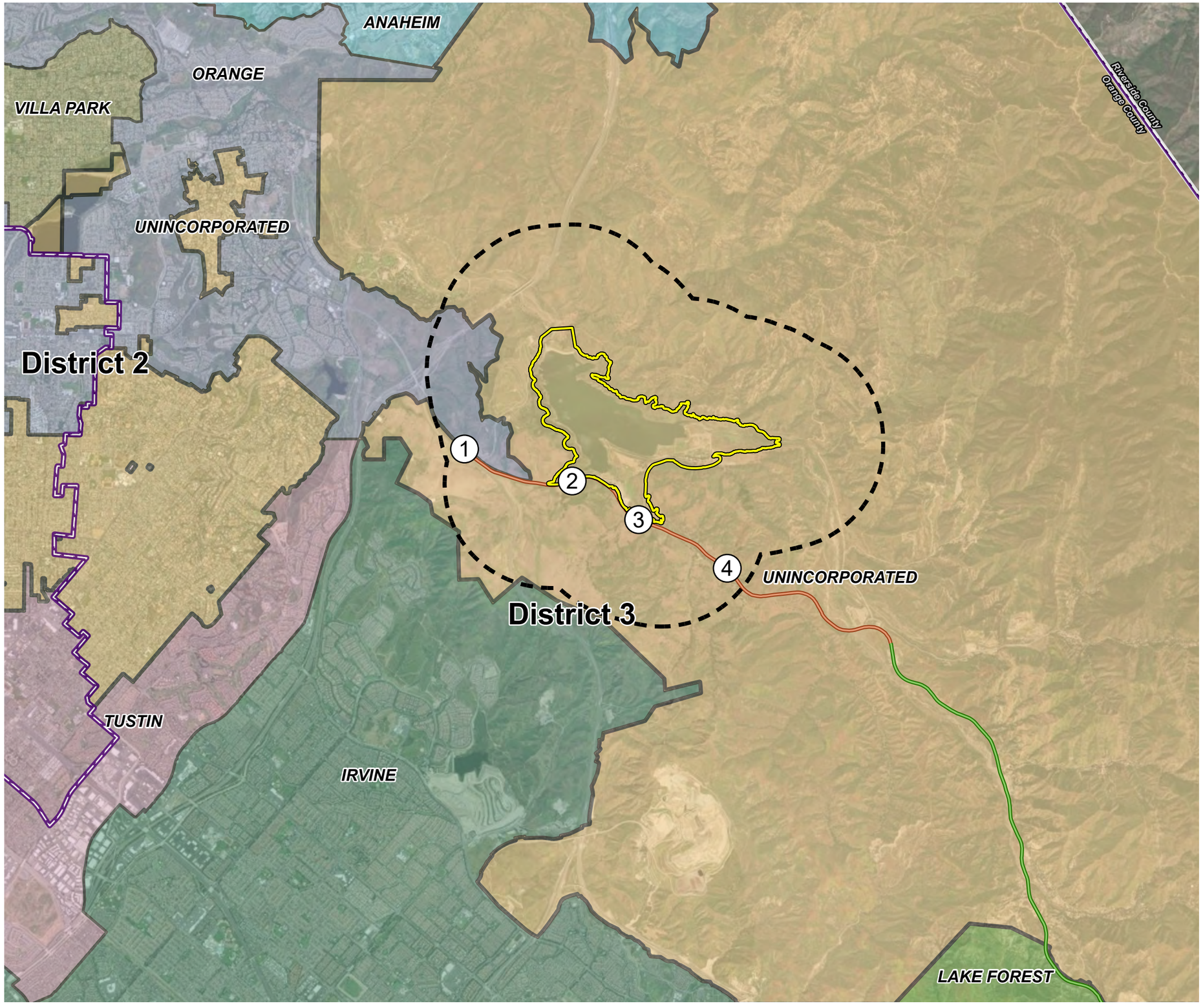
Section 3.0, Project Description, Page 3-16, Table 3-3, County of Orange

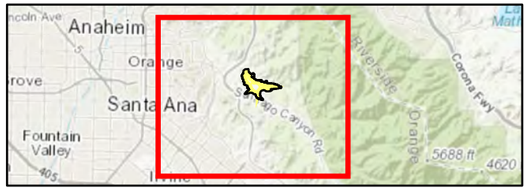
County of Orange (OC Parks, OC Real Estate, OC Public Works, OC Waste & Recycling)

- Division of Drinking Water (DDW) Drinking Water Permit Amendment Update
- Well Permits
- Encroachment Permit
- Noise Ordinance Waiver
- **Easements**
- **Licenses**

Section 4.0, Impact Analysis Introduction, Exhibit 4-1

Exhibit 4-1 to be replaced with the following page.





Biological Study Area

Biological Study Area - 1-mile Buffer

Supervisorial Districts

City Boundaries

Anaheim

Irvine

Lake Forest

Orange

Tustin

Unincorporated

Villa Park

Projects within 1-mile Buffer

Santiago Canyon Road Safety Improvements Project

SR-241 to Silverado Canyon Road

Silverado Canyon Road to Live Oak Canyon Road

1 - Loma Ridge Jeep Trail

2 - Below Irvine Lake

3 - Haul Rd and SR-241

4 - Blue Diamond Haul Rd

City of Orange Housing Element*

County of Orange Housing Element*

**Housing Plan Elements apply to various areas throughout County of Orange and City of Orange and are not reflected in this map.*

N
W E
S

0 2,500 5,000 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Nearby Projects — Exhibit 4–1

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Nearby.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Nearby_Projects

Section 4.1, Aesthetics, Page 4.1-4, First paragraph following bullets, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.2, Air Quality, Page 4.2-10

"The Project will be required to comply with **all applicable** existing SCAQMD rules, **including those** for the reduction of fugitive dust and criteria pollutant emissions. The following rules are most relevant to the proposed Project:"

Section 4.3, Biological Resources, Exhibits 4.3-1 through 4.3-12

Exhibits 4.3-1 and 4.3-12 to be replaced with the following pages.

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_USGS

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 4.3-1

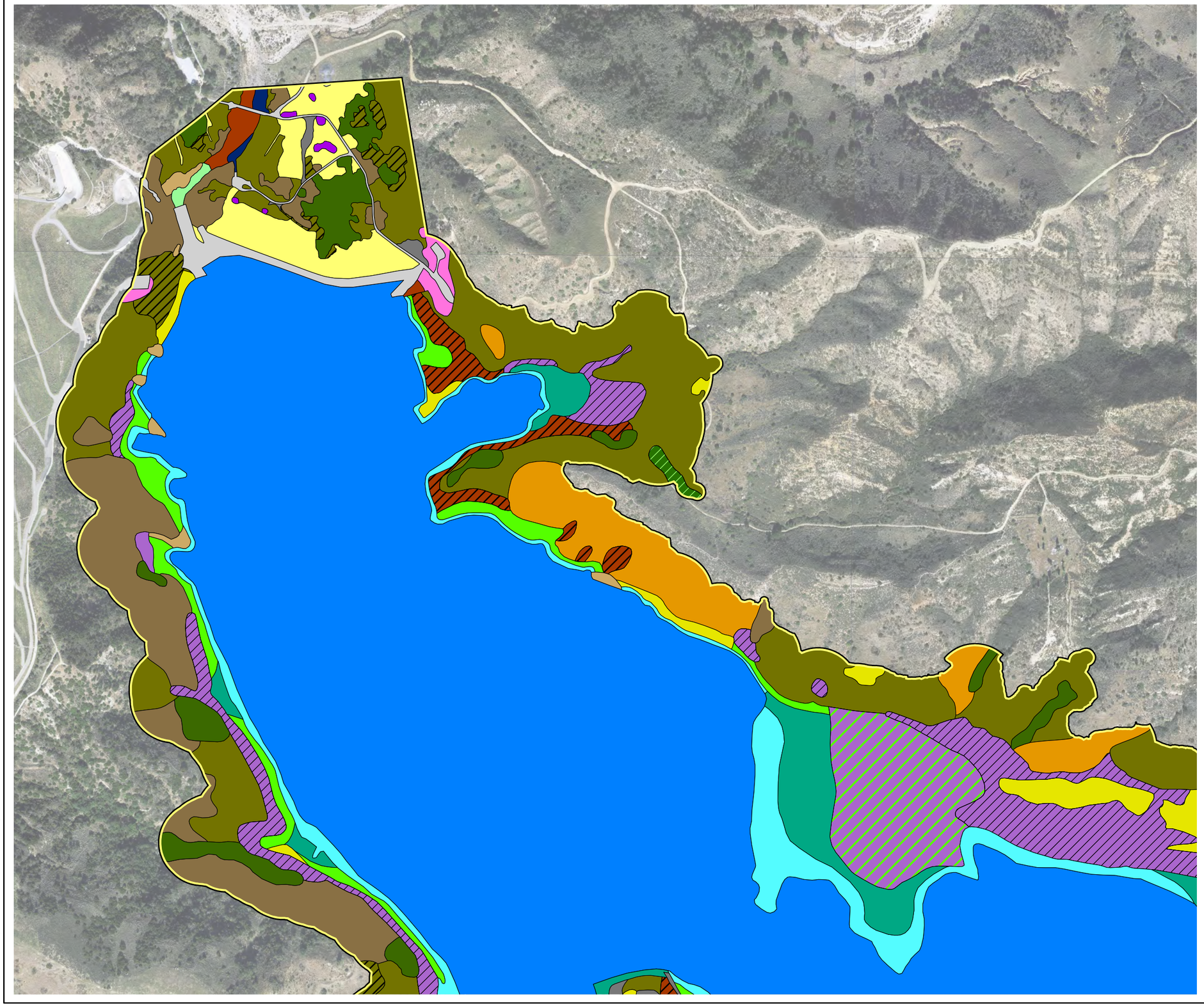
Santiago Creek Dam Improvement Project

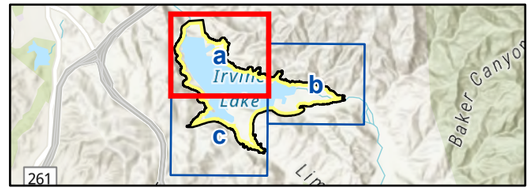
N W E S

0 1,000 2,000 Feet

PSOMAS

(Rev: 10-01-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_USGS.pdf





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

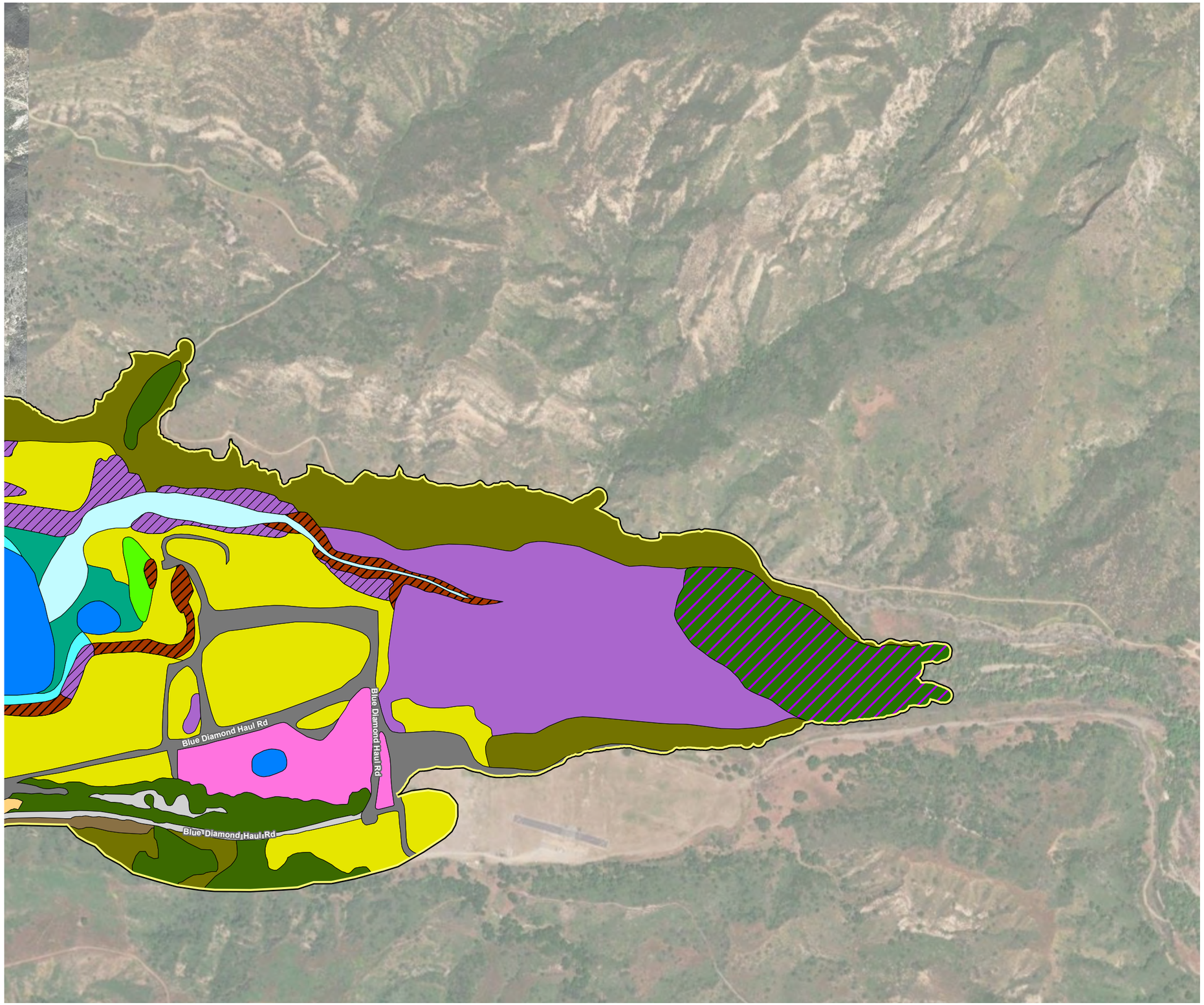
Biological Resources **Exhibit 4.3-2a**

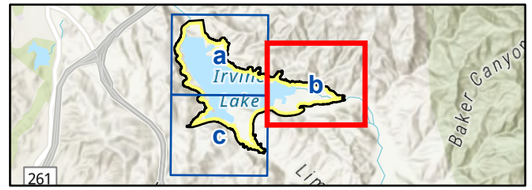
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Biological_Resources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

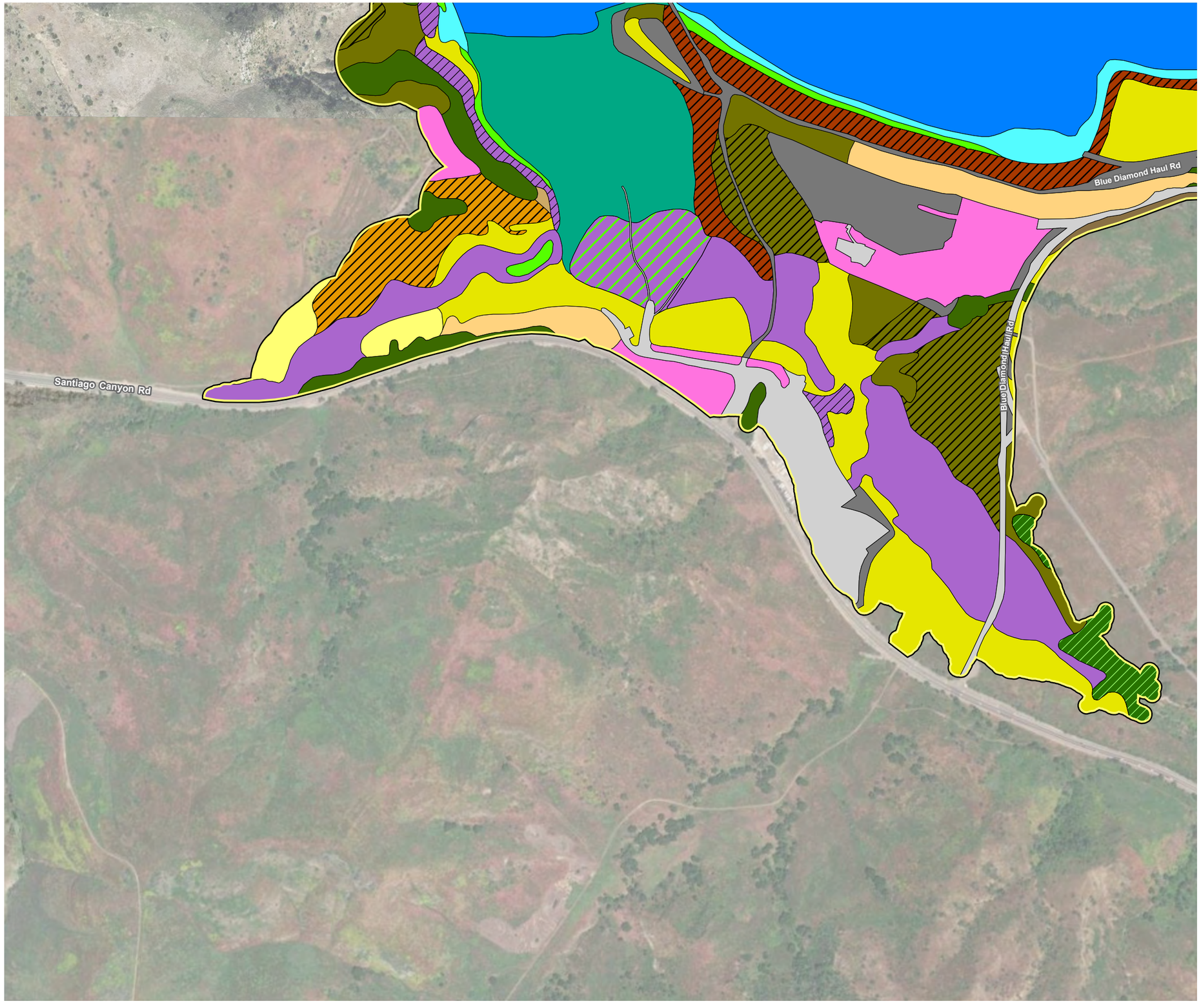
Biological Resources **Exhibit 4.3-2b**

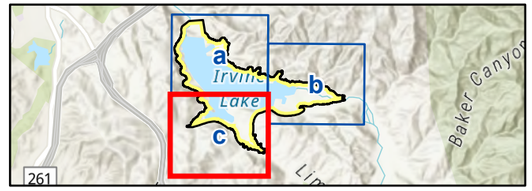
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIRex_Biological_Resources.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

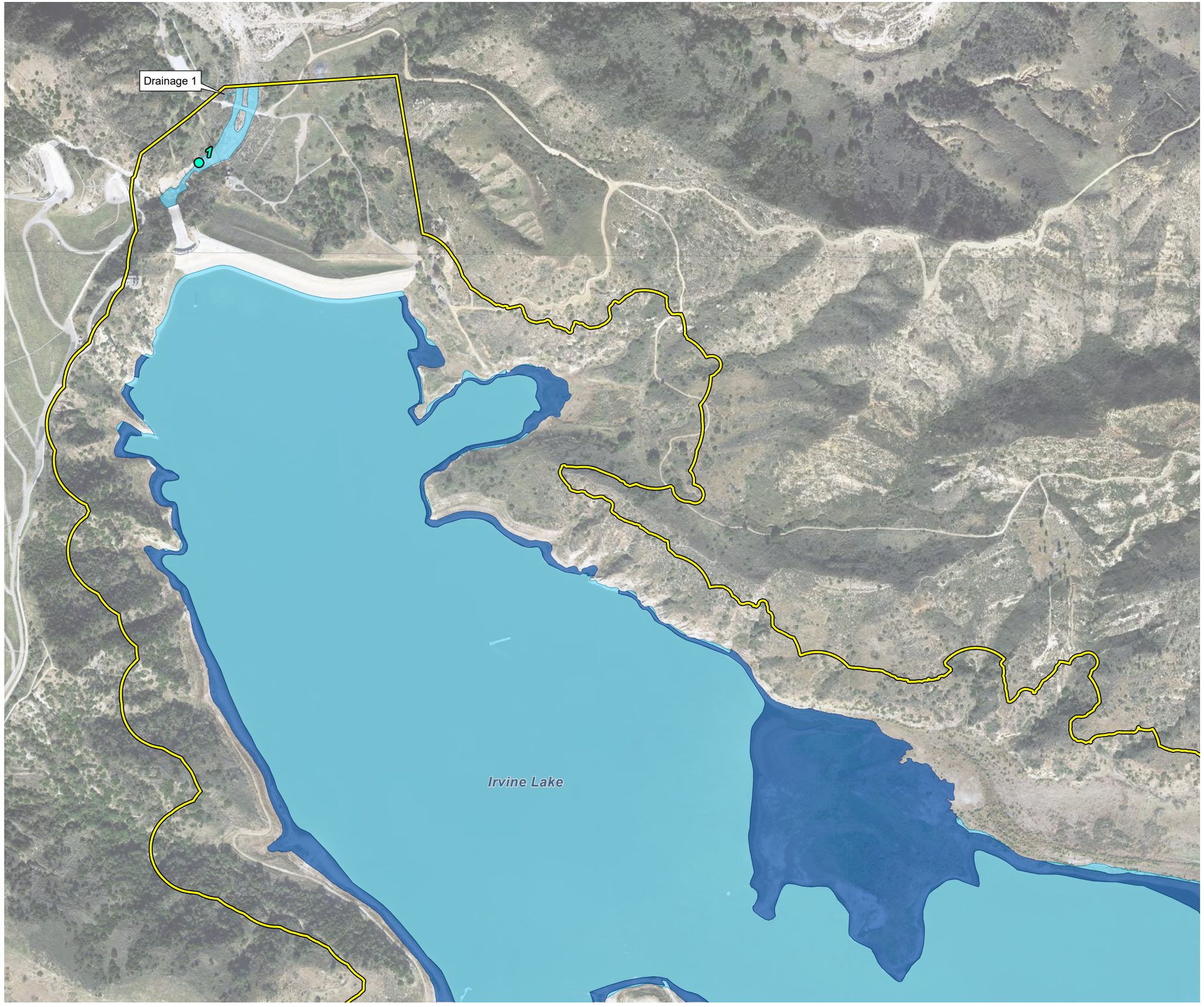
Biological Resources **Exhibit 4.3-2c**

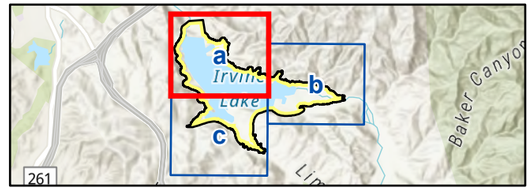
Santiago Creek Dam Improvement Project

PSOMAS

(Rev. 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Biological_Resources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_Biological_Resources





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

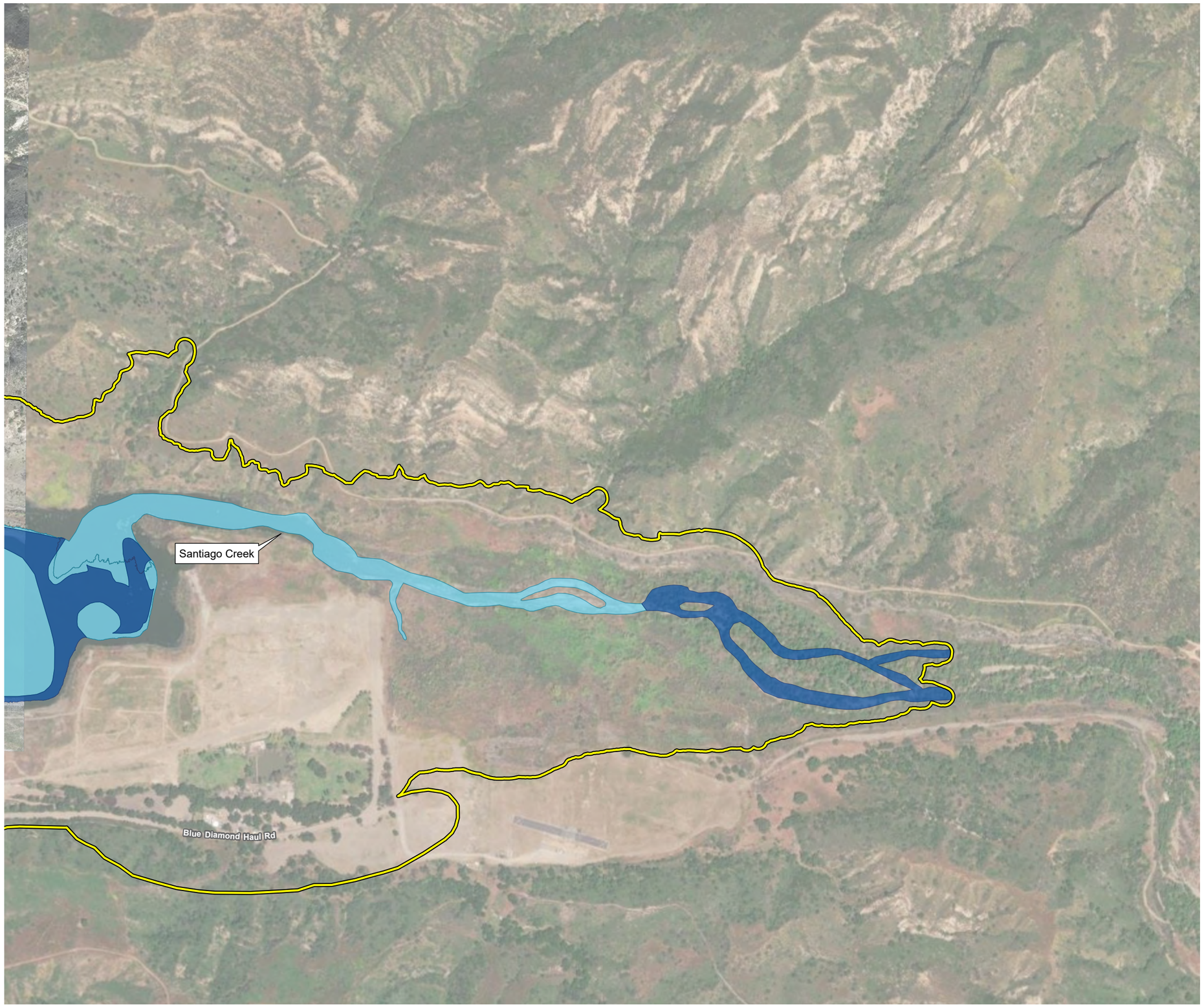
Exhibit 4.3–4a

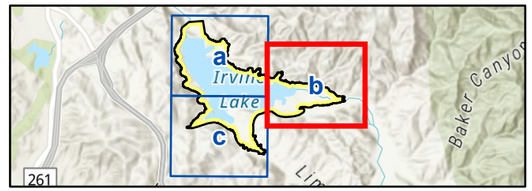
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW010201\Graphics\EIR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

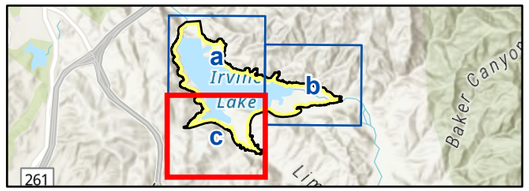
Exhibit 4.3–4b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW010201\Graphics\EIR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE



Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

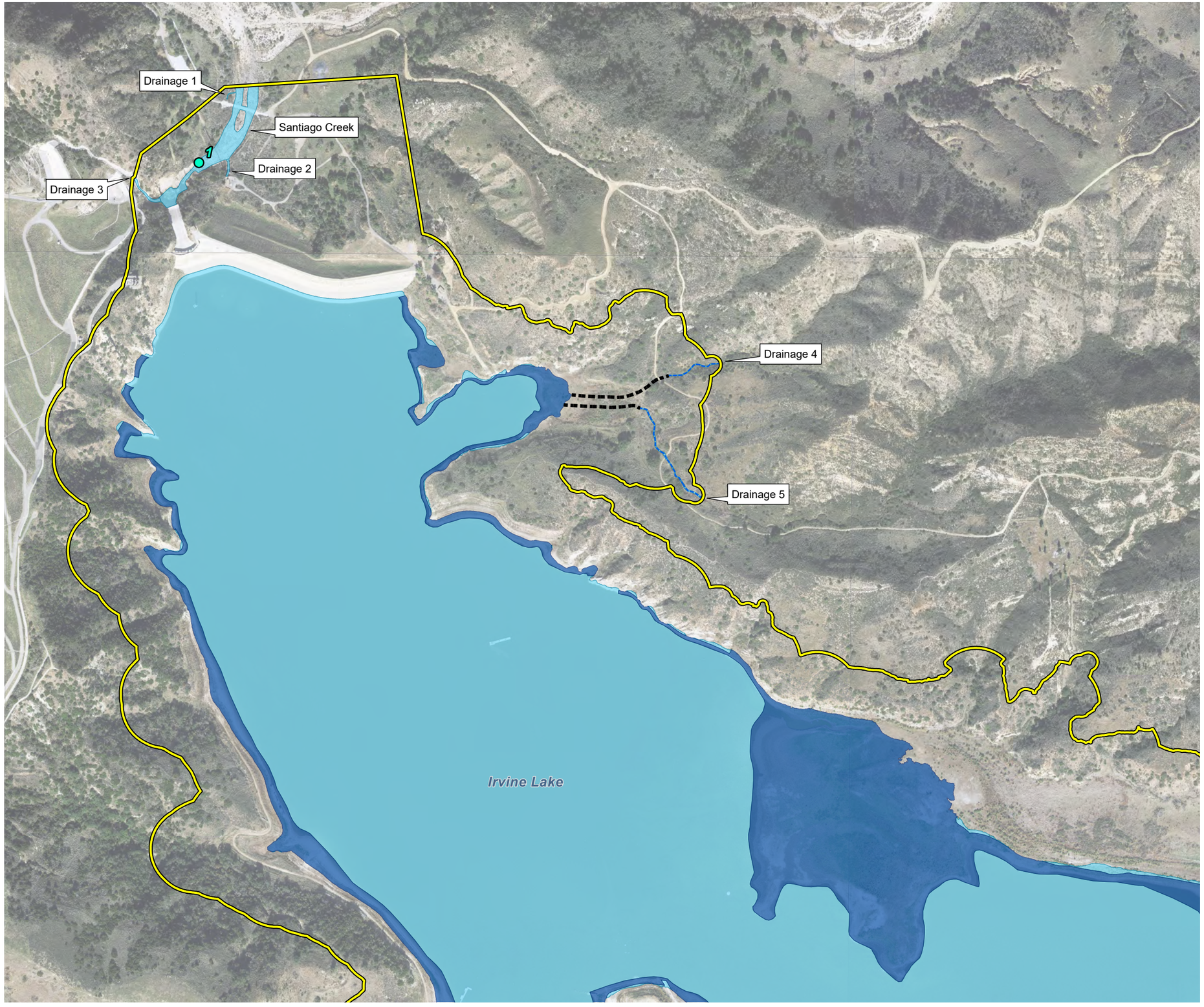
Exhibit 4.3–4c

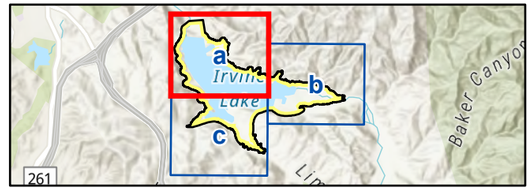
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW010201\Graphics\EIR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

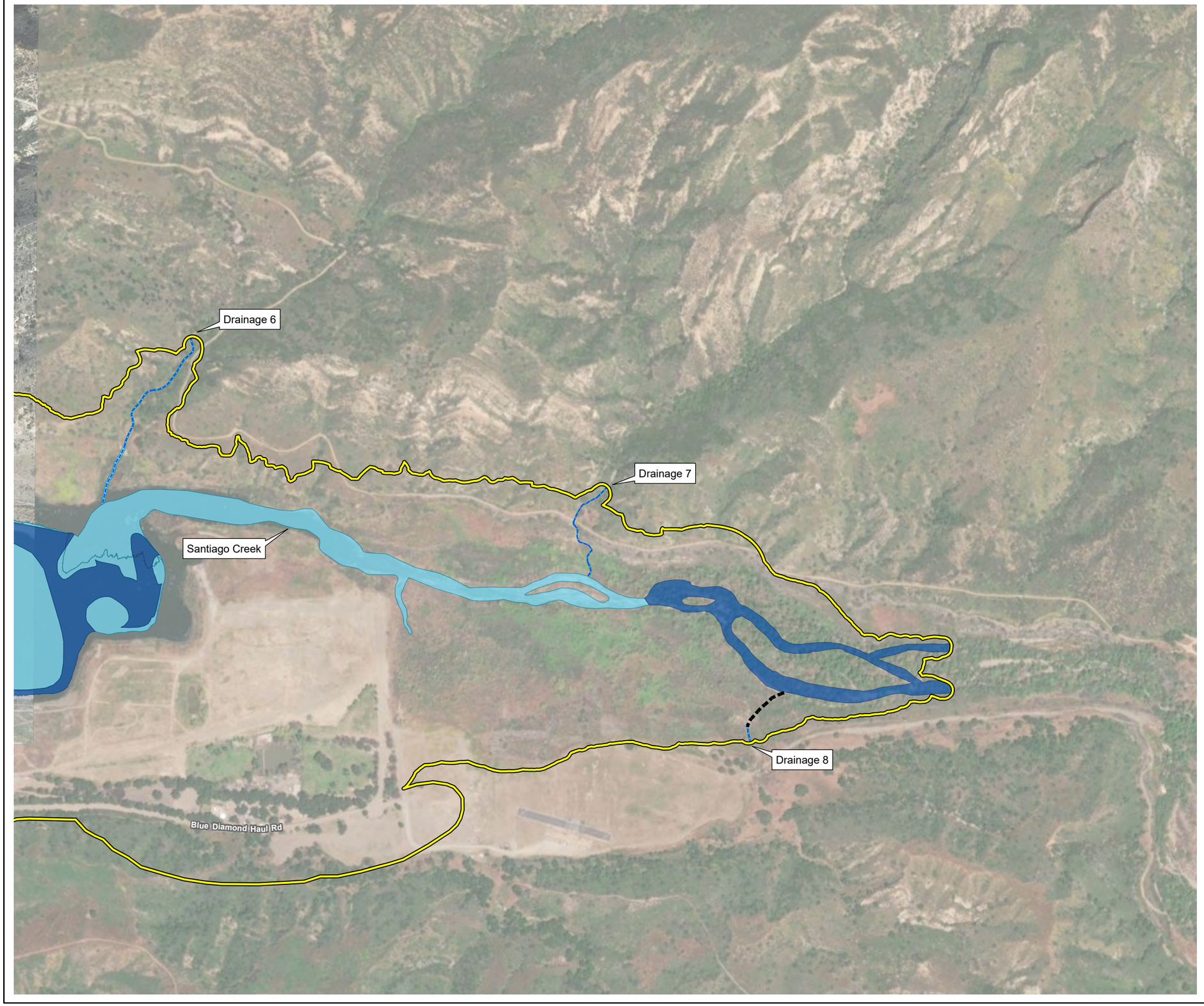
Exhibit 4.3–5a

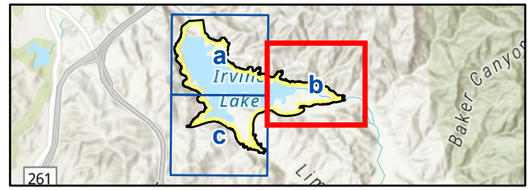
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

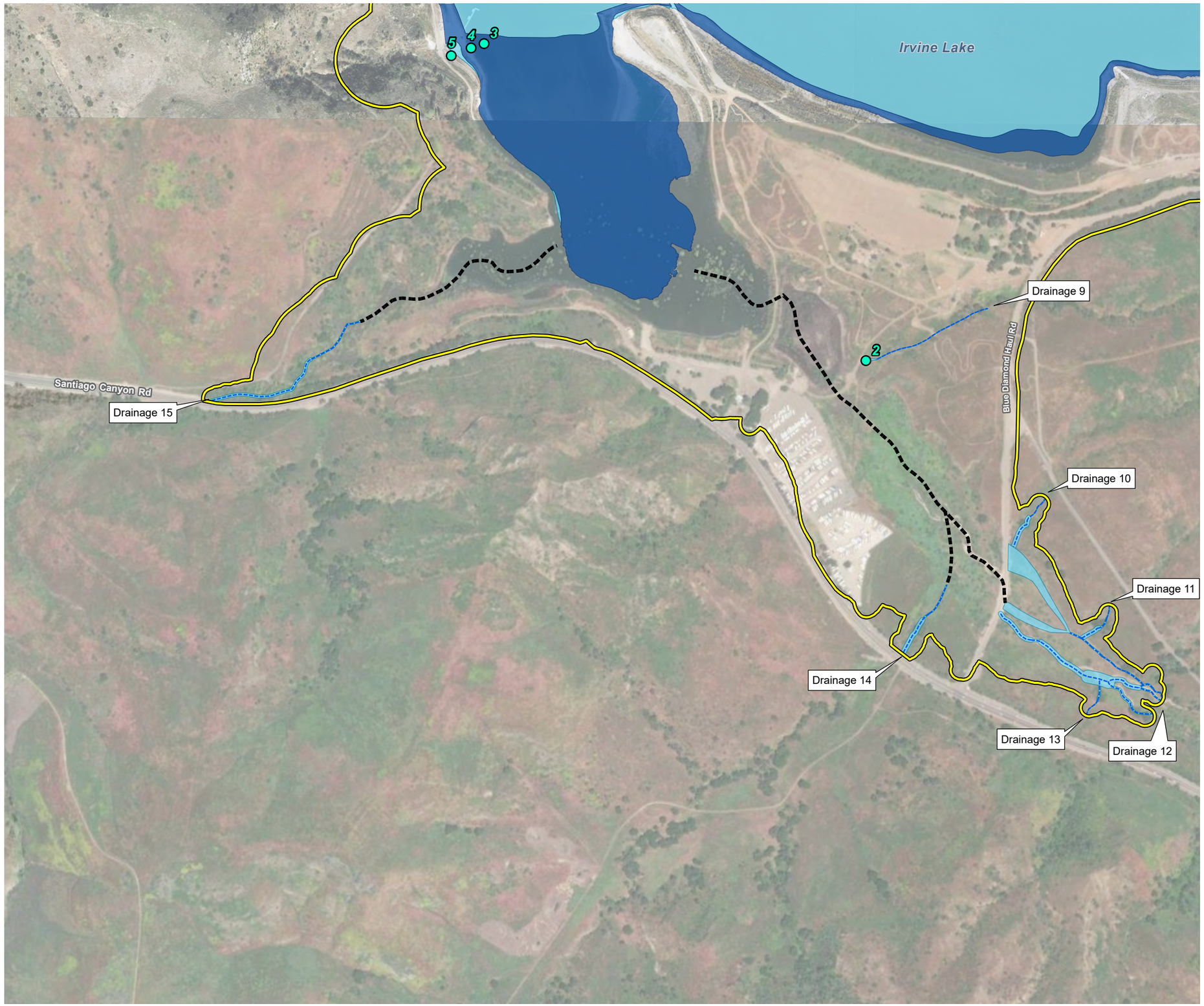
Exhibit 4.3–5b

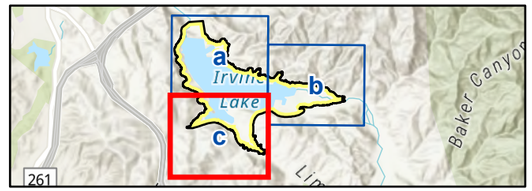
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

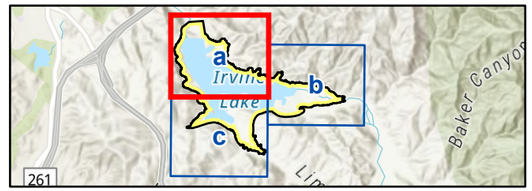
Exhibit 4.3–5c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\SCD_Project.aprx\ex_JD_RWQCB



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

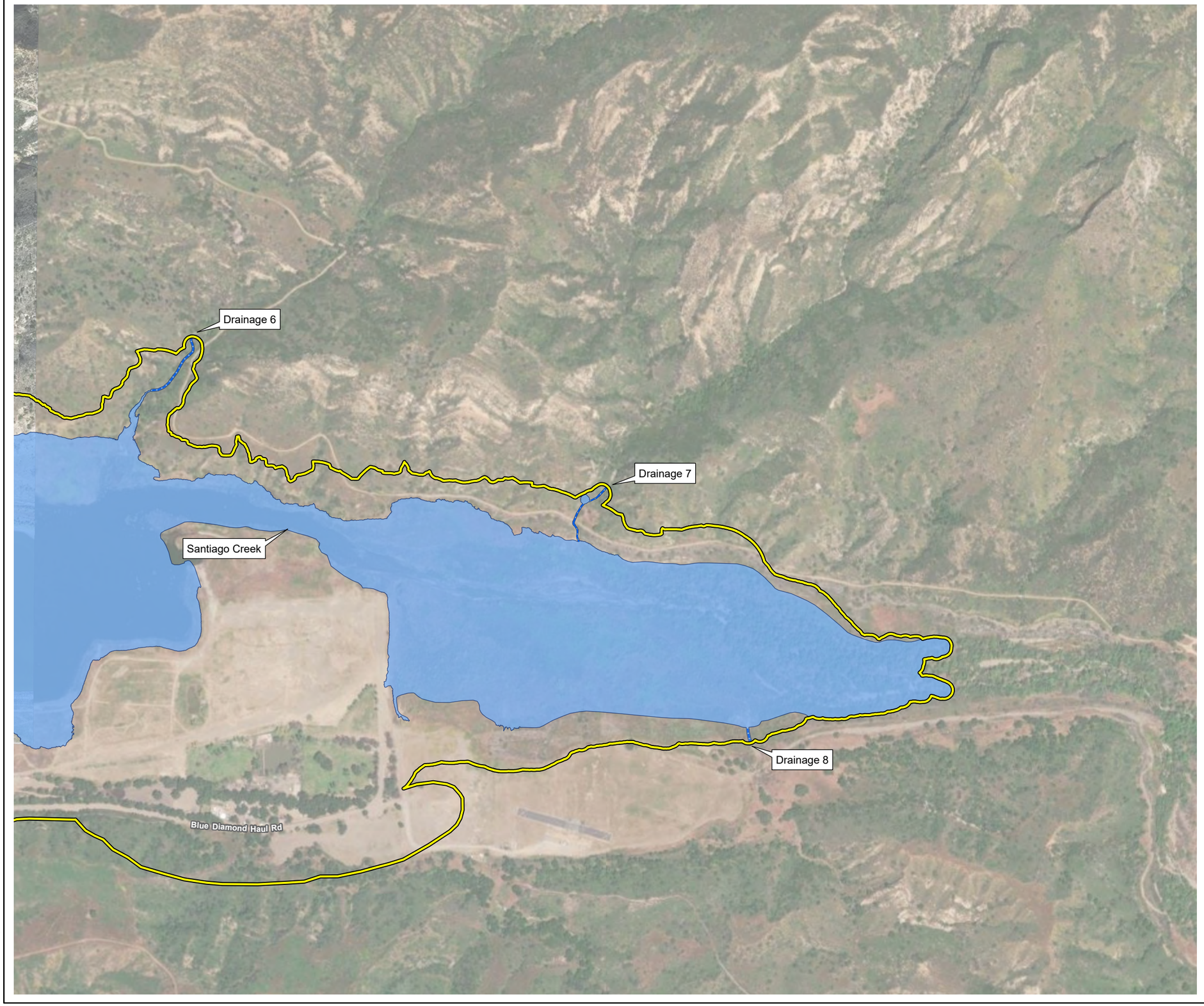
Exhibit 4.3-6a

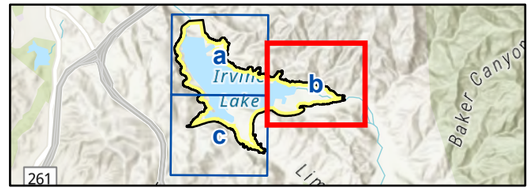
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW





Survey Area

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

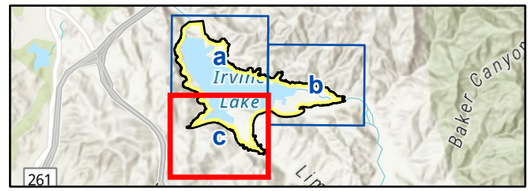
Exhibit 4.3-6b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

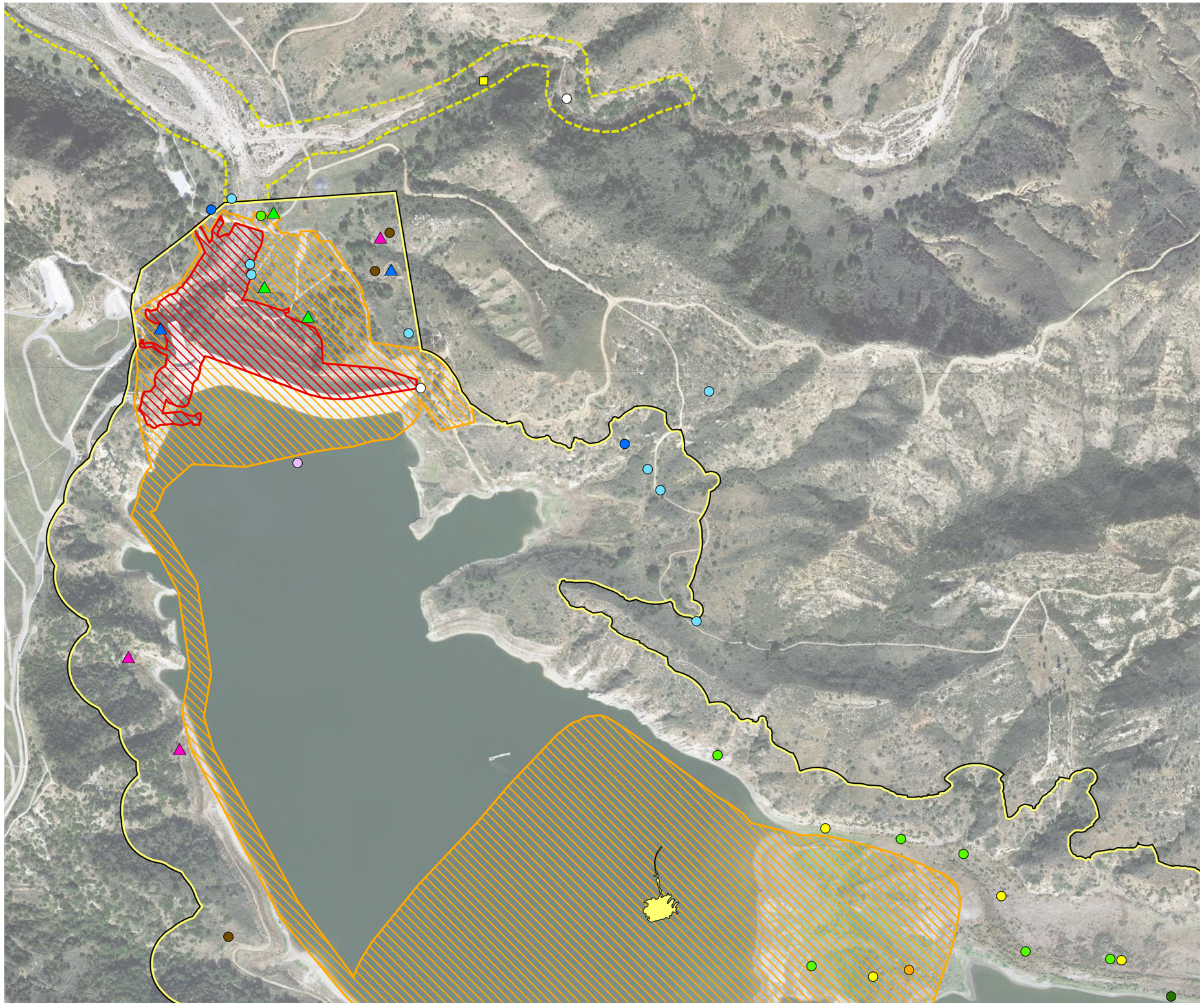
Exhibit 4.3–6c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Biological Study Area
Arroyo Toad Survey Area

Impact Type
Permanent Impacts
Temporary Impacts*

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Many-Stemmed Dudleya Population
Mud Nama Population (mapped polygon)

Special Status Species
American Peregrine Falcon
American White Pelican
Coastal Cactus Wren
Coastal California Gnatcatcher
Grasshopper Sparrow
Least Bell's Vireo
Southern California Rufous-Crowned Sparrow
White-Tailed Kite
Yellow-Breasted Chat
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

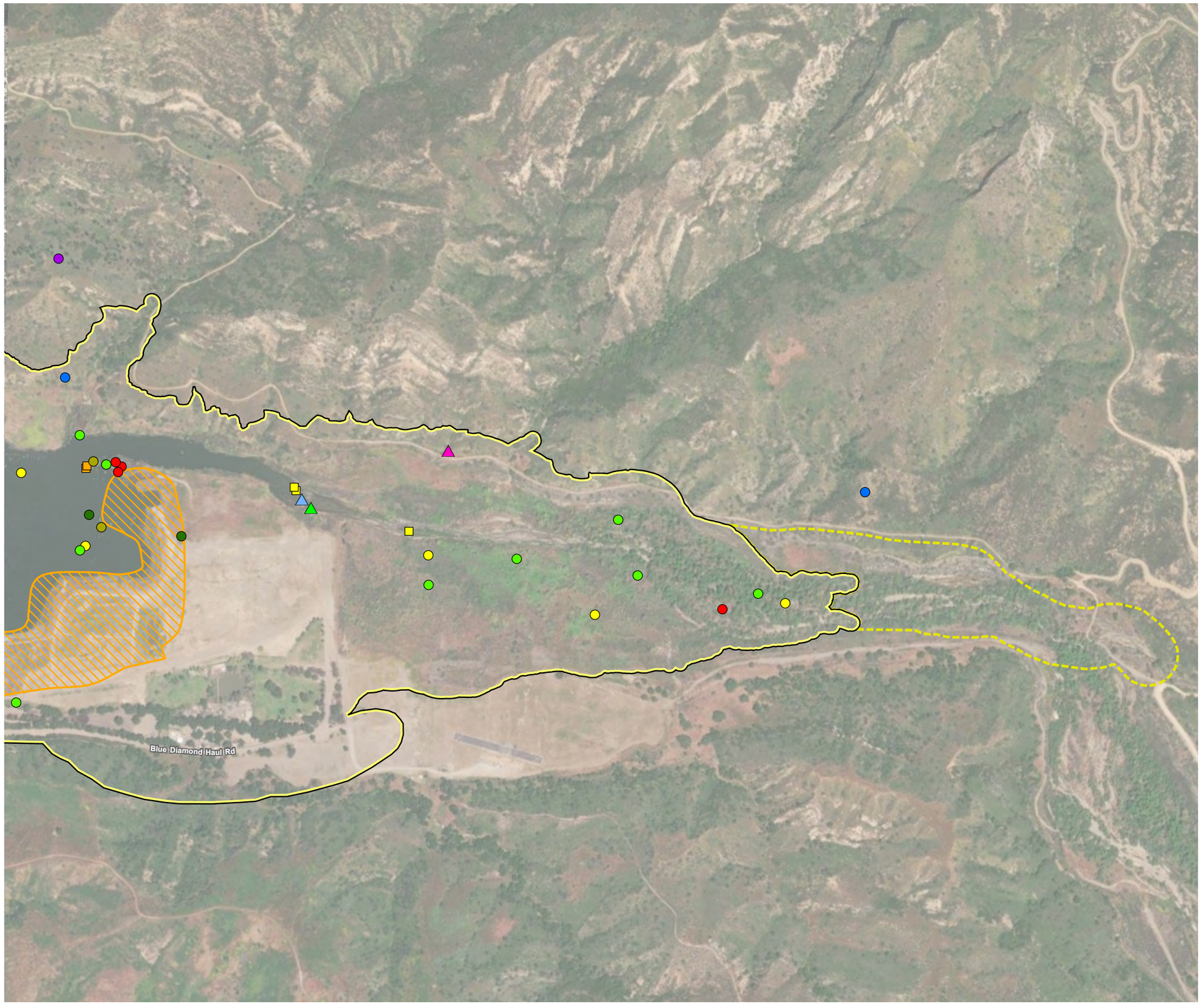
Exhibit 4.3-7a

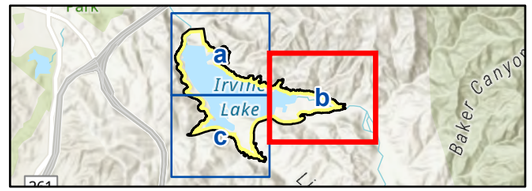
Santiago Creek Dam Improvement Project

PSOMAS

(Rev. 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSC\DS\CD_Project.aprx\ex_SS_Species





Biological Study Area

Arroyo Toad Survey Area

Impact Type

Temporary Impacts*

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Braunton's Milkvetch Population

Special Status Species

- Bald Eagle (Nest)
- Coastal Cactus Wren
- Grasshopper Sparrow
- Least Bell's Vireo
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat
- Belding's Orange-Throated Whiptail
- Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

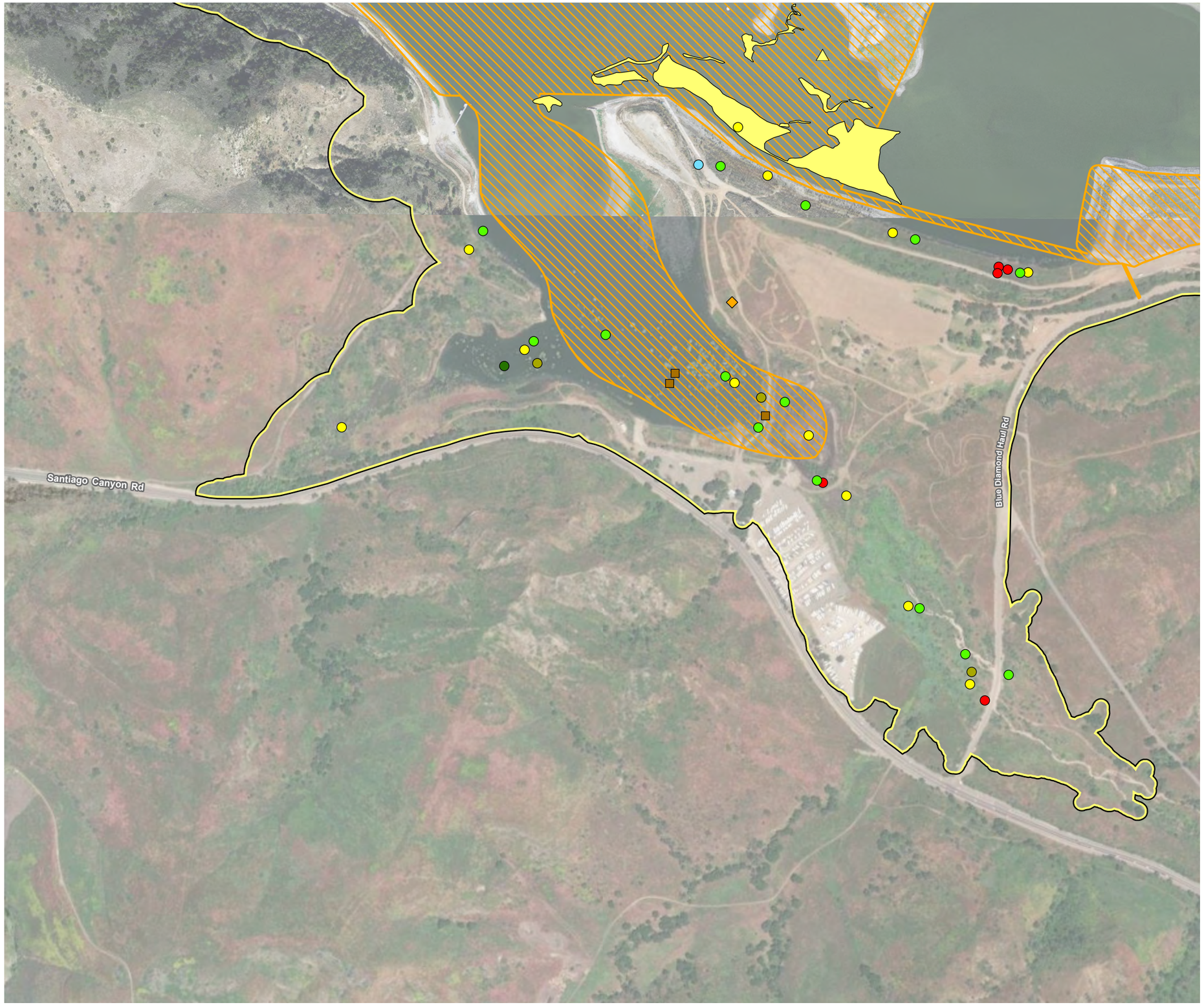
Exhibit 4.3-7b

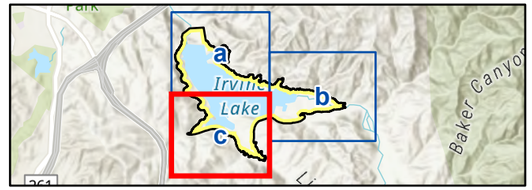
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PROSCD\SCD_Project.aprx\ex_SS_Species





Biological Study Area

Impact Type

Temporary Impacts*

Special Status Plants

Mud Nama Population (point location)

Mud Nama Population (mapped polygon)

Special Status Species

Crotch's Bumble Bee

Coastal California Gnatcatcher

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

Yellow Warbler

Yellow-Breasted Chat

Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

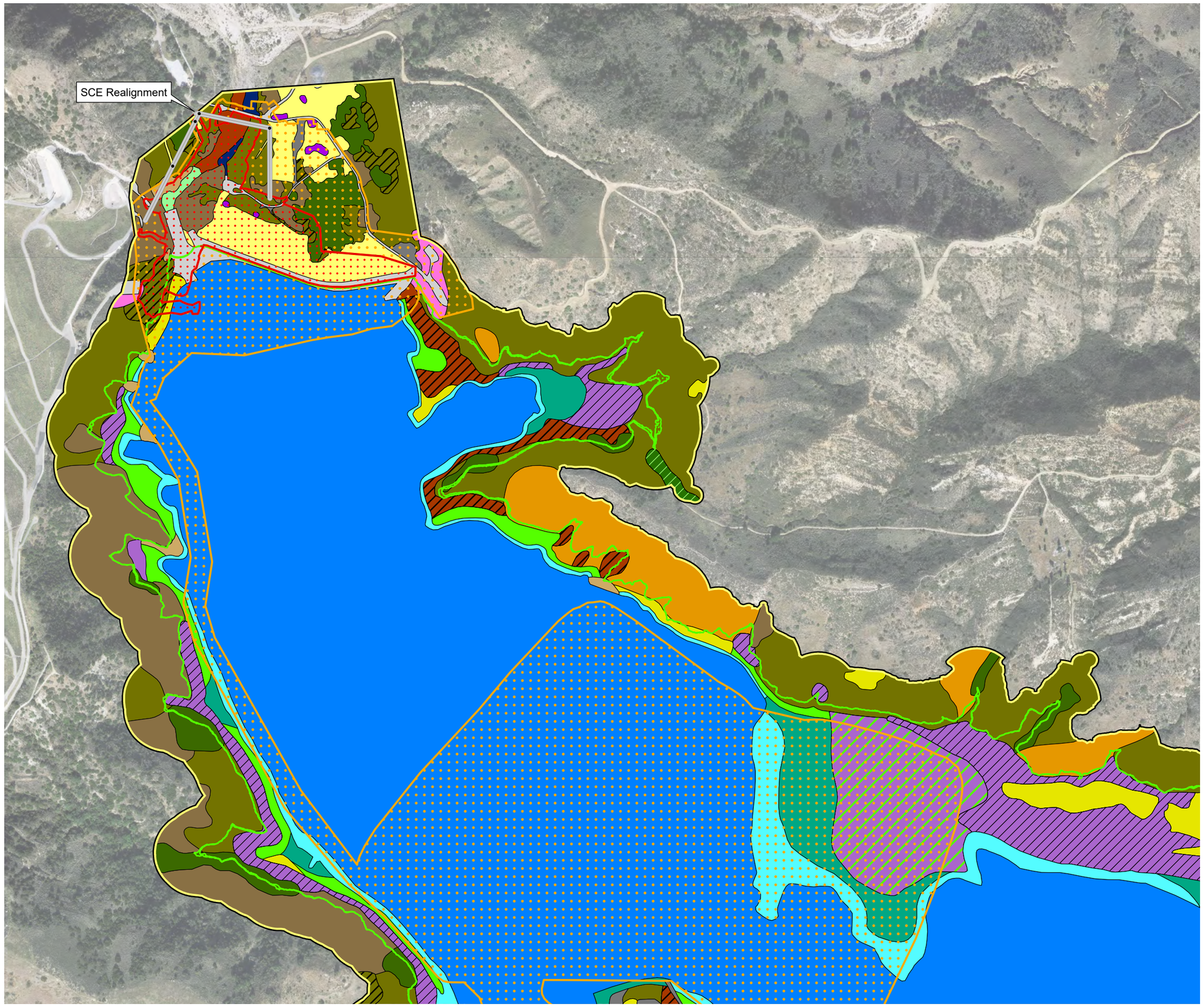
Exhibit 4.3-7c

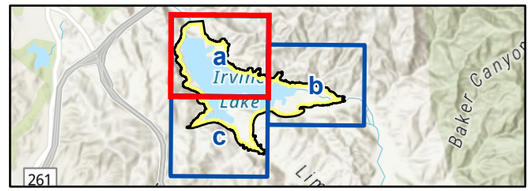
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\CD_Project.aprx\ex_SS_Species





Biological Study Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

Sagebrush Scrub (2.3.6)

Disturbed Sagebrush Scrub (2.3.6)

Southern Cactus Scrub (2.4)

Disturbed Floodplain Sage Scrub (2.6)

Toyon - Sumac Chaparral (3.12)

Annual Grassland (4.1)

Ruderal (4.6)

Riparian Herb (7.1)

Southern Willow Scrub (7.2)

Mulefat Scrub (7.3)

Disturbed Mulefat Scrub (7.3)

Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)

Southern Black Willow Forest (7.7)

Disturbed Southern Black Willow Forest (7.7)

Southern Black Willow Forest/Riparian Herb (7.7/7.1)

Coast Live Oak Woodland (8.1)

Western Sycamore (8.x)

Cliff (10)

Open Water (12.1)

Fluctuating Shoreline (12.2)

Vegetated Fluctuating Shoreline (12.2)

Ornamental (15.5)

Developed (15.6)

Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

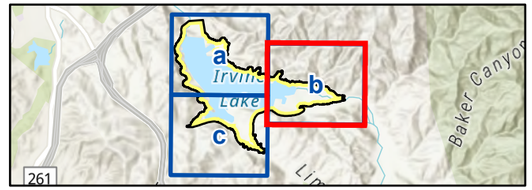
Exhibit 4.3-8a

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Vegetation_Impacts



Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Vegetation Types

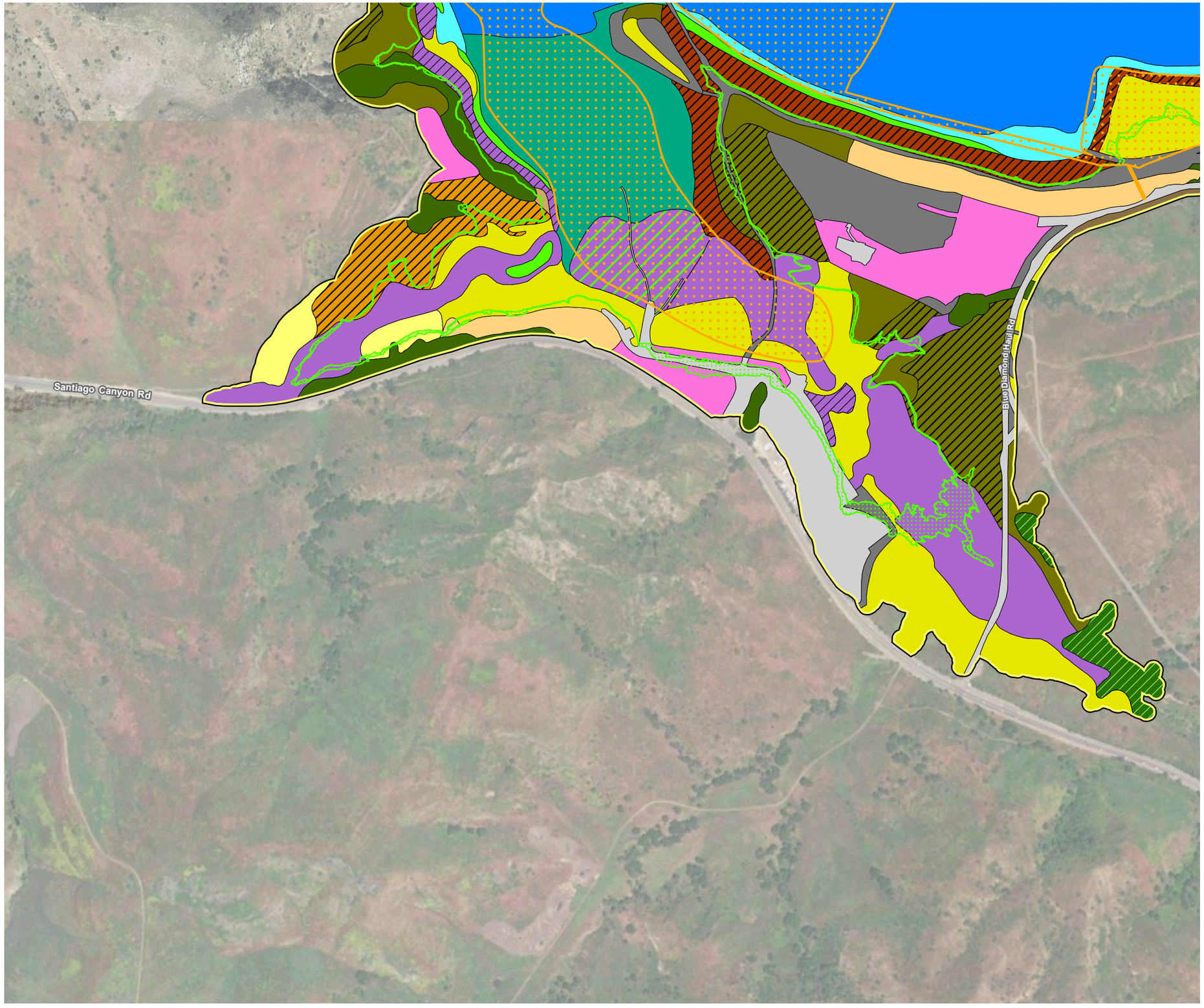
Exhibit 4.3-8b

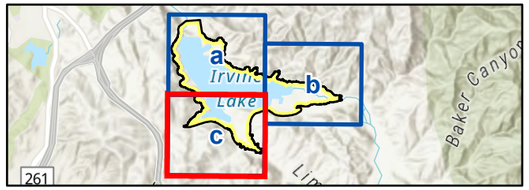
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\CD\SCD_Project.aprx\ex_Vegetation_Impacts





- Biological Study Area

Project Impacts

- Temporary Impacts*
- Additional Inundation Area

SCE Realignment

- Permanent Impacts
- Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

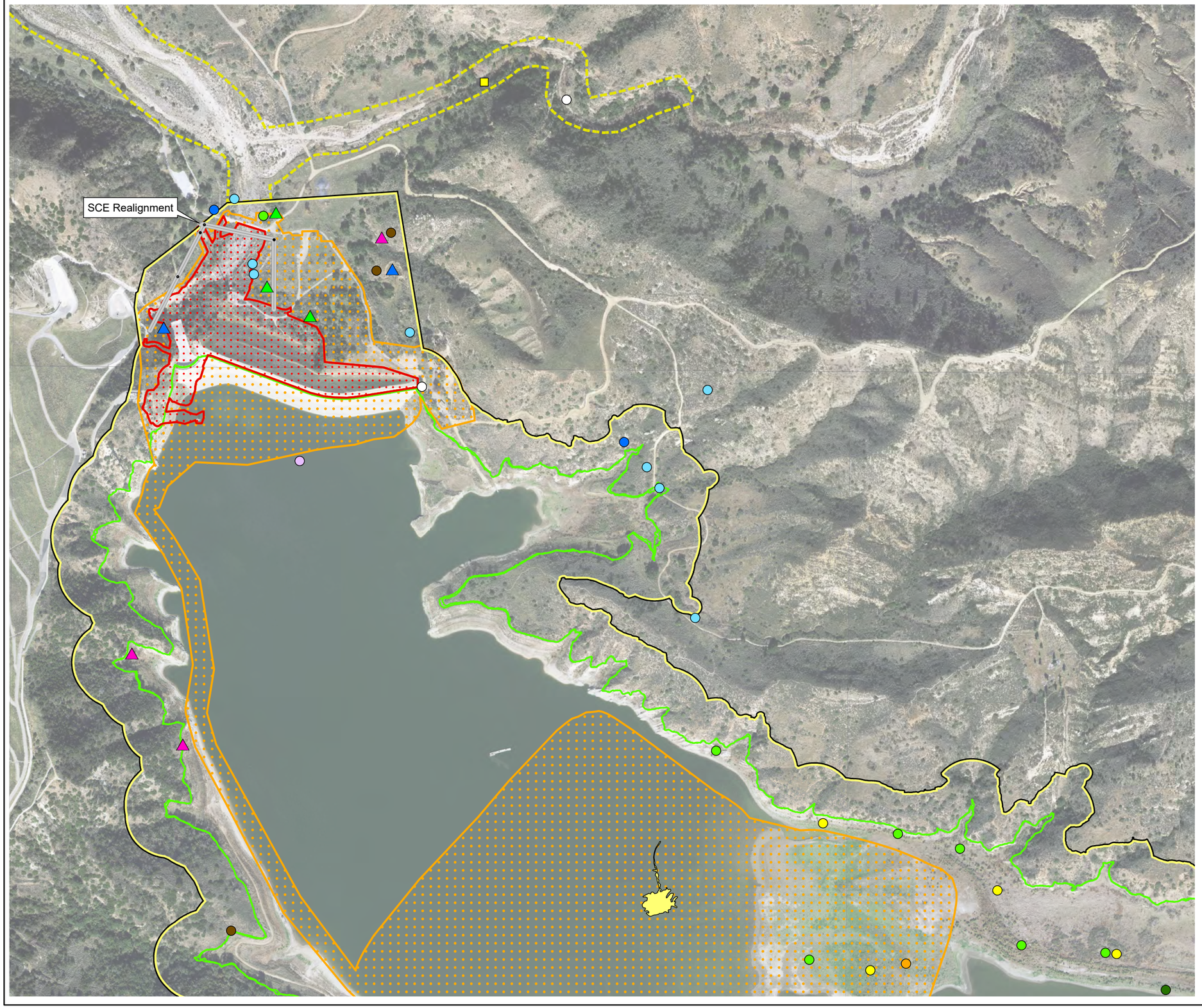
Exhibit 4.3-8c

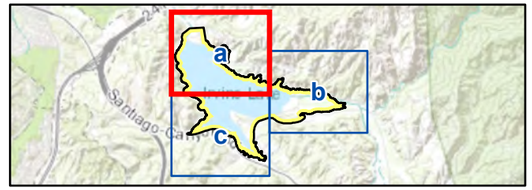
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 10/02/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Vegetation_Impacts





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Permanent Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Many-Stemmed Dudleya Population
Mud Nama Population (mapped polygon)

Special Status Species
American Peregrine Falcon
American White Pelican
Coastal Cactus Wren
Coastal California Gnatcatcher
Grasshopper Sparrow
Least Bell's Vireo
Southern California Rufous-Crowned Sparrow
White-Tailed Kite
Yellow-Breasted Chat
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

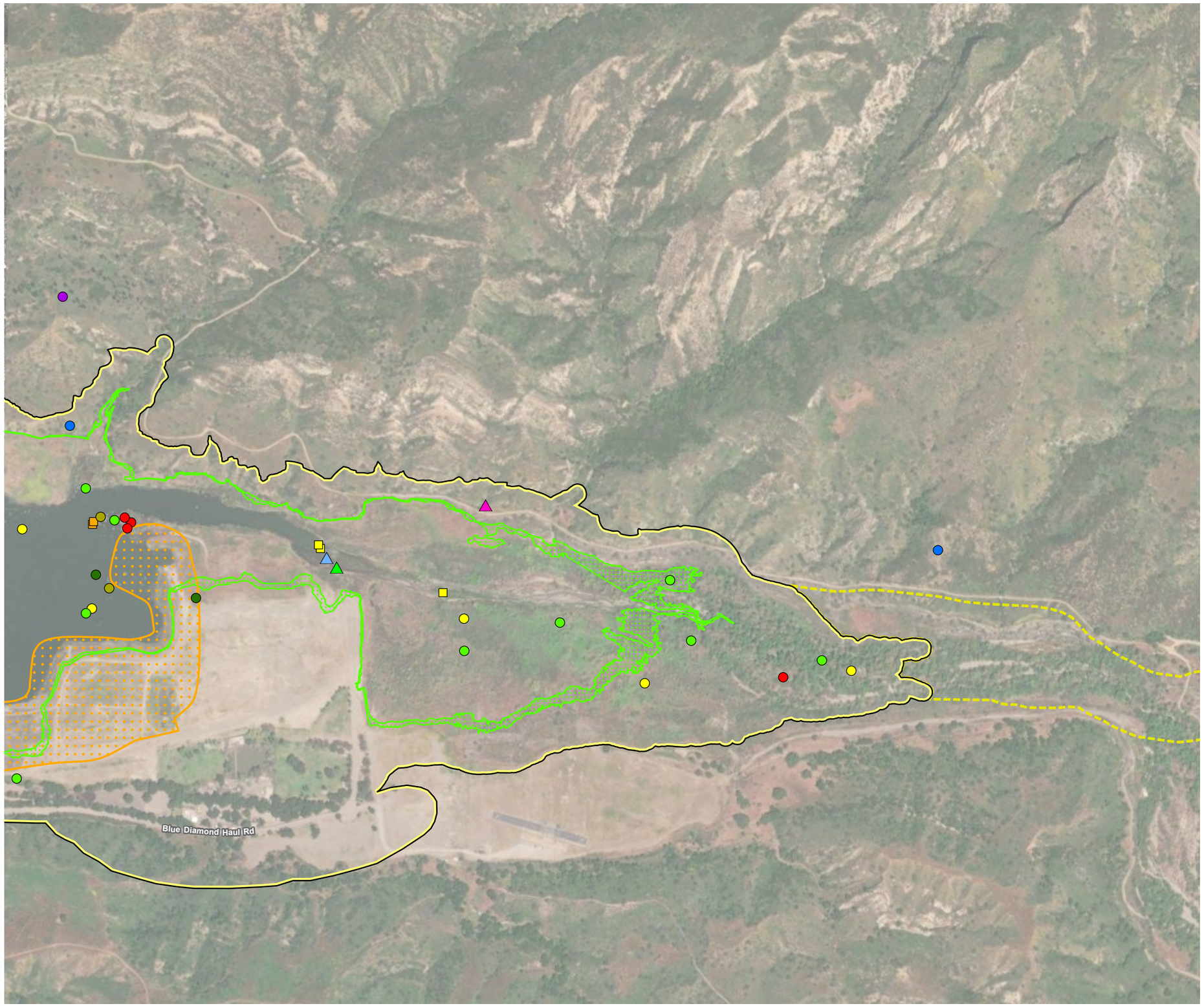
Project Impacts
Special Status Species **Exhibit 4.3-9a**

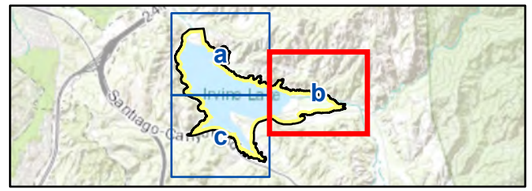
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\CD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Braunton's Milkvetch Population

Special Status Species
Bald Eagle (Nest)
Coastal Cactus Wren
Grasshopper Sparrow
Least Bell's Vireo
Willow Flycatcher (migrant)
Yellow Warbler
Yellow-Breasted Chat
Belding's Orange-Throated Whiptail
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

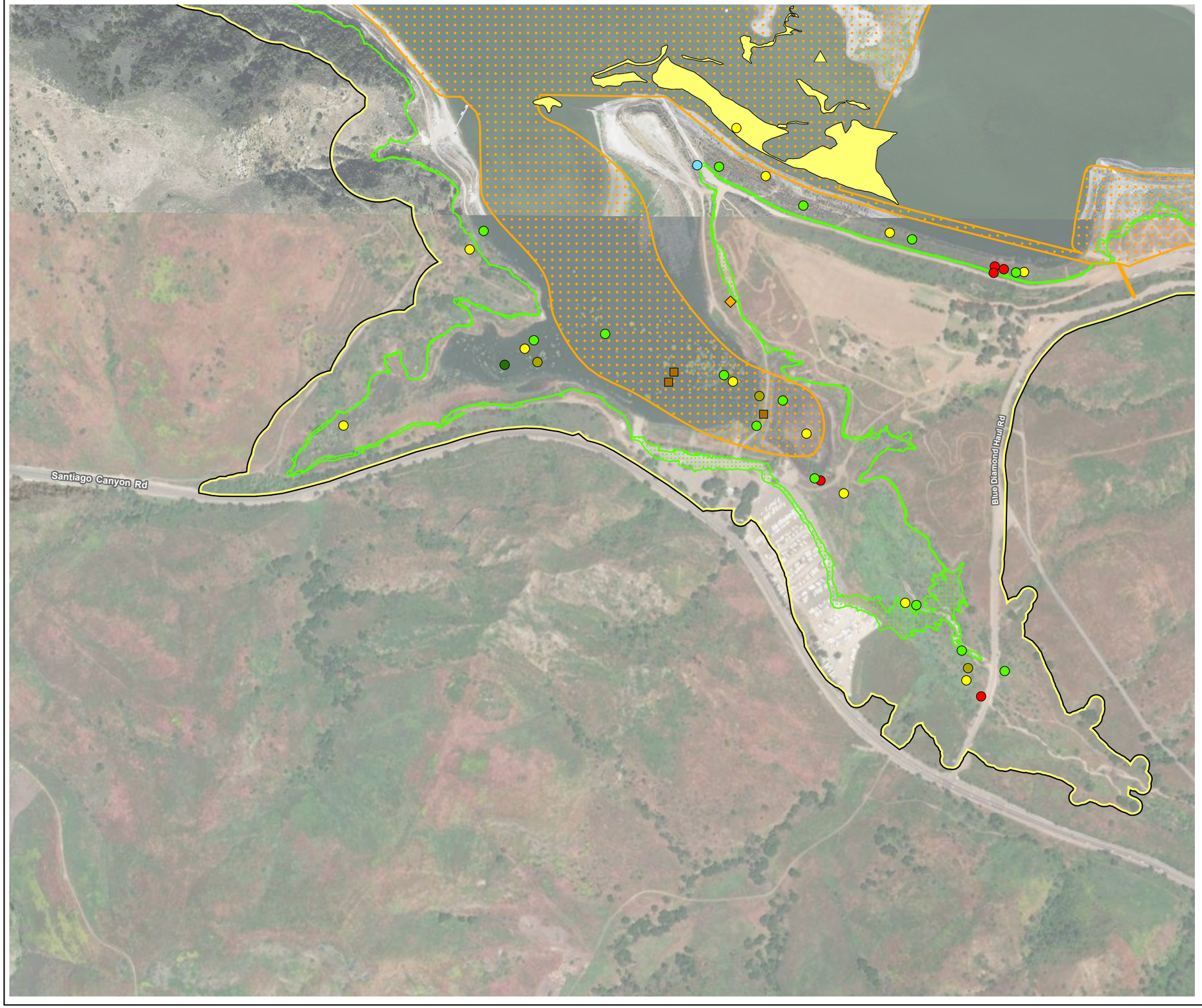
Project Impacts
Special Status Species **Exhibit 4.3-9b**

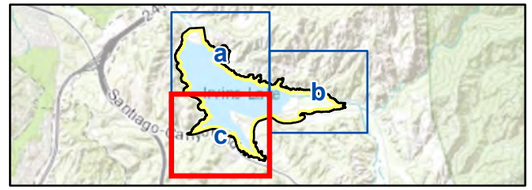
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Special Status Plants

Mud Nama Population (point location)

Mud Nama Population (mapped polygon)

Special Status Species

Crotch's Bumble Bee

Coastal California Gnatcatcher

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

Yellow Warbler

Yellow-Breasted Chat

Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

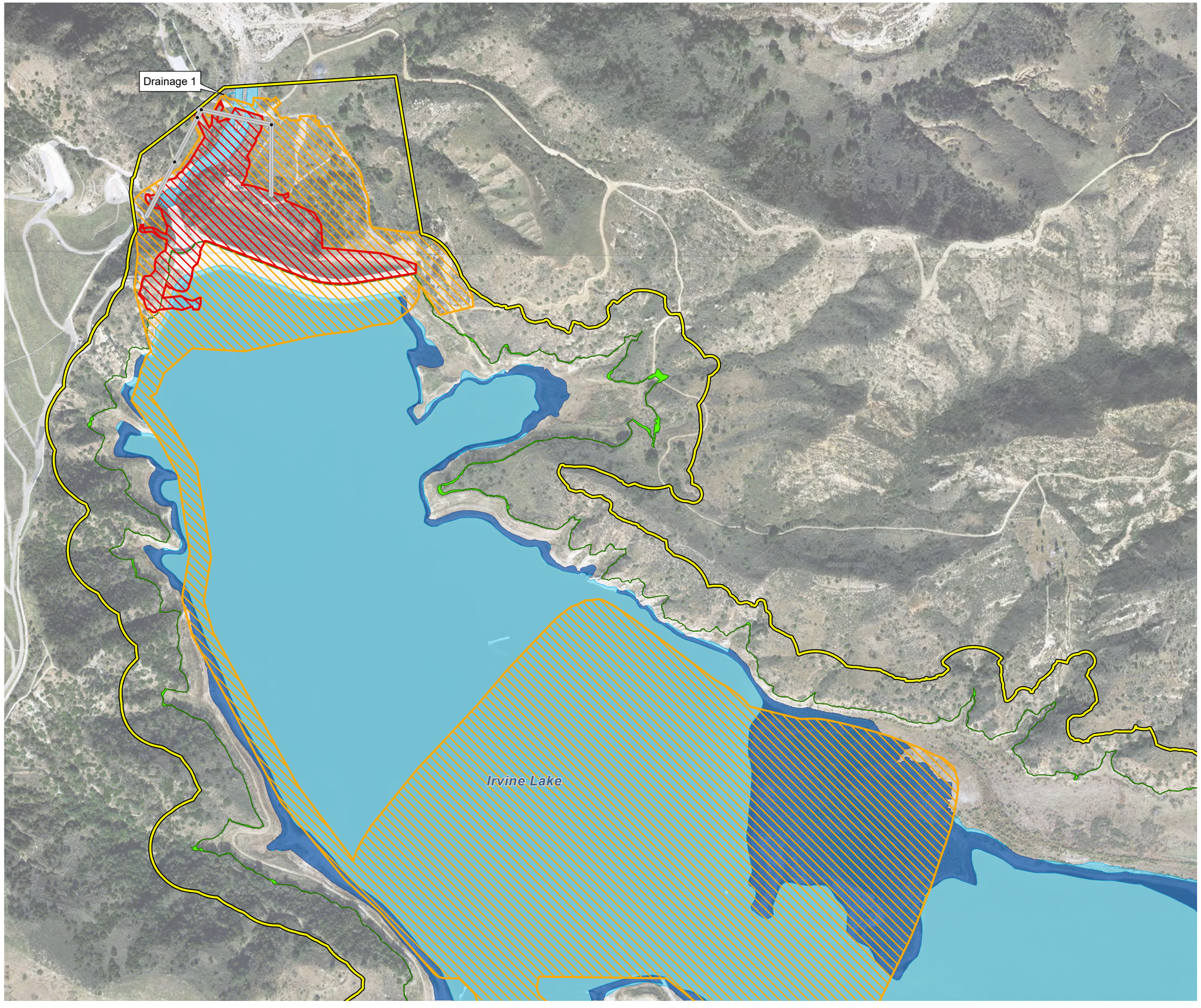
Exhibit 4.3-9c

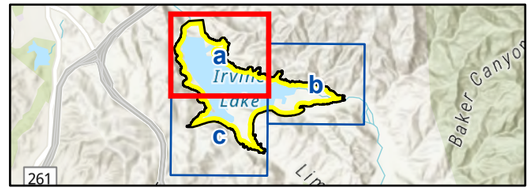
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_SS_Species_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

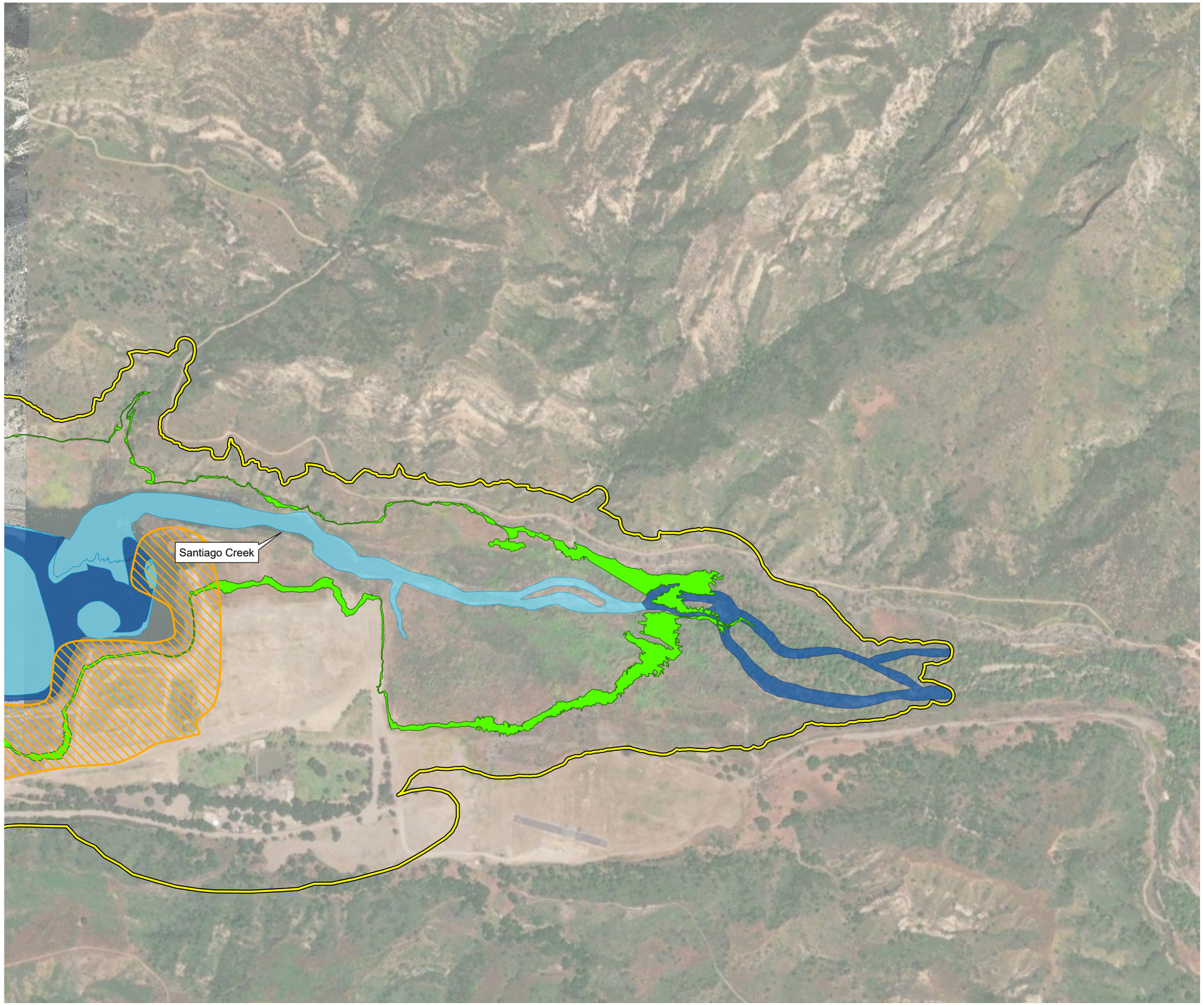
Project Impacts
USACE Waters of the United States Exhibit 4.3-10a

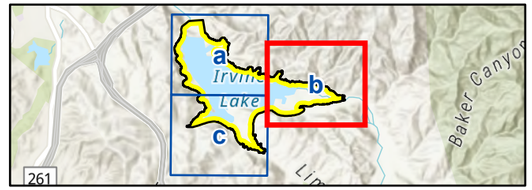
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_USACE_Impacts.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

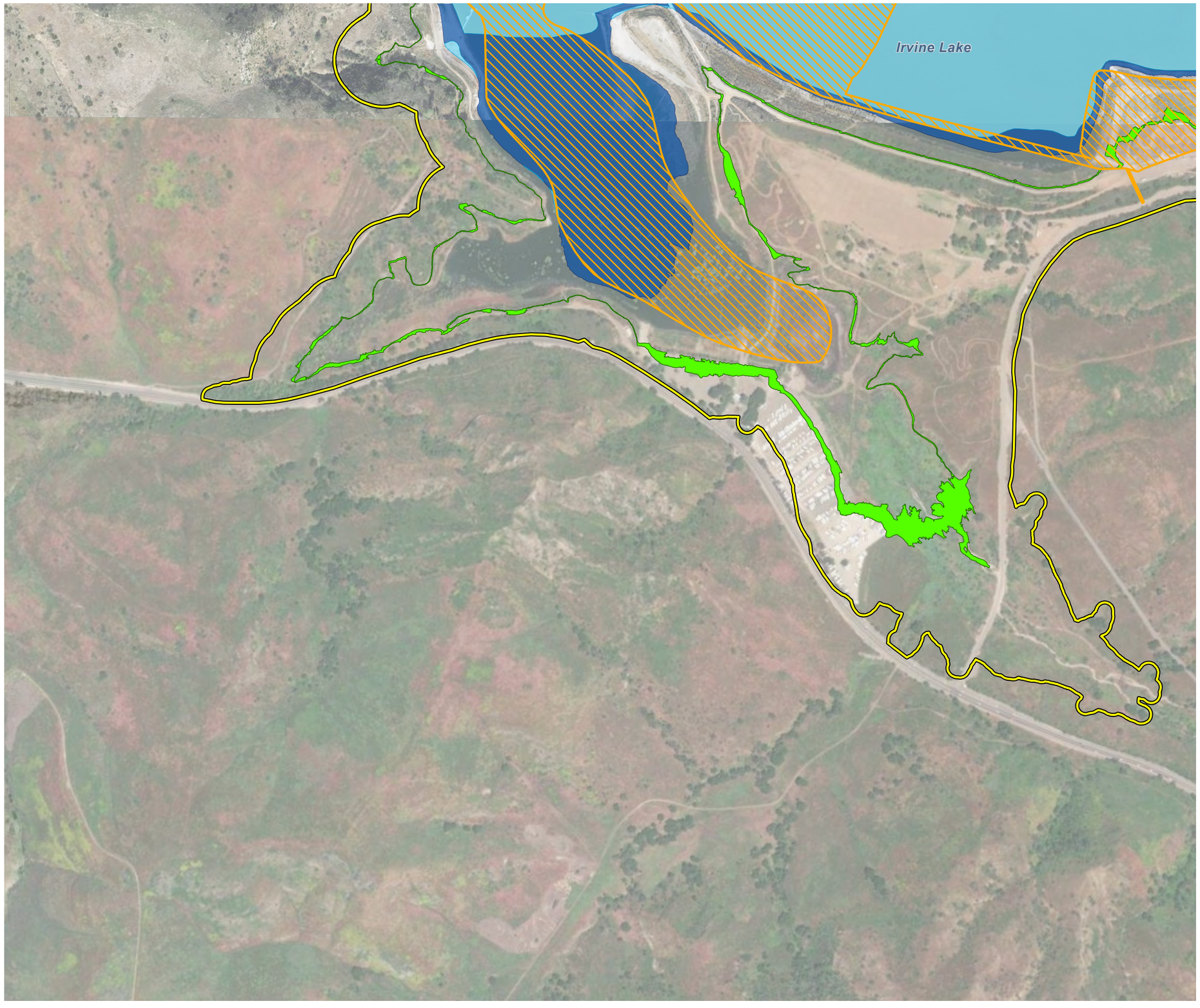
Project Impacts
USACE Waters of the United States Exhibit 4.3–10b

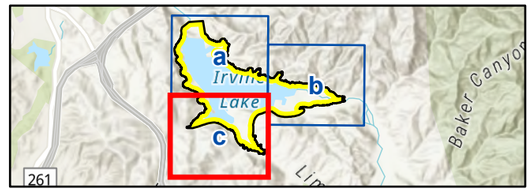
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

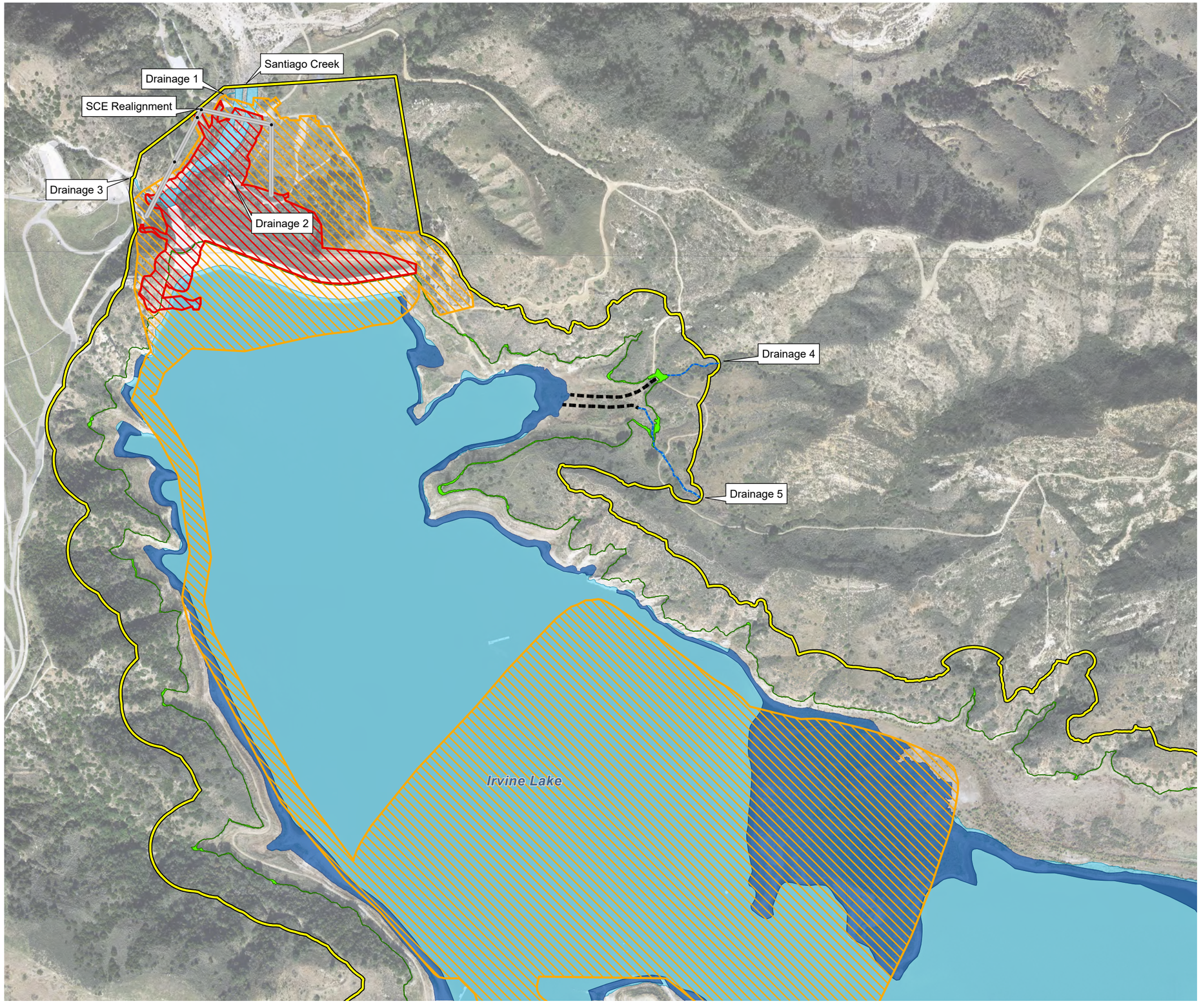
Project Impacts
USACE Waters of the United States Exhibit 4.3–10c

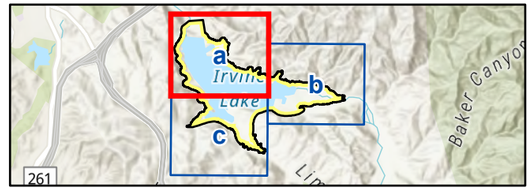
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

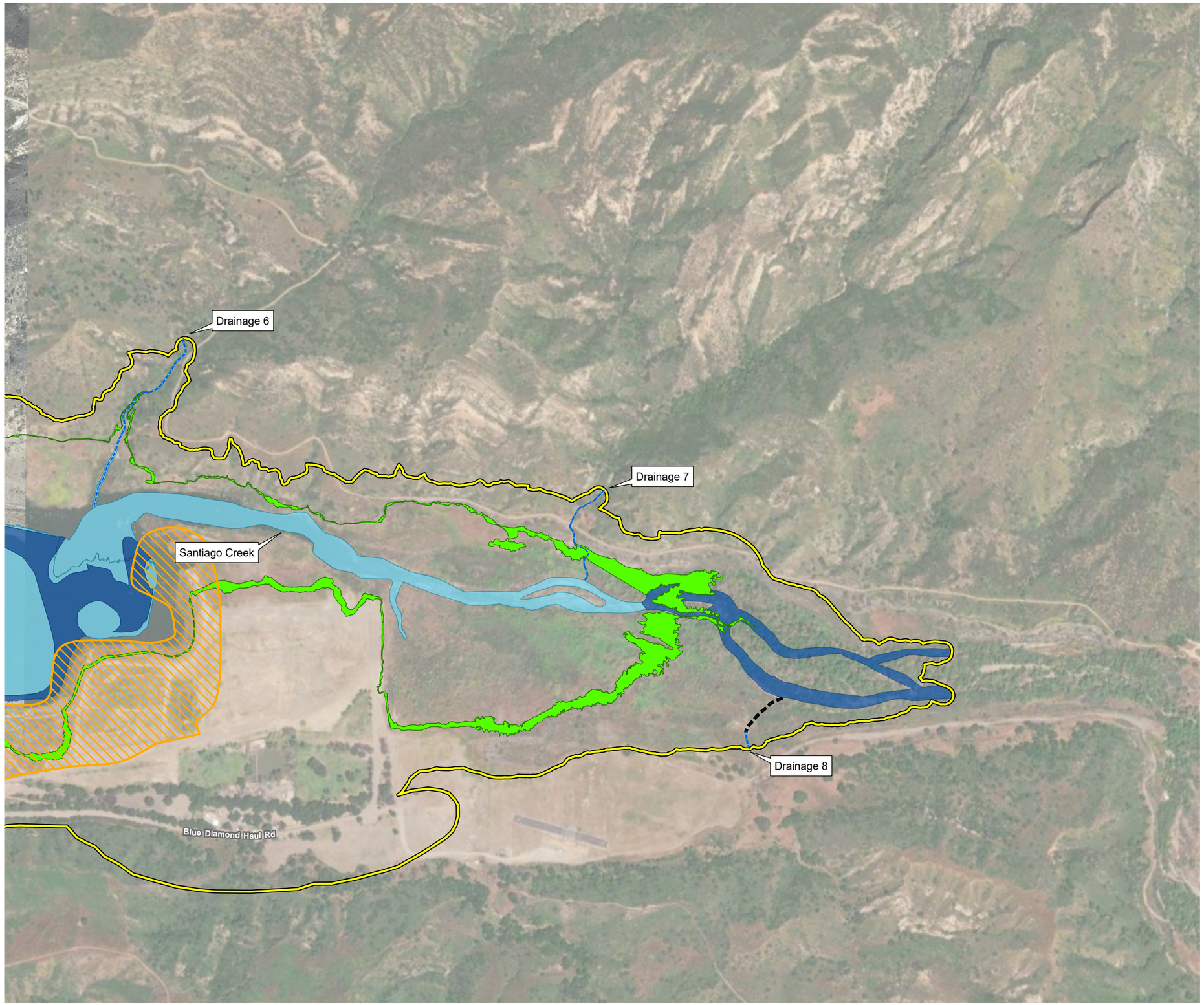
Exhibit 4.3–11a

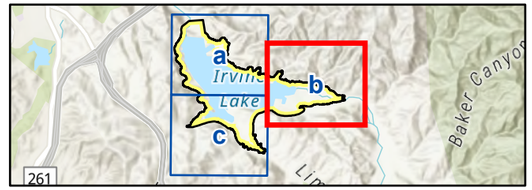
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprvlex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

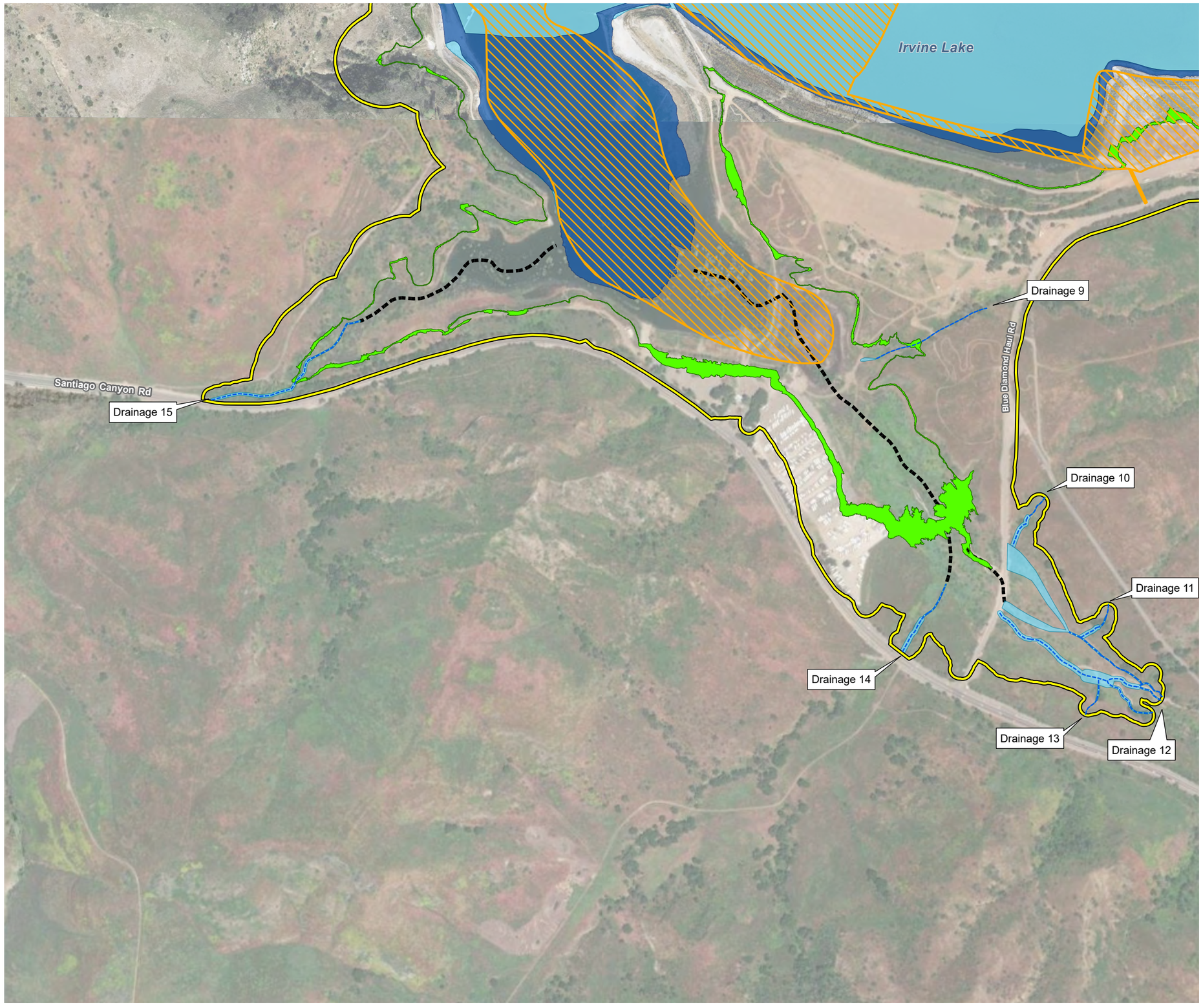
Exhibit 4.3-11b

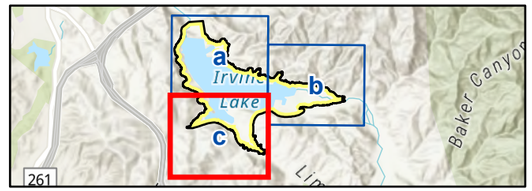
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

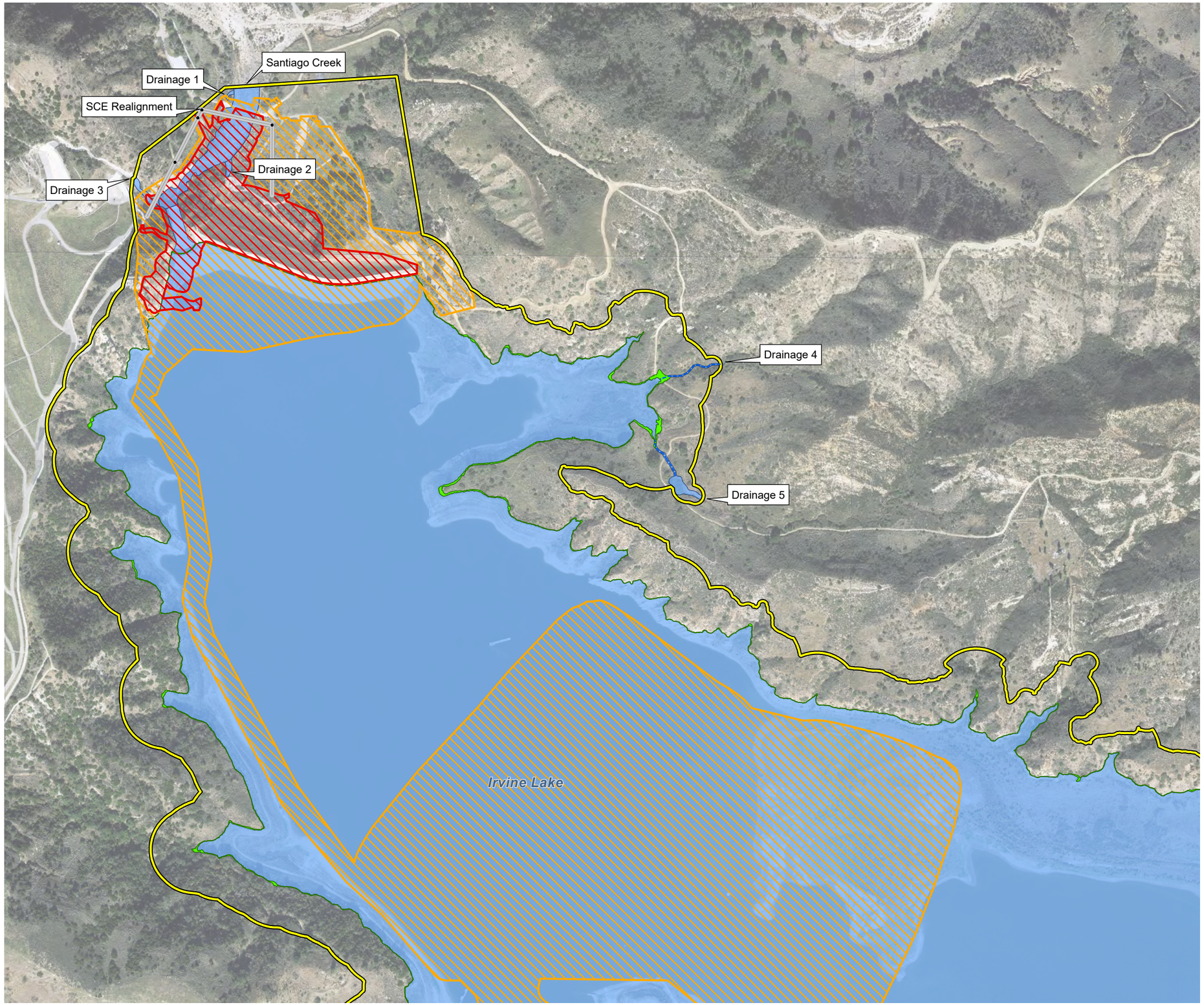
Exhibit 4.3–11c

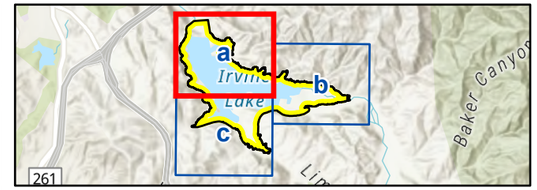
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

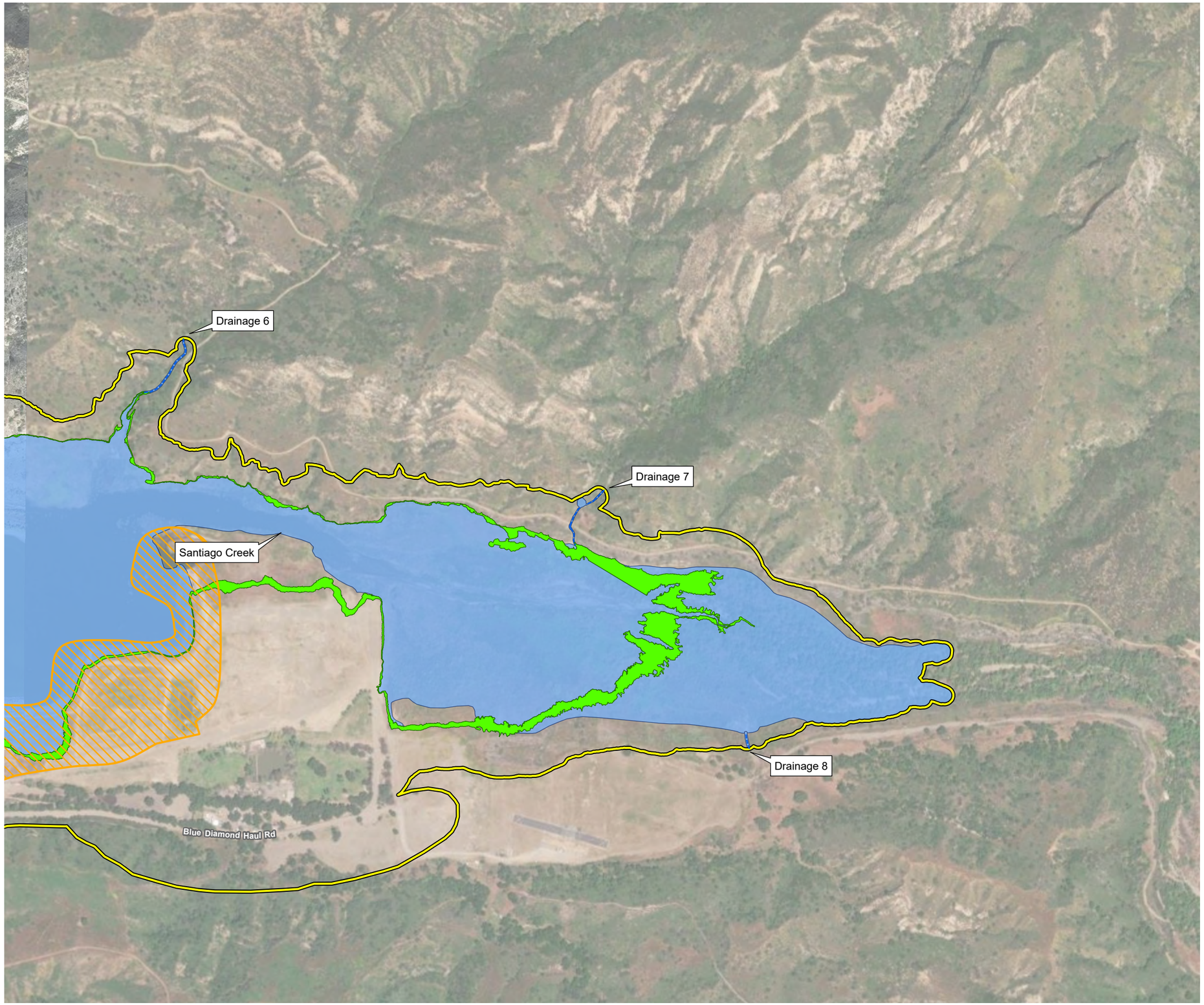
Exhibit 4.3-12a

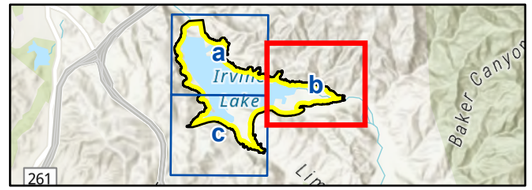
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Survey Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

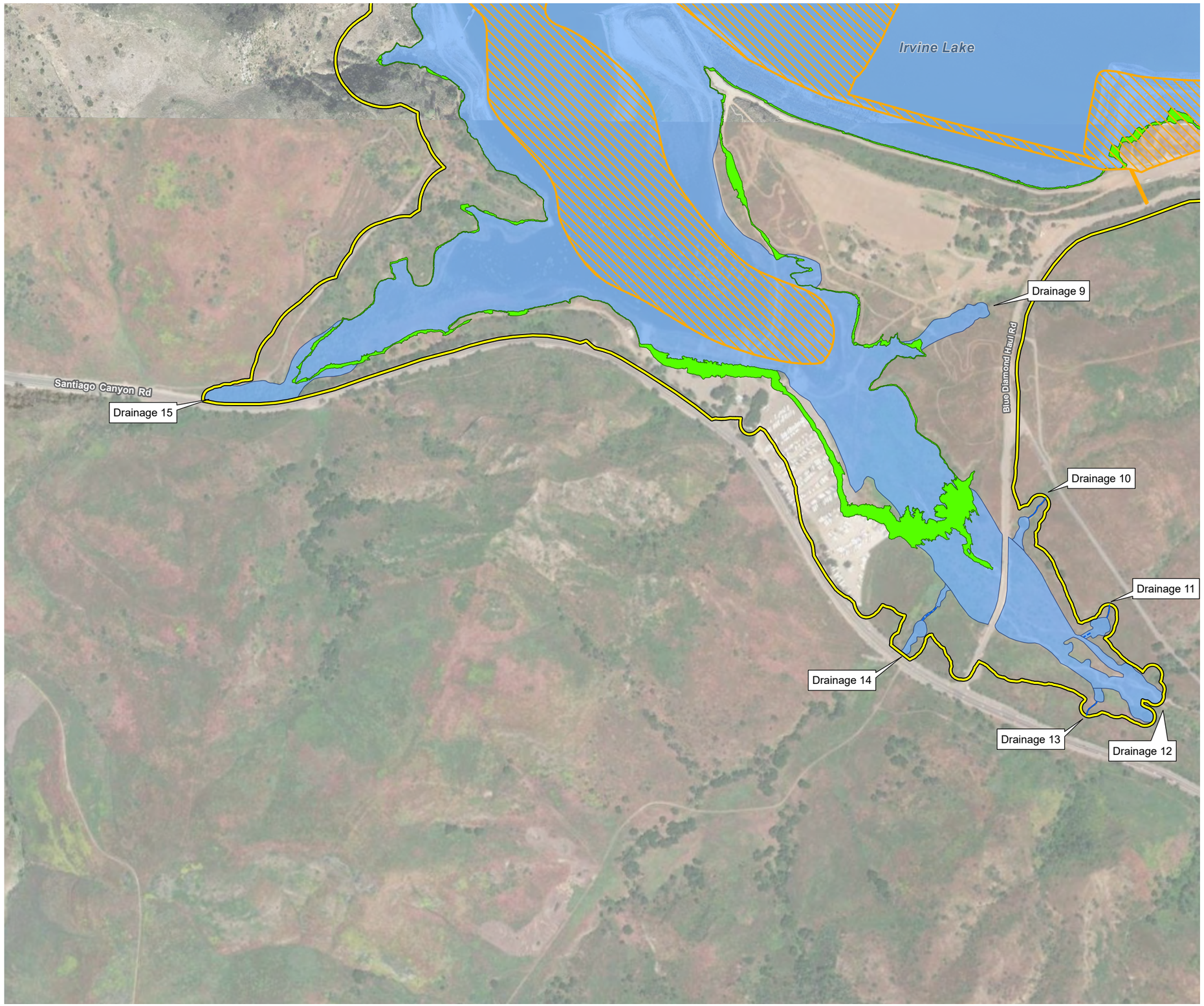
Project Impacts
CDFW Jurisdictional Waters Exhibit 4.3-12b

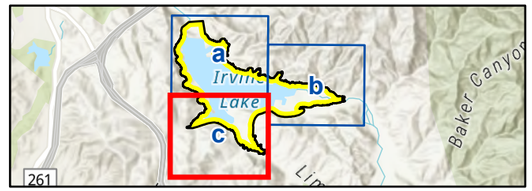
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Survey Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters Exhibit 4.3-12c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts

Section 4.3, Biological Resources, Tables 4.3-1 and 4.3-5

Tables 4.3-1 and 4.3-5 to be replaced with the tables included in Section 3.0, Corrections, Clarifications, and Additions.

TABLE 4.3-1
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Coastal Sage Scrub			
Sagebrush Scrub	2.3.6	No	**119.00**~~115.81~~
Disturbed Sagebrush Scrub	2.3.6	No	**24.89**~~19.39~~
Sagebrush – Coyote Brush Scrub	2.3.12	No	10.5**9**~~9~~
Southern Cactus Scrub	2.4	Provisional[a]	17.48
Disturbed Southern Cactus Scrub	2.4	Yes	10.62
Disturbed Floodplain Sage Scrub	2.6	Yes	0.48
Subtotal Coastal Sage Scrub			***183.02***~~*174.37*~~
Chaparral			
Toyon – Sumac Chaparral	3.12	No	**32.61**~~29.91~~
Subtotal Chaparral			***32.61***~~*29.91*~~
Grassland			
Annual Grassland	4.1	No	15.59
Ruderal	4.6	No	**100.10**~~92.38~~
Subtotal Grassland			***115.69***~~*107.97*~~
Riparian			
Riparian Herb	7.1	No	13.15
Southern Willow Scrub	7.2	Yes	0.43
Mulefat Scrub	7.3	No	1.50
Disturbed Mulefat Scrub	7.3	No	26.67
Southern Sycamore Riparian Woodland	7.4	Yes	20.48
Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest	7.4/7.5	Yes	5.46
Southern Black Willow Forest	7.7	Yes	83.61
Disturbed Southern Black Willow Forest	7.7	Yes	35.34
Southern Black Willow Forest/Riparian Herb	7.7/7.1	No[b]	**25.85**~~26.01~~
Subtotal Riparian			***212.49***~~*65*~~
Woodland			
Coast Live Oak Woodland	8.1	No	**39.22**~~31.09~~
Western Sycamore	8.x	Yes	0.36
Subtotal Woodland			***39.58***~~*31.45*~~
Cliff and Rock			
Cliff	10.0	No	1.62
Subtotal Cliff and Rock			*1.62*
Lakes, Reservoirs, and Basins			
Open Water	12.1	No	**312.11**~~313.28~~
Fluctuating Shoreline	12.2	No	26.31
Vegetated Fluctuating Shoreline	12.2	No	45.**09**~~13~~

TABLE 4.3-1
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Subtotal Lakes, Reservoirs, and Basins			***383.51***~~*384.72*~~
Watercourses			
Perennial Stream	13.1	No	6.97
Subtotal Watercourses			*6.97*
Developed Areas			
Ornamental	15.5	No	**29.19**~~20.77~~
Developed	15.6	No	**25.31**~~20.98~~
Subtotal Developed Areas			***54.45***~~*41.75*~~
Disturbed Areas			
Disturbed	16.1	No	**33.75**~~25.42~~
Subtotal Disturbed Areas			***33.75***~~*25.42*~~
Total			**1,063.74**~~**1,016.83**~~

[a] Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2025b).
[b] This blended community would be characterized more as riparian herb than southern black willow forest; therefore, it would not be considered a sensitive community.

BSA: Biological Survey Area

TABLE 4.3-5
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	~~115.81~~**119.00**	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	~~19.39~~**24.89**	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.5~~9~~**5**	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.62	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		~~*174.37*~~***183.03***	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	~~29.91~~**32.61**	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		~~*29.91*~~***32.61***	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	~~92.38~~**100.10**	1.25	25.72	0.00	25.97	3.07
Subtotal Grassland		~~*107.97*~~***115.69***	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	~~26.01~~**25.85**	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		~~*212.65*~~***212.49***	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

TABLE 4.3-5
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	~~31.09~~**39.22**	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		***~~31.45~~39.58***	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.62	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.62*	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	~~313.28~~**312.11**	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.**09**~~13~~	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		***~~384.72~~383.50***	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	~~20.77~~**29.19**	0.03	1.21	0.00	1.24	0.47
Developed	15.6	~~20.98~~**25.31**	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		***~~41.75~~54.50***	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	~~25.42~~**33.75**	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		***~~25.42~~33.75***	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**~~1,016.83~~1,063.74**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in the Biological Technical Report (Appendix C).

[b] Within the SCE Realignment (outside of the Project's permanent and temporary impact area), only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

Section 4.3, Biological Resources, Page 4.3-17, Physical Environmental Setting, Second Paragraph, Second Sentence

The largest areas in proximity to the BSA include the following: the 1,000-acre NCCP Reserve, Limestone Canyon ~~Regional Park~~ **Nature Preserve**, Whiting Ranch Wilderness Park, Santiago Oaks Regional Park, Irvine Regional Park, and Cleveland National Forest.

Section 4.3, Biological Resources, Page 4.3-26, Second Paragraph, First Sentence

The BSA is contiguous with large undeveloped open space areas in the NCCP Reserve, OC ~~Regional~~ Parks, and the Cleveland National Forest.

Section 4.3, Biological Resources, Page 4.3-26, Third Paragraph, Second sentence

It connects Habitat Reserve areas to the west and north of Irvine Lake to Habitat Reserve areas south of Santiago Canyon Road (i.e., Limestone Canyon **Nature Preserve**).

Section 4.3, Biological Resources, Page 4.3-60, PDF BIO-6

Speed Limit During Construction. The speed limit on construction access roads will be no more than 20 miles per hour. Signage will be posted throughout the construction areas and at multiple locations along the access road between the dam and the staging area at the upstream end of the lake. "Wildlife crossing" signage will also be posted along the access road between the dam and the staging area at the upstream end of the lake. Signage will be verified by the Biological Monitor. **For areas within OC Parks property where the speed limit is less than 20 miles per hour, the County's posted speed limit will apply.**

Section 4.3, Biological Resources, Page 4.3-74, Dewatering of the Lake

Dewatering of the Lake

During the Project, the lake would be dewatered for a period of up to four years. When a lake is dewatered, water is not available to seep through the ground to recharge the underground aquifer and the water table under and around the edge of the lake may drop. If this occurs, it could affect the riparian vegetation around the edge of the lake. However, during the winter storm season, precipitation is expected to recharge or partially recharge the underground aquifer/water table. The water table can also recharge through the areas surrounding the lake that are outside the dewatered area, including through several drainages flowing into the lake and sheet flow from the southeastern and eastern sides of the lake. The majority of riparian scrub/woodland vegetation occurs at the upstream end of the lake, upstream of the work area, where recharge would still be occurring naturally (since it is upstream of the area that would be dewatered). Considering both precipitation and recharge from surrounding areas, lowering of the water table is not expected to substantially affect riparian scrub/woodland vegetation around the edges of the lake. **Based on likely lake draining scenarios, the flows required to drain the lake would vary from a negligible flow rate to approximately 370 cfs depending on hydraulic conditions and whether both pumped diversion and the cone valve are utilized. On average, Irvine Lake captures approximately 5,000 acre-feet of native runoff per year. Assuming approximately 5,000 acre-feet of native runoff is captured and only the pumped diversion system is utilized to drain the lake, it would require approximately 20 to**

30 days to drain the reservoir. These flows would not be maintained long enough to permanently enhance or degrade the riparian and upland habitat and vegetation communities below the lake over the course of the construction period. Historically, IRWD has operated the dam's critical valve, which releases water to Santiago Creek, and discharged up to 250 cfs for weeks at a time. Based on observations during these events, this discharge flow rate is contained within Santiago Creek with additional available capacity in the creek to accommodate increased flows, up to 370 cfs. Once the Project is completed, releases from Irvine Lake would return to normal pre-construction operations. Therefore, this impact is considered adverse but less than significant, and no mitigation would be required.

Section 4.3, Biological Resources, Page 4.3-82, MM BIO-1A, First Paragraph, Second Sentence

However, IRWD will notify the Natural Communities Coalition (NCC) and **OC Parks to** allow the NCC **and OC Parks** to collect seed and/or salvage special status plants that will be impacted by the Project. Seed collection/salvage will be coordinated so that it does not delay the construction schedule.

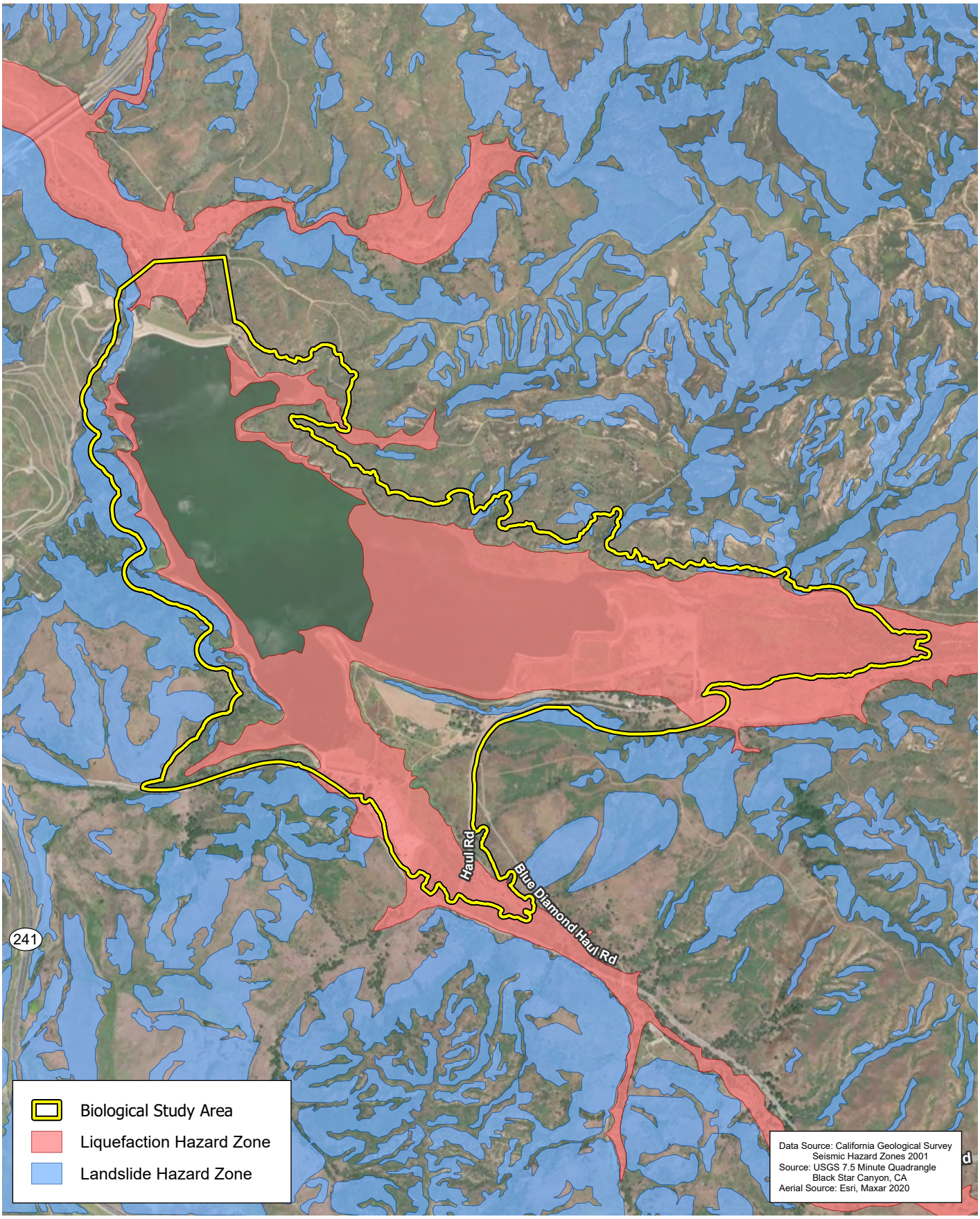
Section 4.3, Biological Resources, Page 4.3-87, MM BIO-6

MM BIO-6 **Bald Eagle: Initial dewatering activities shall be scheduled to avoid the bald eagle nesting season (December 1 to August 15) to the maximum extent feasible.** IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW. **IRWD will comply with all eagle disturbance permit conditions should such a permit be required by USFWS.**

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or early April to confirm the nesting stage (i.e., presence of eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing until the young fledge or May 15, whichever comes last. The Biologist will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

Section 4.6, Geology and Soils, Exhibit 4.6-2

Exhibit 4.6-2 to be replaced with the following page.



Zones of Required Investigation for Landslides and Liquefaction

Exhibit 4.6-2

Santiago Creek Dam Improvement Project

N
W E
S

0 2.5 5
Miles

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Landslide_Liquefaction.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Landslide_Liquefaction

Section 4.8, Hazards and Hazardous Materials, Page 4.8-5, Surrounding Land Uses, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.9, Hydrology and Water Quality, Page 4.9-7, Following Third Paragraph "RARE"

Santiago Creek, Reach 1 (below Irvine Lake) has the following surface water beneficial uses:

MUN – Municipal and Domestic Supply waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.

GWR – Groundwater Recharge waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality or halting saltwater intrusion into freshwater aquifers.

REC1 – Water Contact Recreation (Primary Contact Recreation) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs. Although the Irvine Lake (Santiago Reservoir) is listed with a REC1 beneficial use, IRWD does not permit primary contact recreation because the reservoir waters are used for water supply.

REC2 – Non-contact Water Recreation (Secondary Contact Recreation) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing and aesthetic enjoyment in conjunction with the above activities.

WARM – Warm Freshwater Habitat waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

WILD – Wildlife Habitat waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife. (RWQCB 2025)

Section 4.9, Hydrology and Water Quality, Page 4.9-12, Second Paragraph

Furthermore, the Project would comply with the General Waste Discharge Requirements issued by the Santa Ana Regional Water Quality Control Board (~~R8-2015-0004, NPDES No. CAG998001~~ **R8-2020-0006, NPDES No. CAG998001**, General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant [De Minimis] Threat to Water Quality) (RWQCB ~~2015~~ **2020 until a new Order is issued**), including

provisions requiring notification, testing, and reporting of dewatering and testing-related discharges, which would mitigate any impacts of such discharges.

Section 4.9, Hydrology and Water Quality, Page 4.9-18, References

Santa Ana Regional Water Quality Control Board (RWQCB). 2025 (April). Water Quality Control Plan for the Santa Ana River Basin. Santa Ana, CA: https://www.waterboards.ca.gov/water_issues/programs/basin_plan/docs/2025/chp3_beneficial_uses_5-25.pdf.

Section 4.10, Land Use and Planning, Page 4.10-6, Land Uses Surrounding the Project Site, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Section 4.11, Noise, Page 4.11-14, new paragraph following second paragraph

The noise analysis focused on local recreational areas with passive uses. Oak Canyon Park, which would be located adjacent to the primary staging area and is used for various private events, was selected to represent a worst case scenario of exposure of passive park visitors to construction-related noise sources, including concrete crushing activities. Due to the proximity of Oak Canyon Park to the Project activities and the anticipated intensity of the Project activities at this location, anticipated Project-related noise impacts at Oak Canyon Park would be equal to or greater than those at the other park locations noted by the commenter. Use of the aforementioned parks is generally confined to hiking trails and is transient in nature, where park users generally do not spend extended periods of time at one location. Therefore, exposure to noise from construction would be temporary and variable at Fremont Canyon Nature Preserve, Red Rock Wilderness, and Saddleback Wilderness and is not considered a significant impact.

Section 4.13, Recreation, Pages 4.13-5 – 4.13-7, Table 4.13-1

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Aliso and Wood Canyons Wilderness Park	28373 Alicia Parkway Laguna Niguel, California	23 miles	Bike Trails, Bird Watching, Equestrian Trails, Hiking Trails, Interpretive Programs, Picnic Areas, Restrooms, Scenic Overlook
Carbon Canyon Regional Park	4442 Carbon Canyon Road Brea, California	16 miles	Ball Fields, Barbeques, Bike Trails Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Fishing, Hiking Trails, Historic Dam, Nature Center, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds Shelters, Tennis Courts, Volleyball Courts
Ronald W. Caspers Wilderness Park	33401 Ortega Highway San Juan Capistrano, California	36 miles	Amphitheater, Barbeques Bike Trails, Bird Watching, Camping, Corral, Dump Station Equestrian Camping, Equestrian Trails Fire Rings, Gazebo, Hiking Trails, Historic Windmill, Horseshoe Pits, Interpretive Programs Center, Nature Center, Picnic Areas (Tables, Restrooms), Restrooms, RV Camping, Scenic Overlook, Shelters
Ralph B. Clark Regional Park	8800 Rosecrans Avenue Buena Park, California	23 miles	Amphitheater, Ball Fields, Barbeques, Dogs Permitted on Leashes, Fishing, Hiking Trails Horseshoe Pits, Interpretive Programs Center, Model Boats, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation Playgrounds, Tennis Courts, Volleyball Courts, Weddings Special Events
Ted Craig Regional Park	3300 State College Boulevard Fullerton, California	19 miles	Ball Fields, Barbeques, Basketball Courts, Bike Trails, Bird Watching, Dogs Permitted on Leashes, Fishing, Hiking Trails, Interpretive Programs Center, Model Boats Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Racquetball Courts, Weddings Special Events
Featherly Regional Park	24001 Santa Ana Canyon Road Anaheim, California	14 miles	RV Camping, Wilderness Area
Irvine Lake	4621 E Santiago Canyon Road Silverado, California	0 miles Project site	Shoreline Fishing
Irvine Ranch Open Space	13333 Black Star Canyon Road Silverado, California	~~6 miles~~ **Adjacent**	Biking, Equestrian Activities, Hiking, Wilderness Area (Includes Fremont Canyon Nature Preserve, Limestone Canyon **Nature Preserve**, and Black Star Canyon Wilderness)
Irvine Regional Park	1 Irvine Park Road California Orange, California	3 miles	Ball Fields, Barbeques, Bike Rentals Bike Trails, Boarding Stables Dogs Permitted on Leashes, Equestrian Trails Fishing, Food Concessions, Hiking Trails, Interpretive Programs Center, Paddle Boat Rentals, Picnic Areas, Picnic Shelters for Reservation, Playgrounds, Pony Rides, Train Rides
Laguna Coast Wilderness Park	18751 Laguna Canyon Road Laguna Beach, California	20 miles	Bike Trails, Bird Watching, Equestrian Trails, Hiking Trails, Interpretive Programs, Nature Center, Picnic Areas (Tables, Restrooms), Restrooms, Scenic Overlook

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Laguna Niguel Regional Park	28241 La Paz Road Laguna Niguel, California	24 miles	Amphitheater, Barbeques, Bike Trails Dogs Permitted on Leashes, Fishing Gazebo, Hiking Trails, Horseshoe Pits, Model Glider Area, Pickleball, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Scenic Overlook, Tennis Courts, Volleyball Courts, Weddings Special Events
William R. Mason Regional Park	18712 University Drive Irvine, California	15 miles	Amphitheater, Ball Fields, Bike Trails Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Fitness Par Course Gazebo, Hiking Trails, Horseshoe Pits Interpretive Programs, Model Boats, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playground Tot Lot, Playgrounds, Restrooms, Shelters, Volleyball Courts
Mile Square Regional Park	16801 Euclid Street Fountain Valley, California	18 miles	Archery, Ball Fields, Barbeques, Bike Rentals, Bike Trails, Camping, Dogs Permitted on Leashes, Fishing, Fitness Par Course, Interpretive Programs, Paddle Boat Rentals, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Restrooms, Shelters, Soccer Field, Volleyball Courts, Weddings Special Events
O'Neill Regional Park	30892 Trabuco Canyon Road Trabuco Canyon, California	19 miles	Amphitheater, Bike Trails, Camping Conference Rooms, Dump Station, Equestrian Trails, Hiking Trails, Horseshoe Pits, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Playgrounds, RV Camping, Scenic Overlook, Showers
Thomas F. Riley Wilderness Park	30952 Oso Parkway Coto de Caza, California	25 miles	Amphitheater, Bike Trails Corral, Equestrian Trails, Hiking Trails, Interpretive Programs Center, Restrooms, Scenic Overlook
Peters Canyon Regional Park	8548 E. Canyon View Avenue Orange, California	7 miles	Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Scenic Overlook
Santiago Oaks Regional Park	2145 North Windes Drive Orange, California	6 miles	Barbeques, Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Historic Dam, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Playgrounds, Scenic Overlook, Weddings Special Events
Talbert Regional Park	1298 Victoria Avenue Costa Mesa, California	20 miles	Bike Trails, Dogs Permitted on Leashes, Hiking Trails, Picnic Areas (Tables, Restrooms), Restrooms, Scenic Overlook
Whiting Ranch Wilderness Park	26701 Portola Parkway Foothill Ranch, California	16 miles	Bike Trails, Equestrian Center, Equestrian Trails, Hiking Trails, Restrooms
Tri-City Regional Park	2301 Kraemer Boulevard Placentia, California	15 miles	Barbeques, Dogs Permitted on Leashes Fishing, Picnic Shelters for Reservation, Restrooms

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Upper Newport Bay Nature Preserve	2301 University Drive Newport Beach, California	18 miles	Amphitheater, Bike Trails, Classroom Conference Center, Dogs Permitted on Leashes, Equestrian Trails, Gift Shop, Hiking Trails, Interpretive Programs Center, Restrooms, Scenic Overlook
Harriett M. Wieder Regional Park	19251 Seapoint Avenue Huntington Beach, California	26 miles	Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Picnic Areas (Tables, Restrooms), Playgrounds
Yorba Regional Park	7600 East La Palma Avenue Anaheim, California 92807	15 miles	Ball Fields, Barbeques, Bike Rentals, Bike Trails, Dogs Permitted on Leashes, Equestrian Trails, Fishing, Fitness Par Course, Hiking Trails, Horseshoe Pits, Kite Flying Area, Model Boats, Paddle Boat Rentals, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Volleyball Courts
Source: OC Parks 2024b.			

Section 4.13, Recreation, Page 4.13-7, Table 4.13-2

Name	Location	Distance from the Nearest Site Boundary	Amenities
Oak Canyon Park	5305 Santiago Canyon Road, Silverado, California	0.4 miles	Privately leased park by James Event Productions
Saddleback ~~Motocross Park~~ **Wilderness**	Santiago Canyon Road, Orange, California	1.1 miles	~~Motor playground/motocross~~ **Model aircraft flying**
OCMA (Orange County Modelers Association) Bob Swenson Flying Site	Blue Diamond Haul Road, Silverado, California	0.8 miles	Model aircraft flying

Section 4.13, Recreation, Page 4.13-8, last paragraph, second sentence

The nearest public recreational facilities to the proposed Project include ~~Oak Canyon Park,~~ Saddleback ~~Motocross Park~~ **Wilderness**, Irvine Regional Park, OCMA flying site, **Peters Canyon Regional Park, and Irvine Ranch Open Space areas including** Fremont Canyon Nature Preserve, Black Star Canyon Wilderness Park, Limestone Canyon ~~Regional Park~~ **Nature Preserve**, **and Red Rock Wilderness.**~~and Peters Canyon Regional Park.~~ **The nearest private park is Oak Canyon Park.**

Section 4.14, Transportation, Page 4.14-7, Threshold 4.14-4

Less Than Significant Impact. The proposed Project would involve improvements to the Santiago Creek Dam outlet works and spillway facility improvements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. During construction, existing access routes would be maintained at the Project site. Furthermore, emergency access routes

are already in place at the Project site, and proposed Project actions would not alter access. **IRWD would coordinate with the County throughout the construction process to ensure necessary access routes are maintained or alternative access routes are provided.** Therefore, no **significant** impact to local or regional emergency access routes would occur, and no mitigation is required.

Section 4.14, Transportation, Page 4.14-16, second paragraph

To facilitate the movement of construction traffic including worker commutes and to minimize potential disruptions, a Traffic Control Plan would be prepared in accordance with County requirements and followed during construction. The Traffic Control Plan would include measures such as requiring an encroachment permit for work in the public right-of-way, limiting heavy truck activity during peak hours, using flaggers to manage short-term traffic control, requiring a formal traffic control plan for lane closures, limiting time and duration of closures, and/or requiring a minimum number of lanes to be open for travel during peak hours. Compliance with the Traffic Control Plan and County requirements would prevent any conflict between the Project and applicable plans, ordinances, or policies; and the Project's impact would be less than significant. **As discussed in Section 4.13, Recreation, these impacts would be temporary and alternative recreational facilities offering hiking, biking, and equestrian opportunities exist in the local region. Because these alternative forms of transportation are primarily for recreational purposes, this would not represent a significant impact related to transportation.**

Section 4.17, Wildfire, Page 4.17-6, Existing Conditions, Second Paragraph, Second Sentence

Irvine Regional Park is located northwest of SR-241; Limestone Canyon ~~Regional Park~~ **Nature Preserve** is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake.

Draft EIR Appendix C, Biological Technical Report, Exhibits 1 through 15

Exhibits 1 through 15 to be replaced with the following pages.

Regional Location and Local Vicinity

Exhibit 1

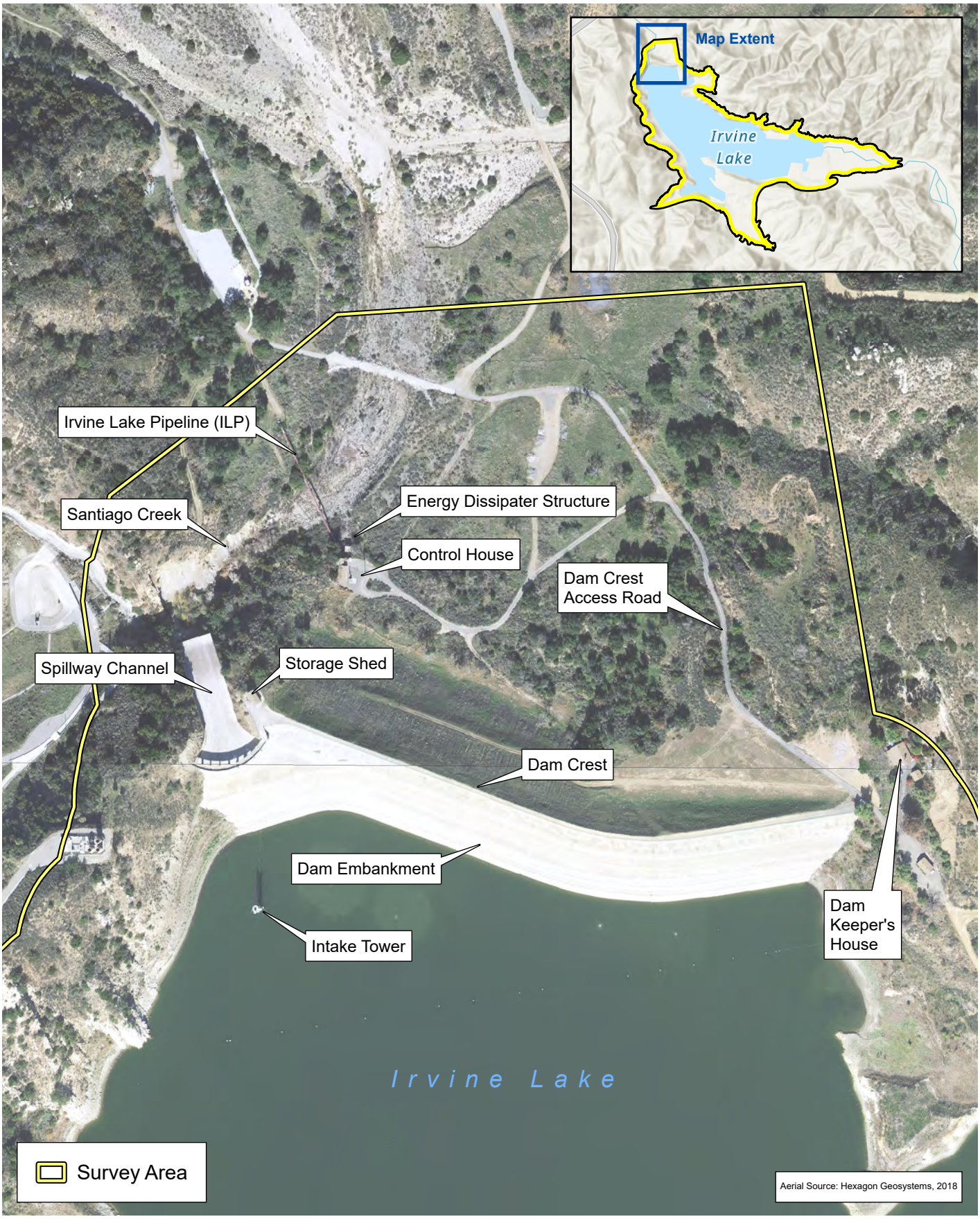
Santiago Creek Dam Improvement Project

N
W
E
S

0 2,000 4,000 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_LV_RL.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Existing_Dam_Features

Existing Dam Features

Exhibit 2

Santiago Creek Dam Improvement Project

N W E S

0 150 300 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_ExistingDamFeatures.pdf

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 3

Santiago Creek Dam Improvement Project

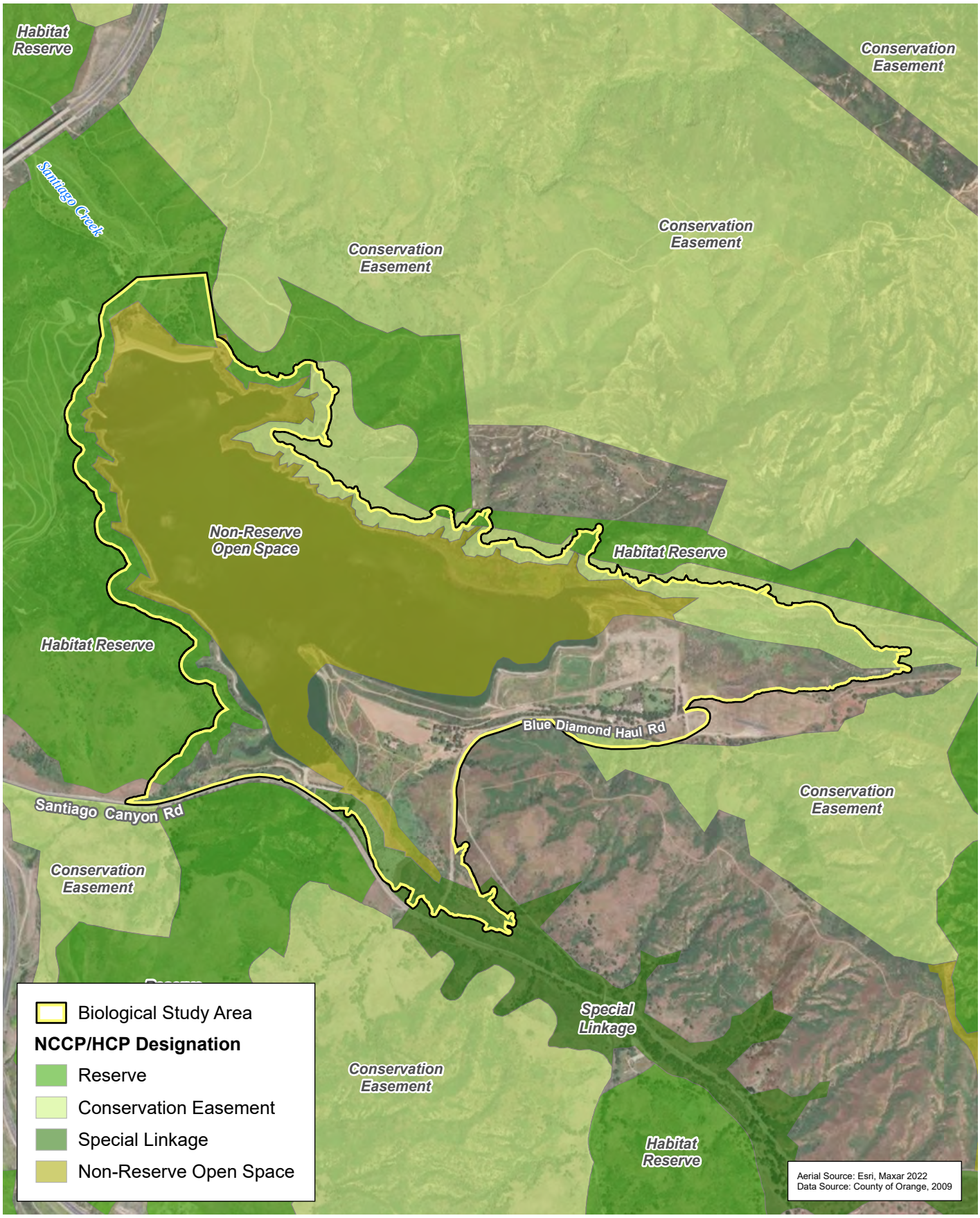
N W E S

0 1,000 2,000 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_USGS



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_NCCP

Orange County Central/Coastal NCCP/HCP

Exhibit 4

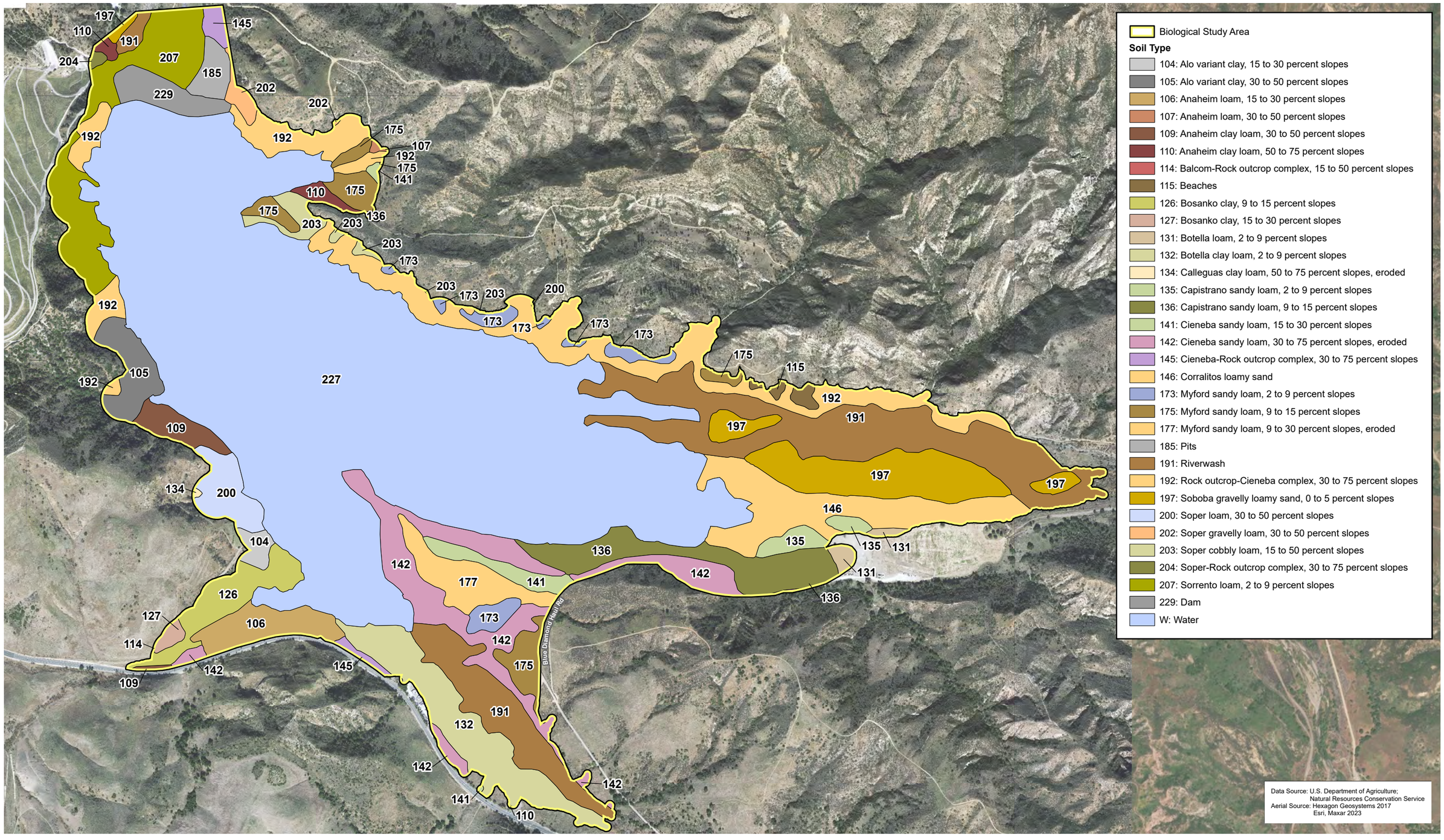
Santiago Creek Dam Improvement Project

N W E S

0 1,000 2,000 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_NCCP.pdf



D:\Projects\IRW\SantiagoCreek\PROSCD\SCD_Project aprx\ex_Soils

Soil Types

Santiago Creek Dam Improvement Project

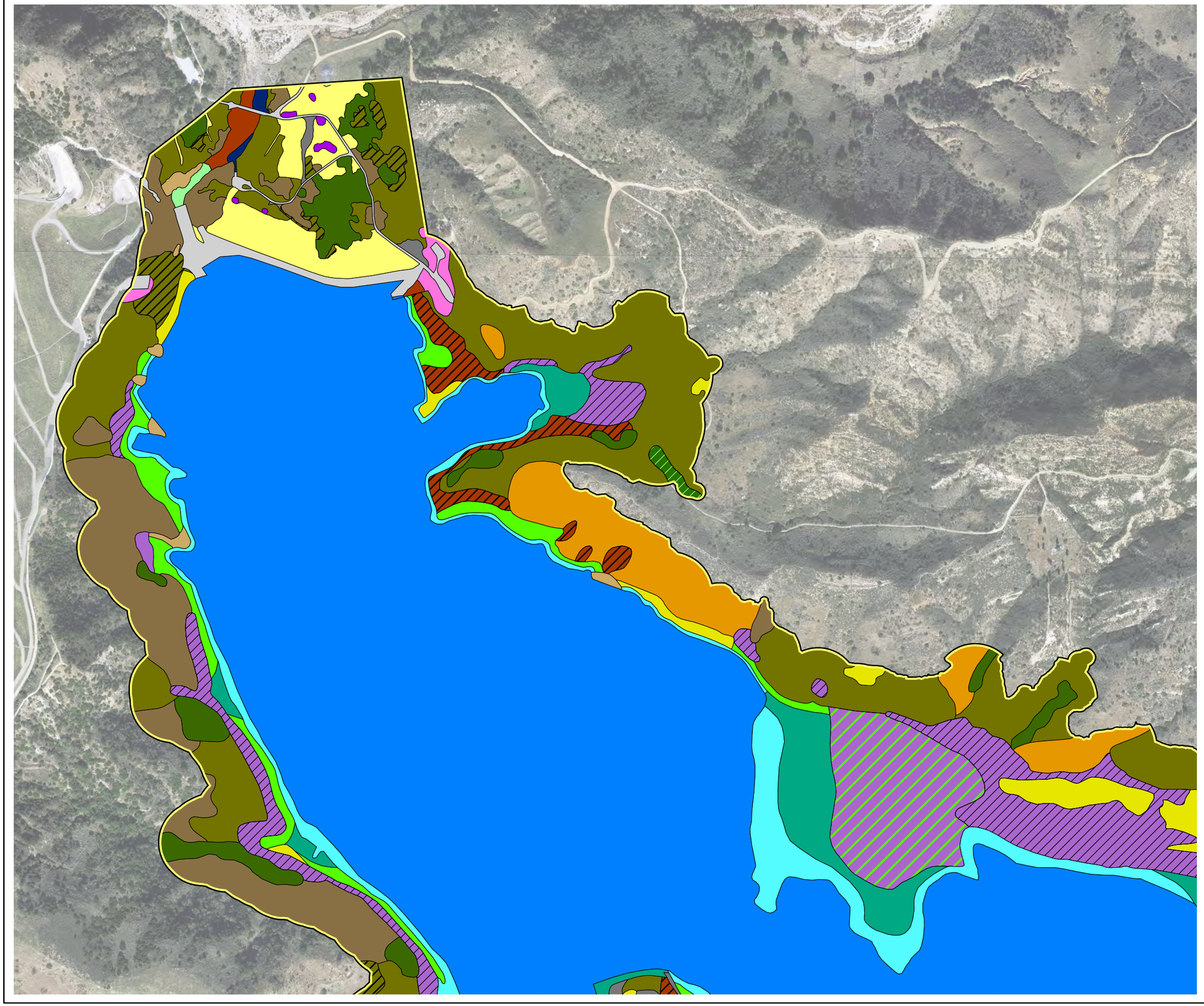
Exhibit 5

N W E S

0 550 1,100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SoilTypes.pdf



Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources

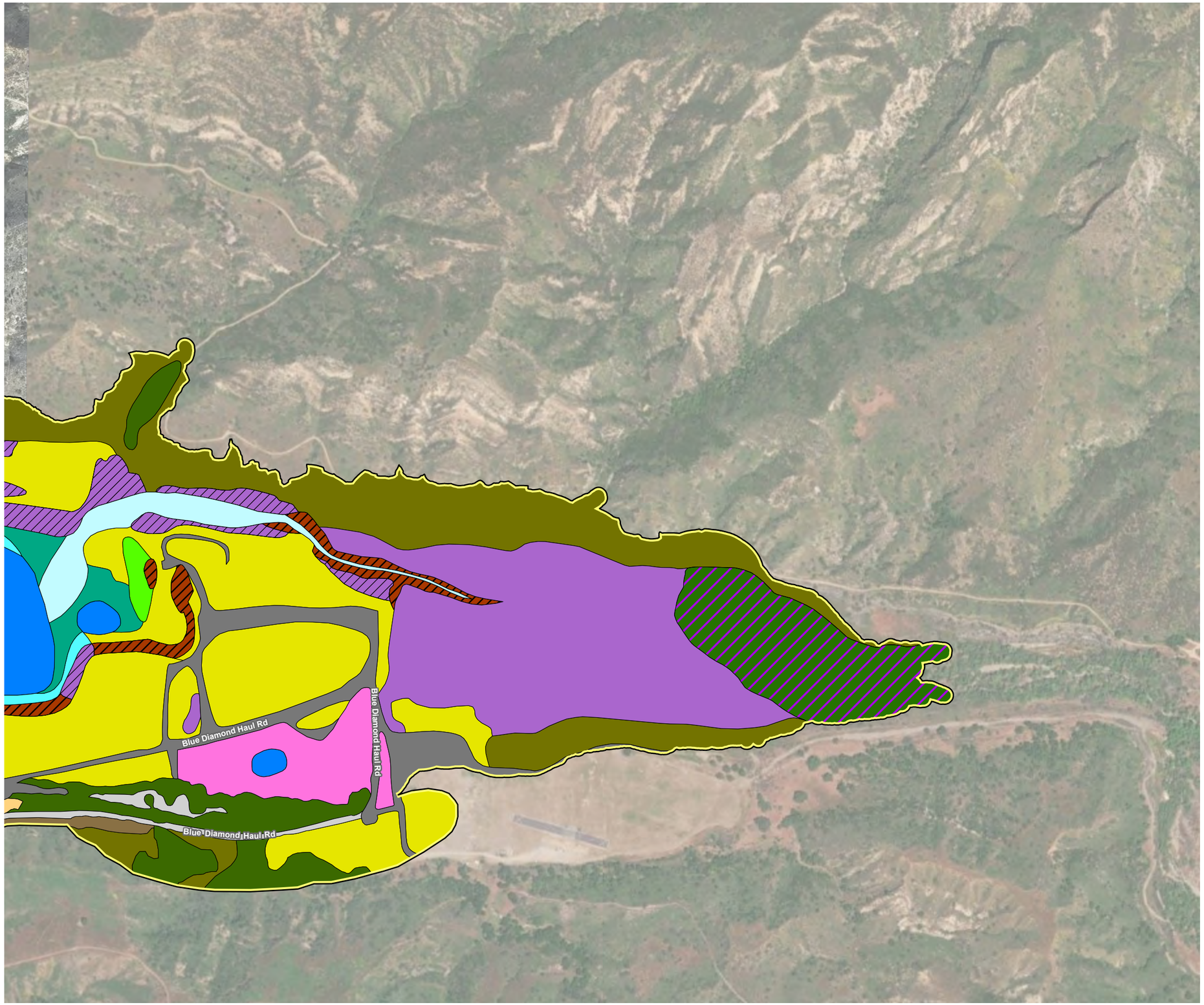
Exhibit 6a

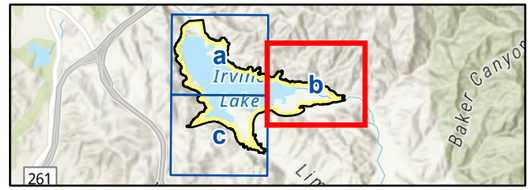
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/30/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Biological_Resources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources

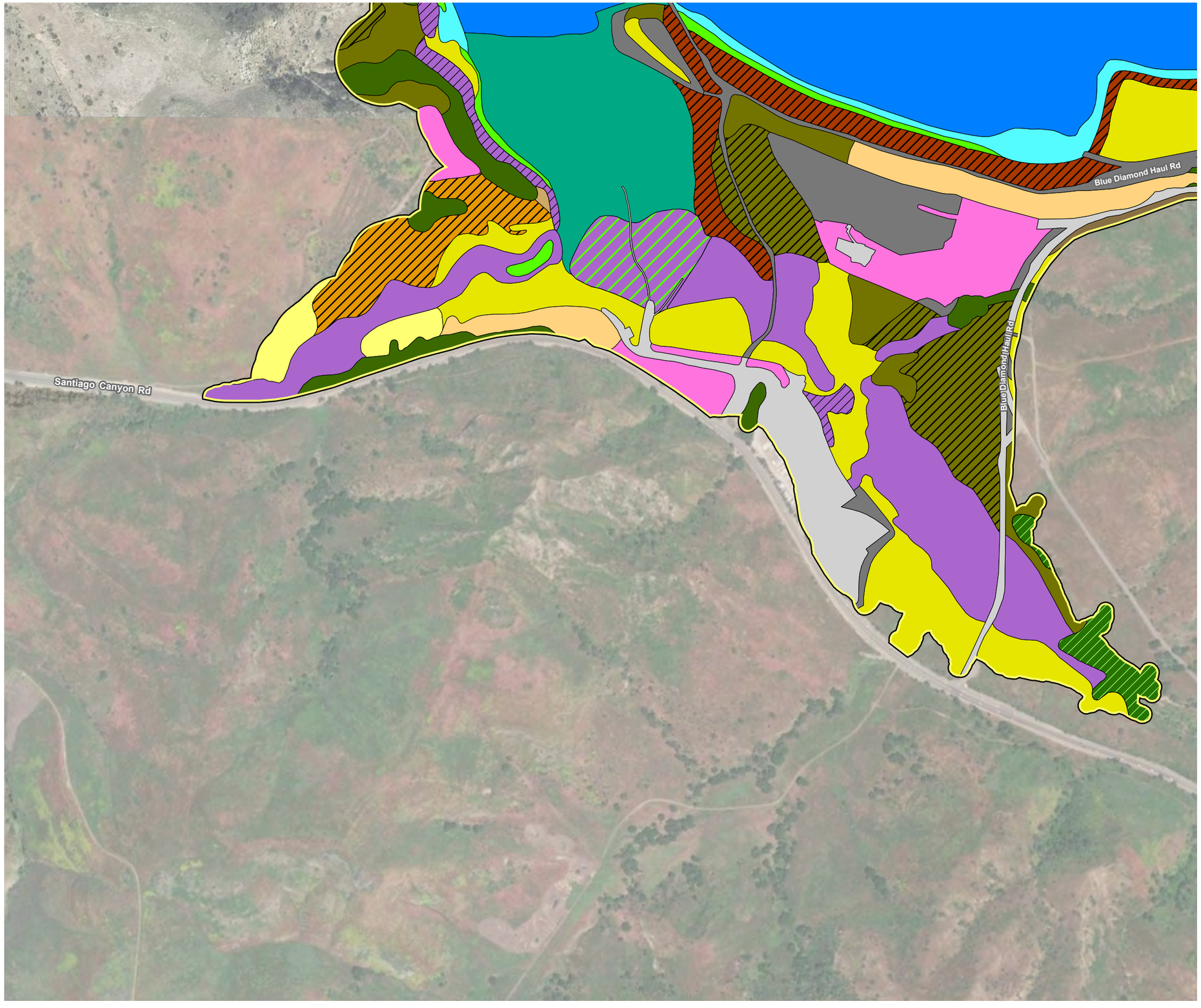
Exhibit 6b

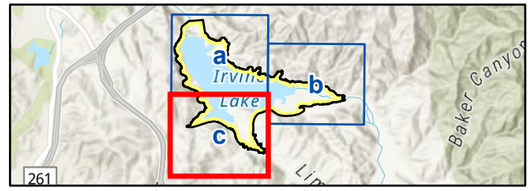
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/30/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Biological_Resources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources

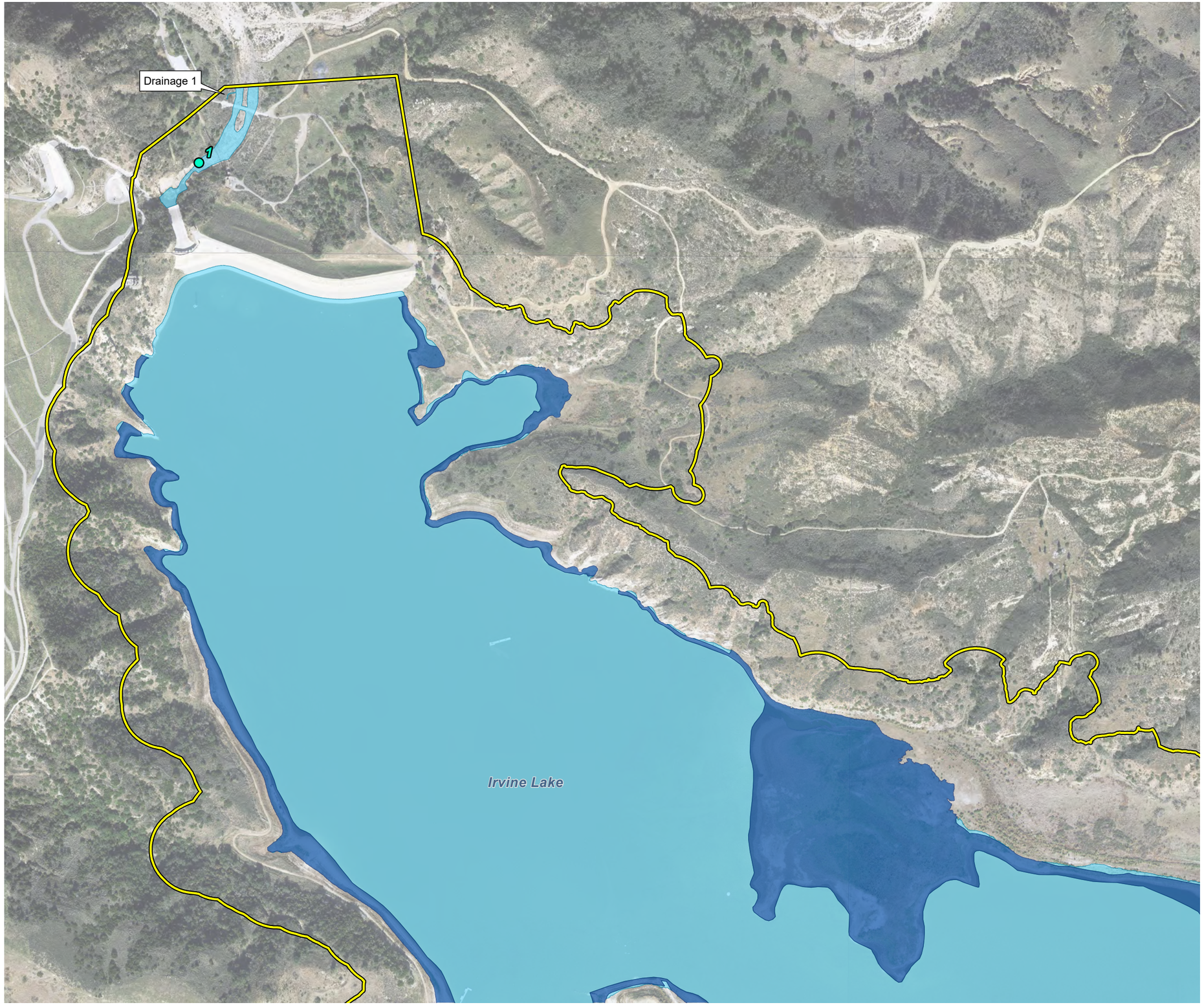
Exhibit 6c

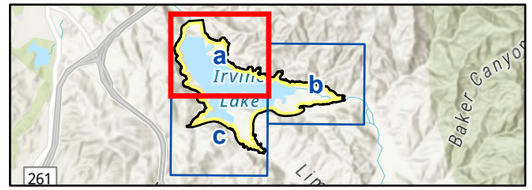
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/30/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Biological_Resources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_Biological_Resources





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

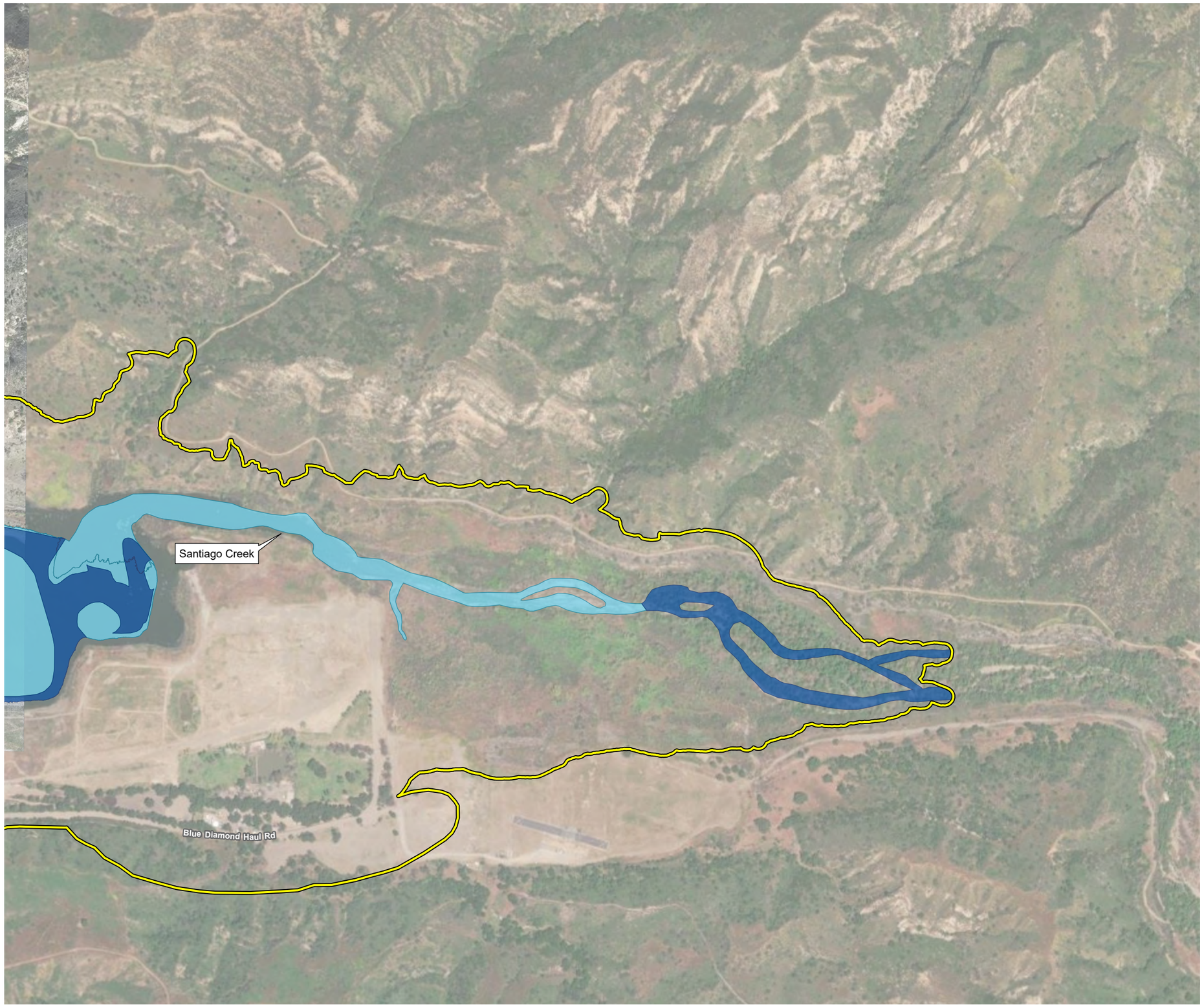
Exhibit 7a

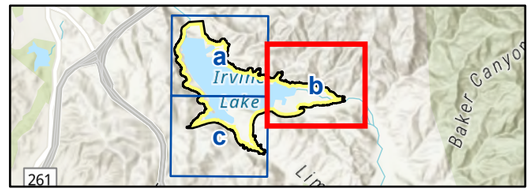
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

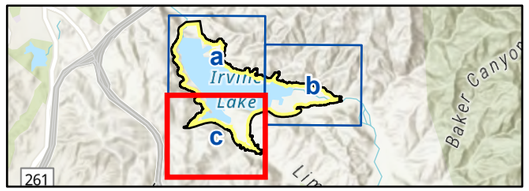
Exhibit 7b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE



Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

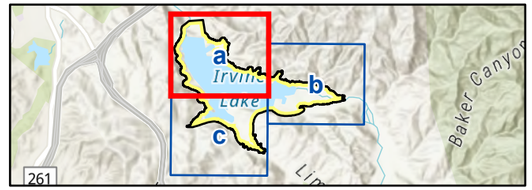
Exhibit 7c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE



Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

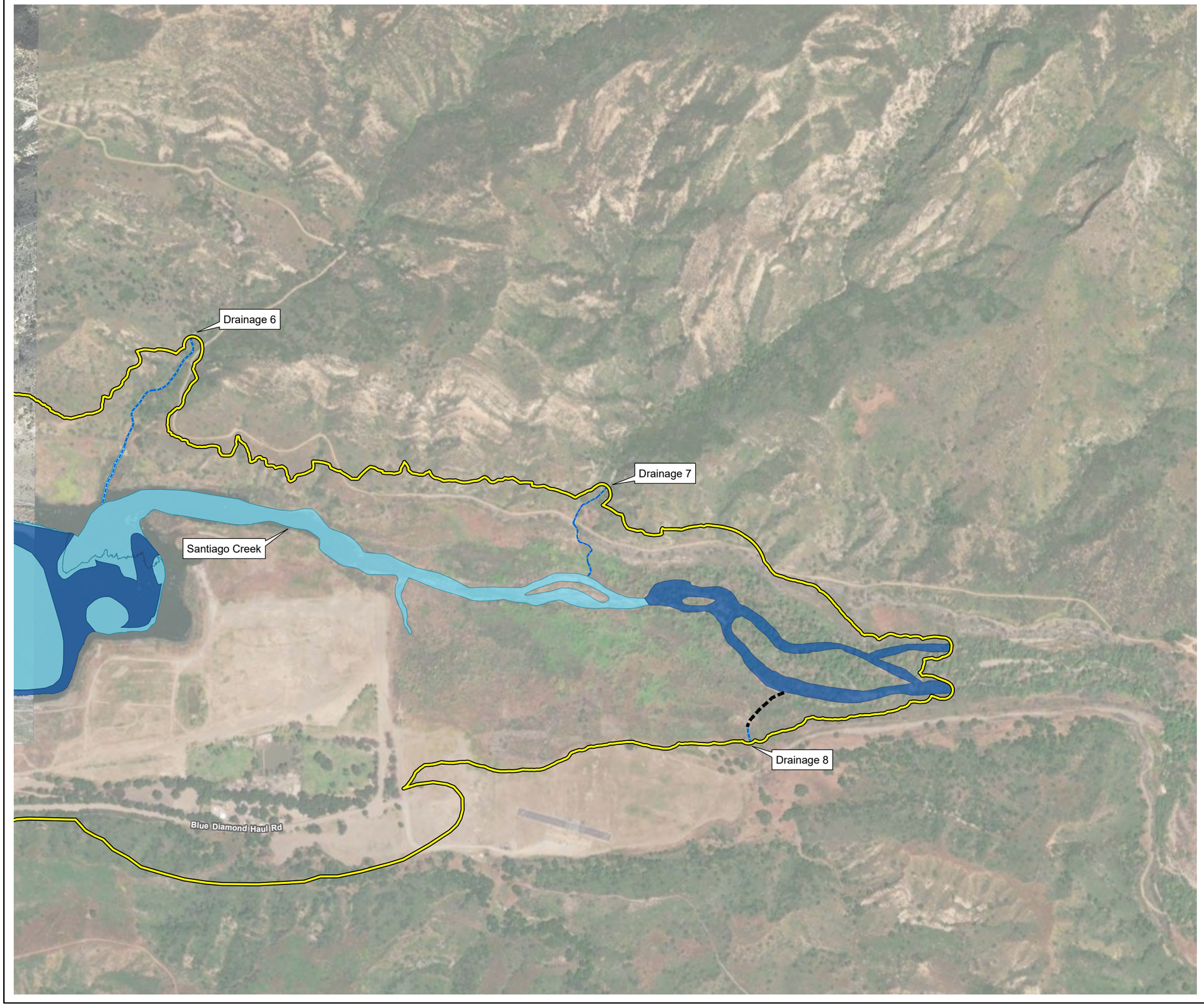
Exhibit 8a

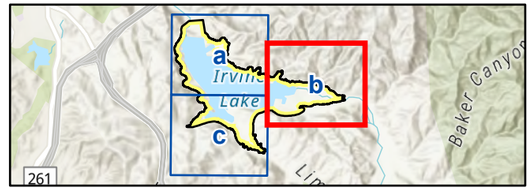
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

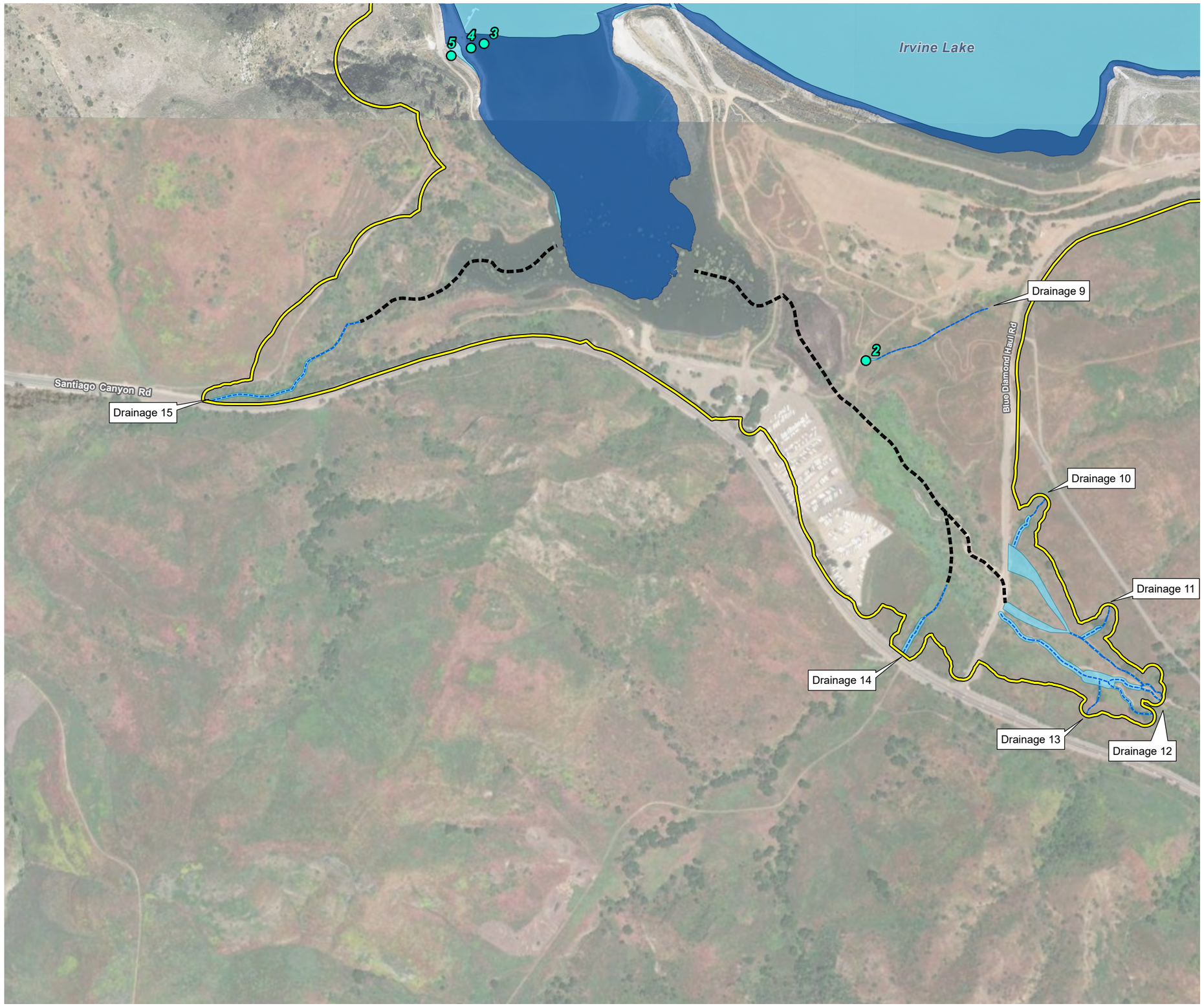
Exhibit 8b

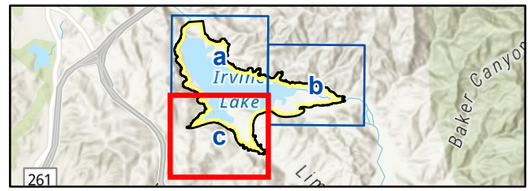
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

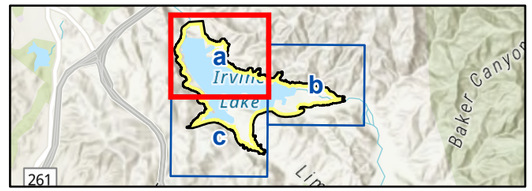
Exhibit 8c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\SCD_Project.aprx\ex_JD_RWQCB



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

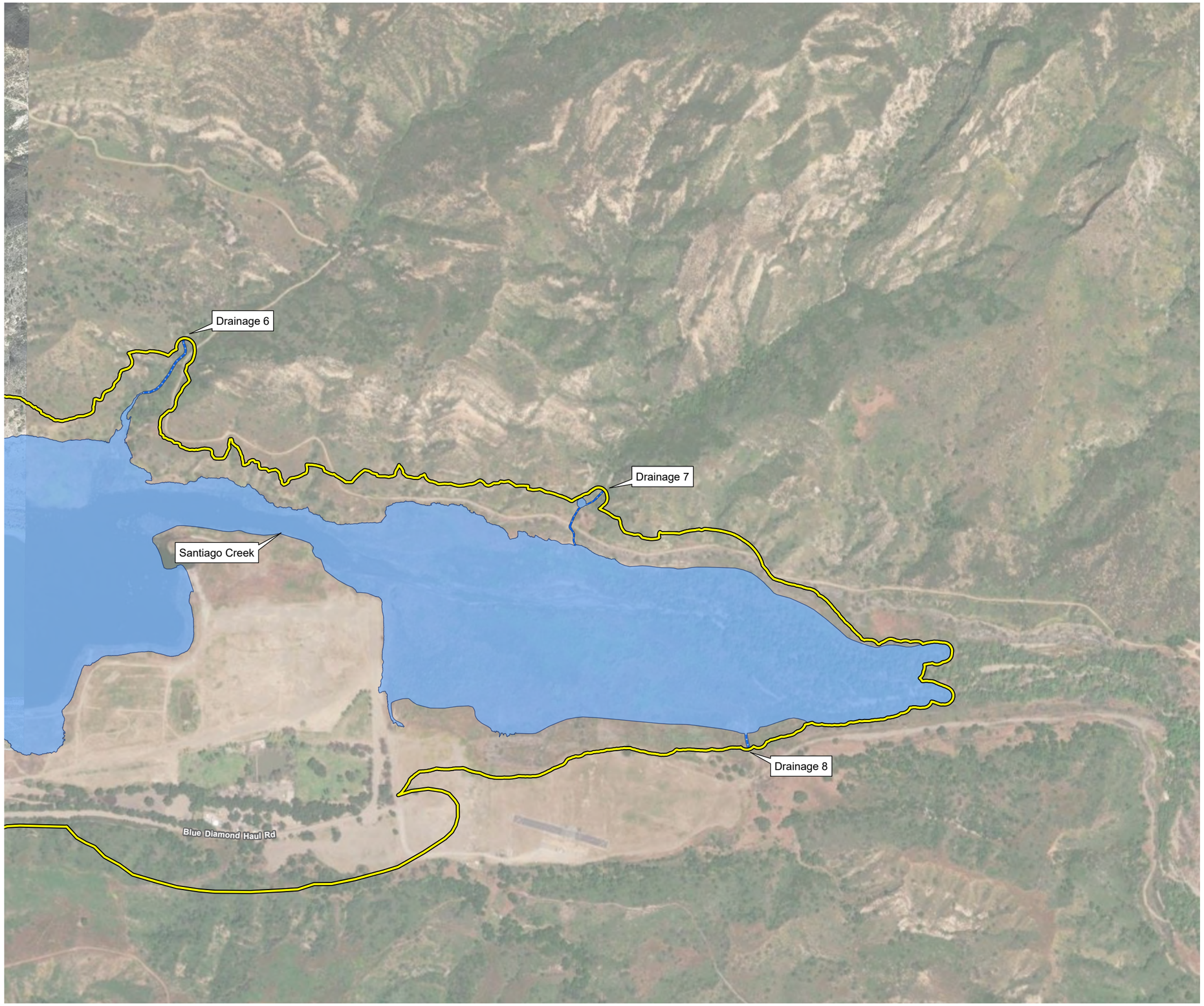
Exhibit 9a

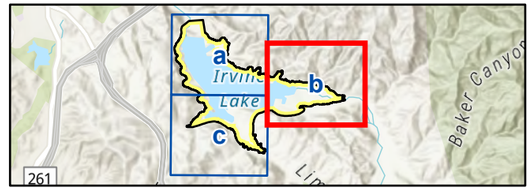
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW





Survey Area

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

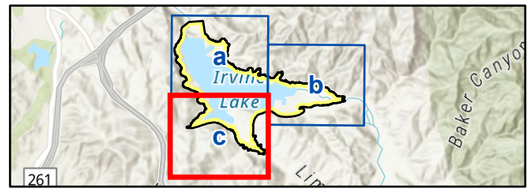
Exhibit 9b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

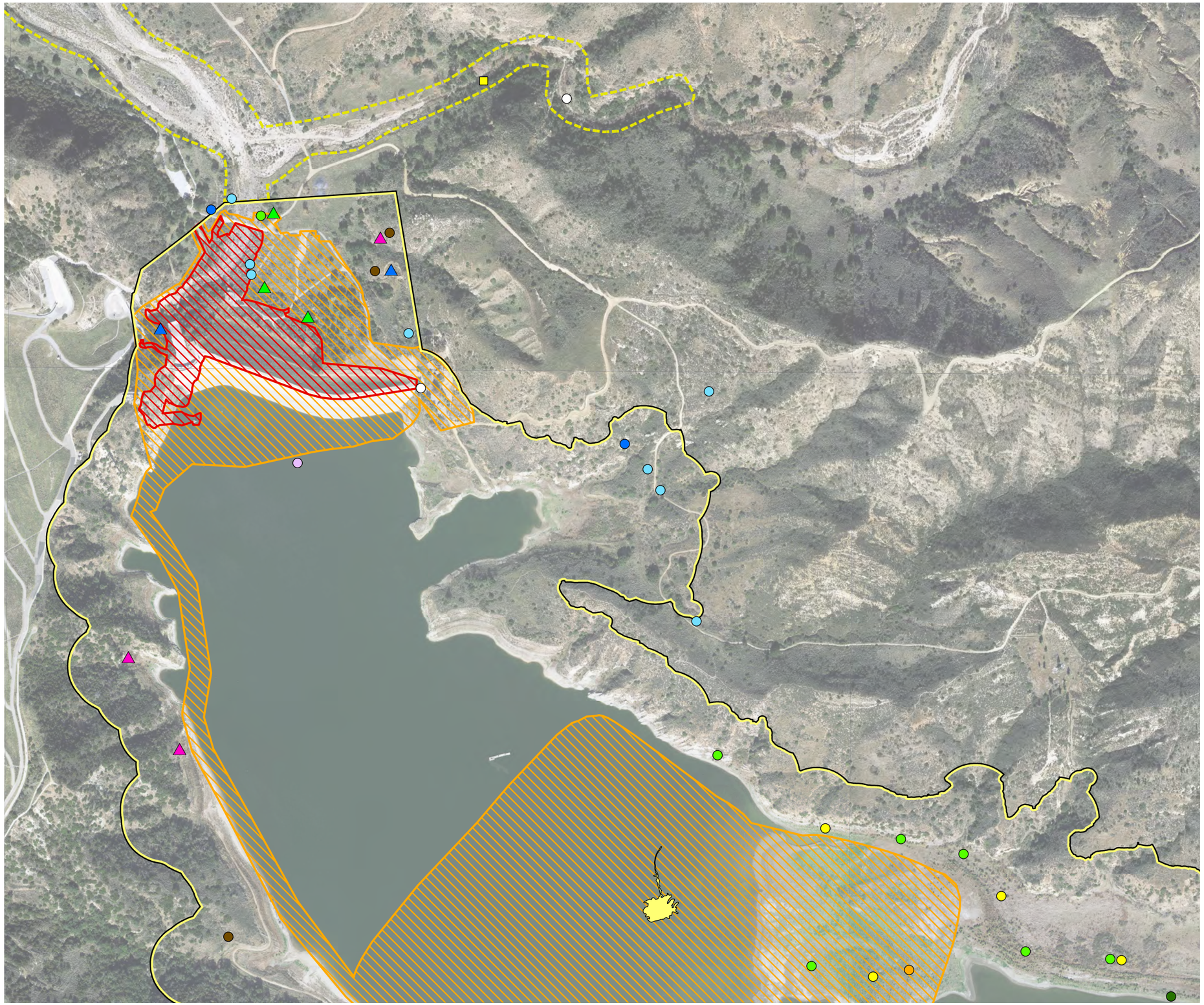
Exhibit 9c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Biological Study Area
Arroyo Toad Survey Area

Impact Type
Permanent Impacts
Temporary Impacts*

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Many-Stemmed Dudleya Population
Mud Nama Population (mapped polygon)

Special Status Species
American Peregrine Falcon
American White Pelican
Coastal Cactus Wren
Coastal California Gnatcatcher
Grasshopper Sparrow
Least Bell's Vireo
Southern California Rufous-Crowned Sparrow
White-Tailed Kite
Yellow-Breasted Chat
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

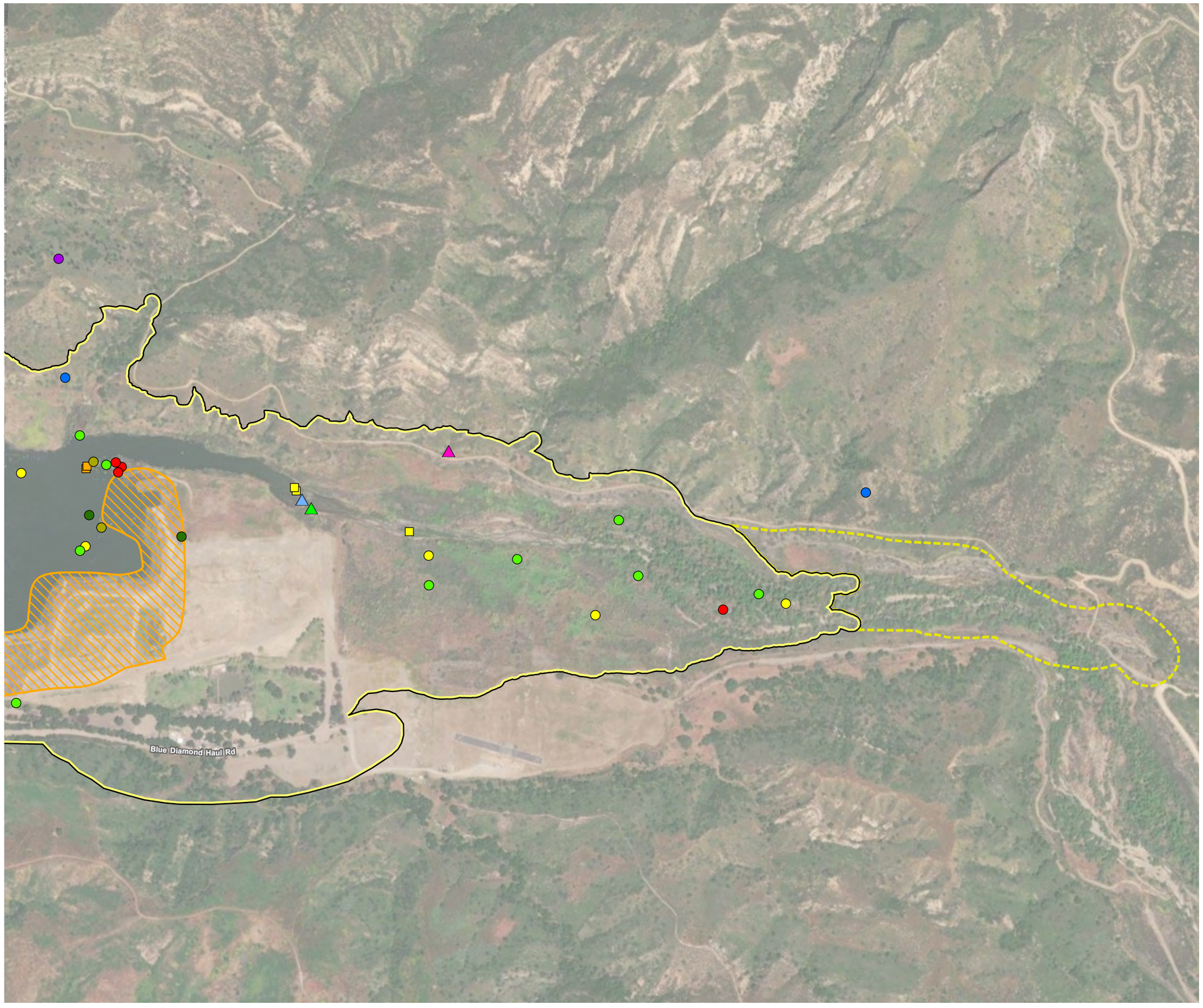
Exhibit 10a

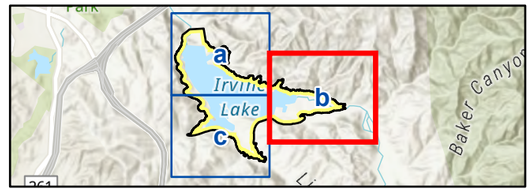
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSC\DS\CD_Project.aprx\ex_SS_Species





Biological Study Area

Arroyo Toad Survey Area

Impact Type

Temporary Impacts*

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Braunton's Milkvetch Population

Special Status Species

- Bald Eagle (Nest)
- Coastal Cactus Wren
- Grasshopper Sparrow
- Least Bell's Vireo
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat
- Belding's Orange-Throated Whiptail
- Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

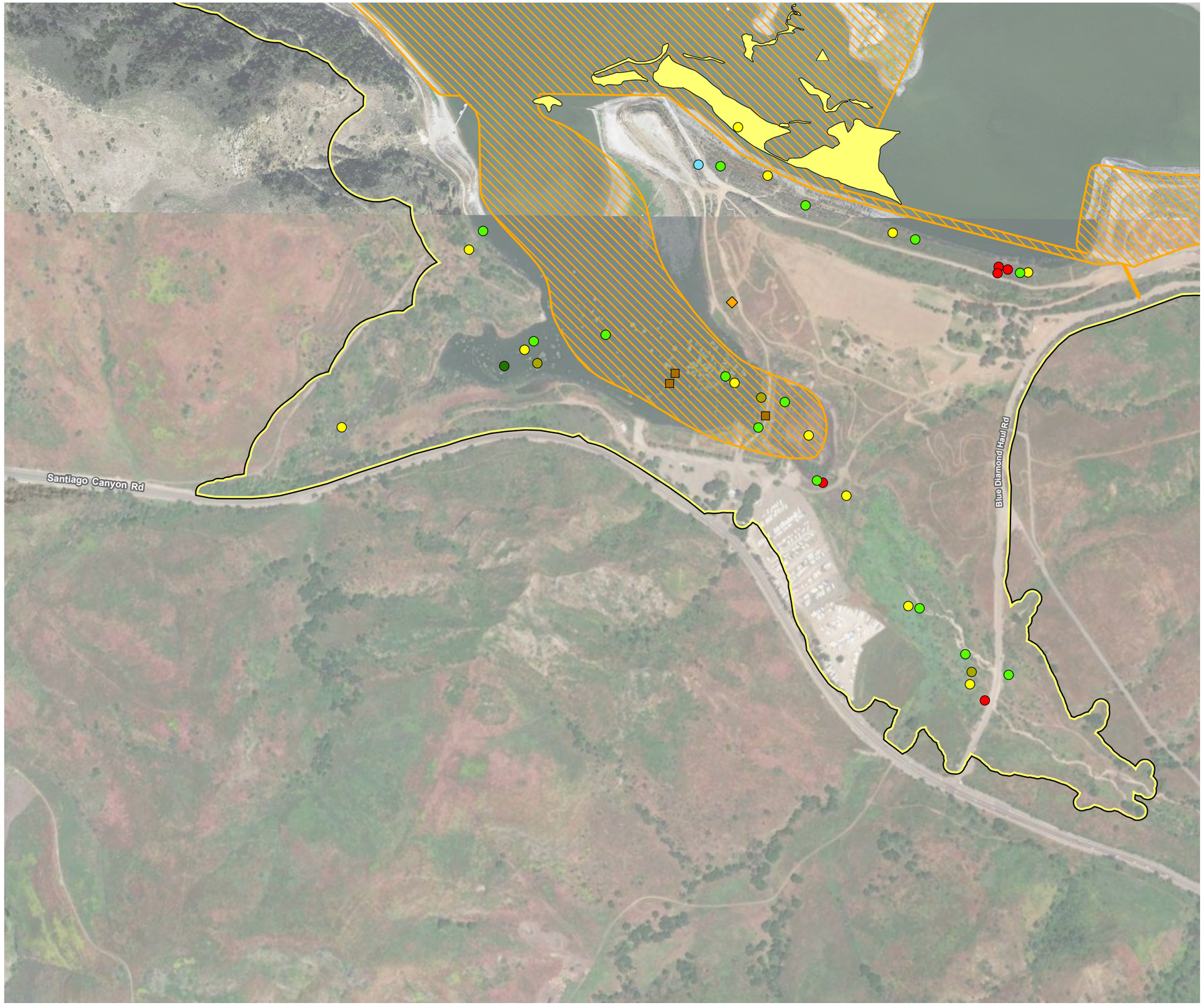
Exhibit 10b

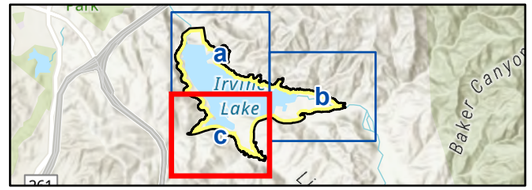
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PROSCD\SCD_Project.aprx\ex_SS_Species





Biological Study Area

Impact Type

Temporary Impacts*

Special Status Plants

Mud Nama Population (point location)

Mud Nama Population (mapped polygon)

Special Status Species

Crotch's Bumble Bee

Coastal California Gnatcatcher

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

Yellow Warbler

Yellow-Breasted Chat

Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

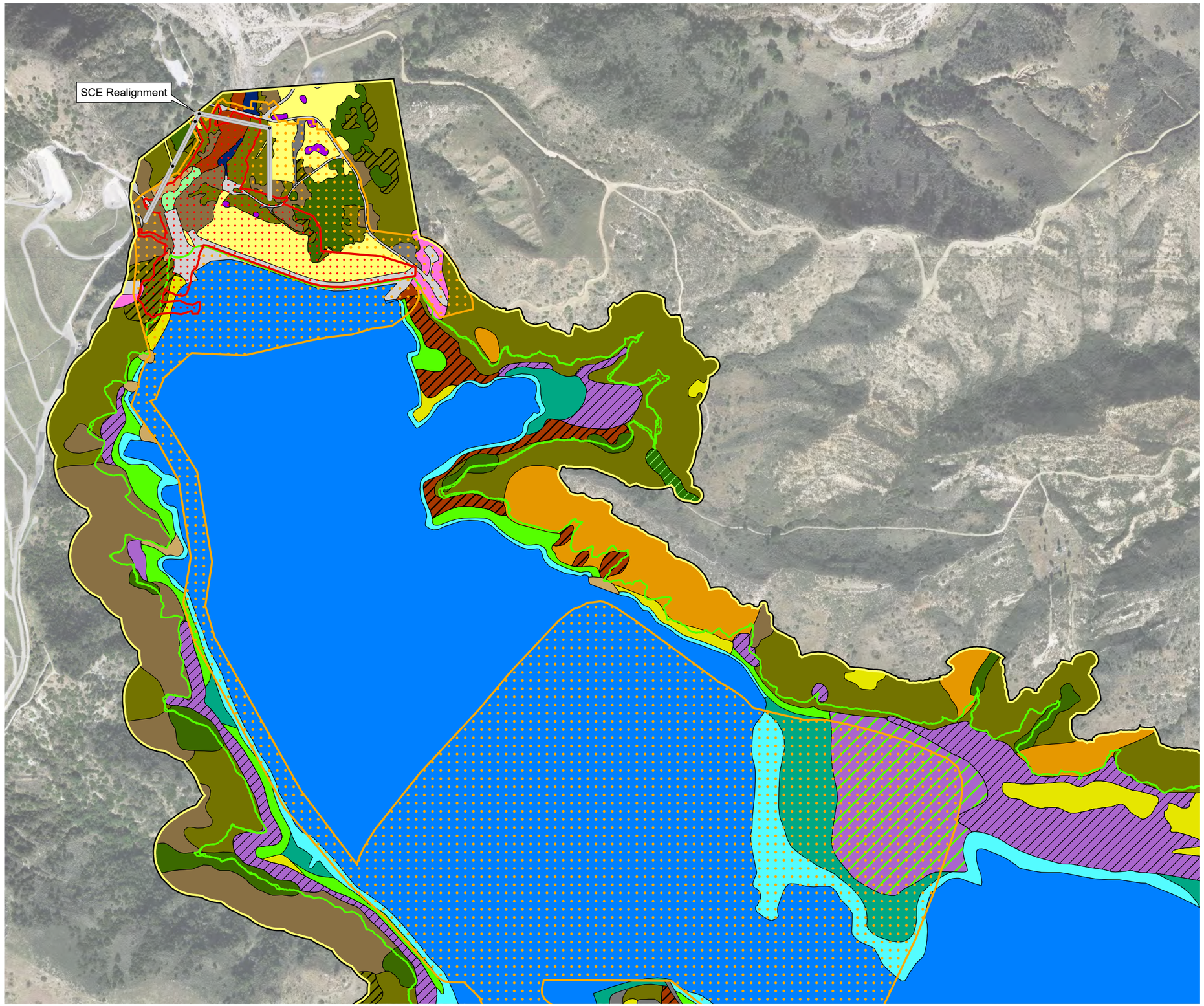
Exhibit 10c

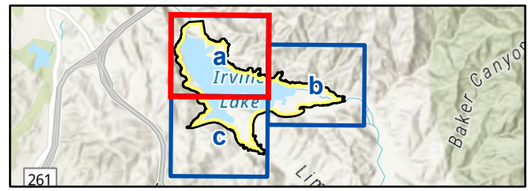
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\CD_Project.aprx\ex_SS_Species





Biological Study Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

Sagebrush Scrub (2.3.6)

Disturbed Sagebrush Scrub (2.3.6)

Southern Cactus Scrub (2.4)

Disturbed Floodplain Sage Scrub (2.6)

Toyon - Sumac Chaparral (3.12)

Annual Grassland (4.1)

Ruderal (4.6)

Riparian Herb (7.1)

Southern Willow Scrub (7.2)

Mulefat Scrub (7.3)

Disturbed Mulefat Scrub (7.3)

Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)

Southern Black Willow Forest (7.7)

Disturbed Southern Black Willow Forest (7.7)

Southern Black Willow Forest/Riparian Herb (7.7/7.1)

Coast Live Oak Woodland (8.1)

Western Sycamore (8.x)

Cliff (10)

Open Water (12.1)

Fluctuating Shoreline (12.2)

Vegetated Fluctuating Shoreline (12.2)

Ornamental (15.5)

Developed (15.6)

Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

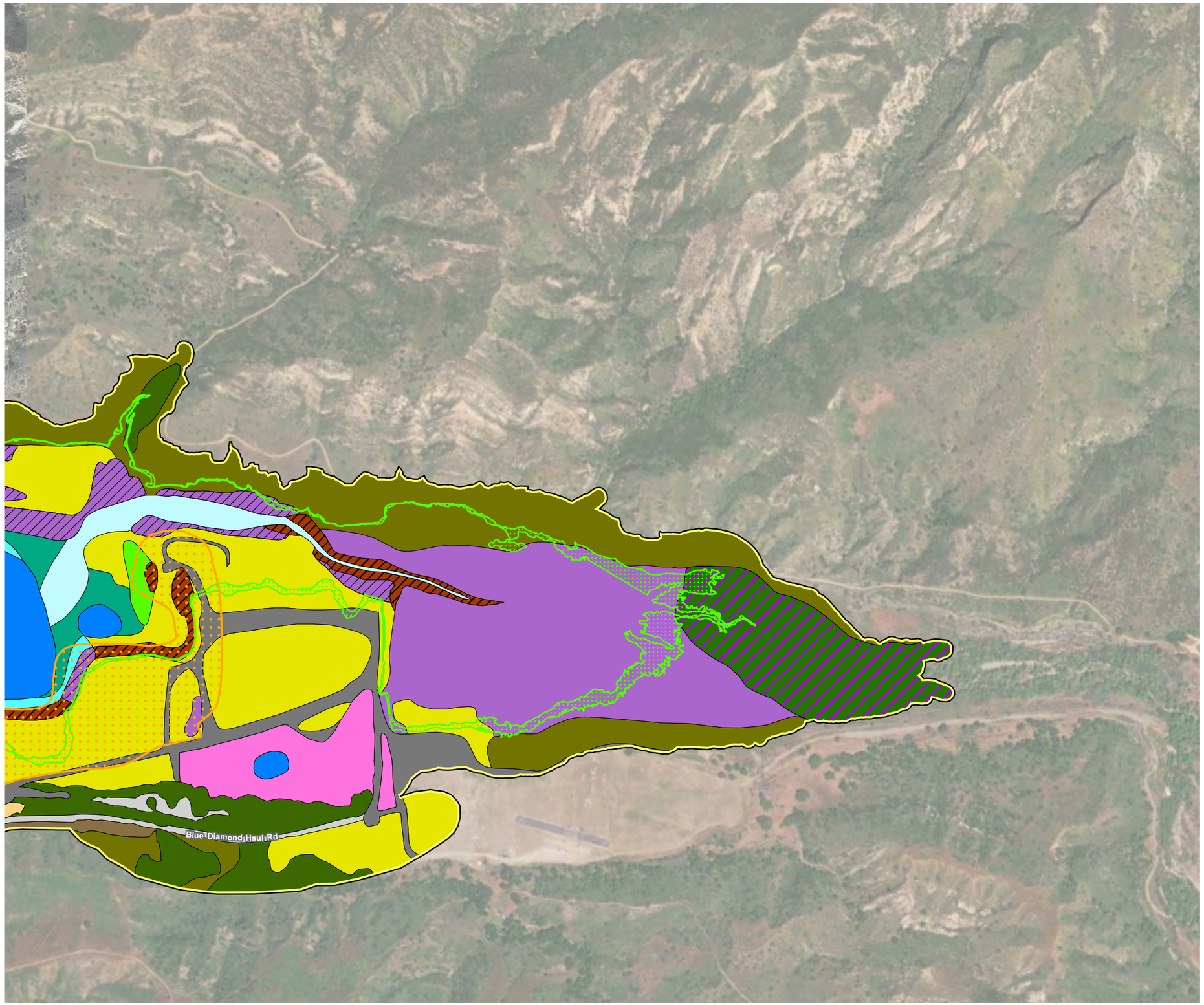
Exhibit 11a

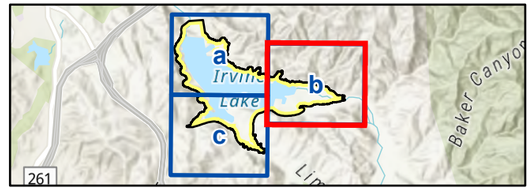
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/30/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Vegetation_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

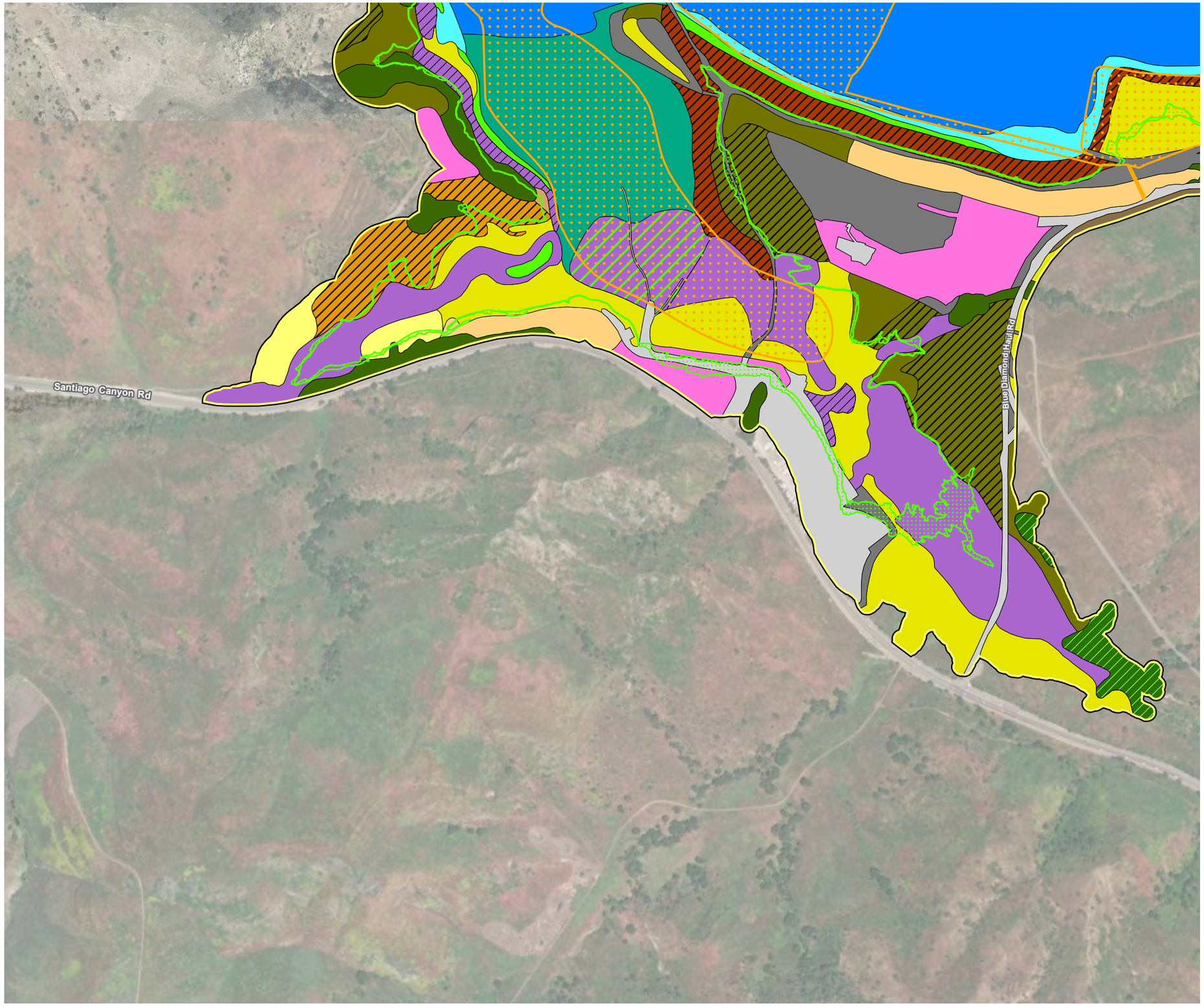
Exhibit 11b

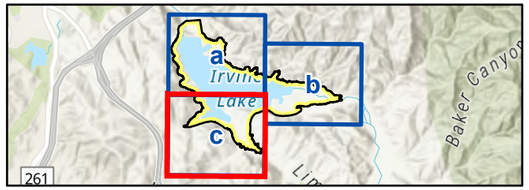
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/30/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Vegetation_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Vegetation Types

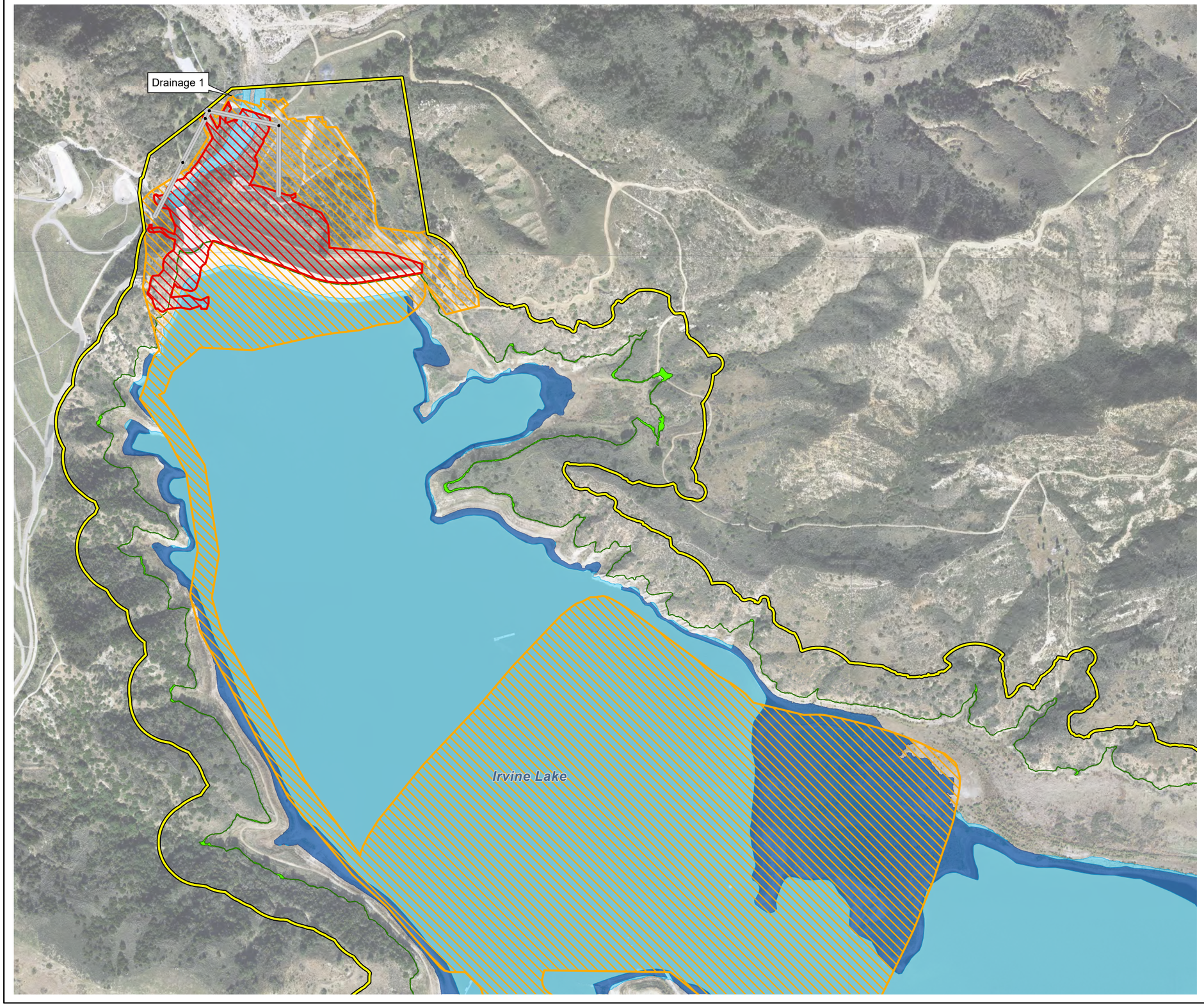
Exhibit 11c

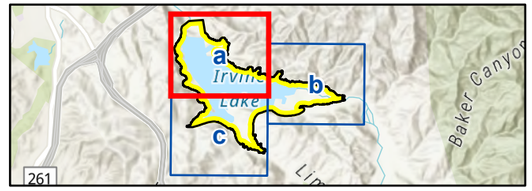
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/30/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Vegetation_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

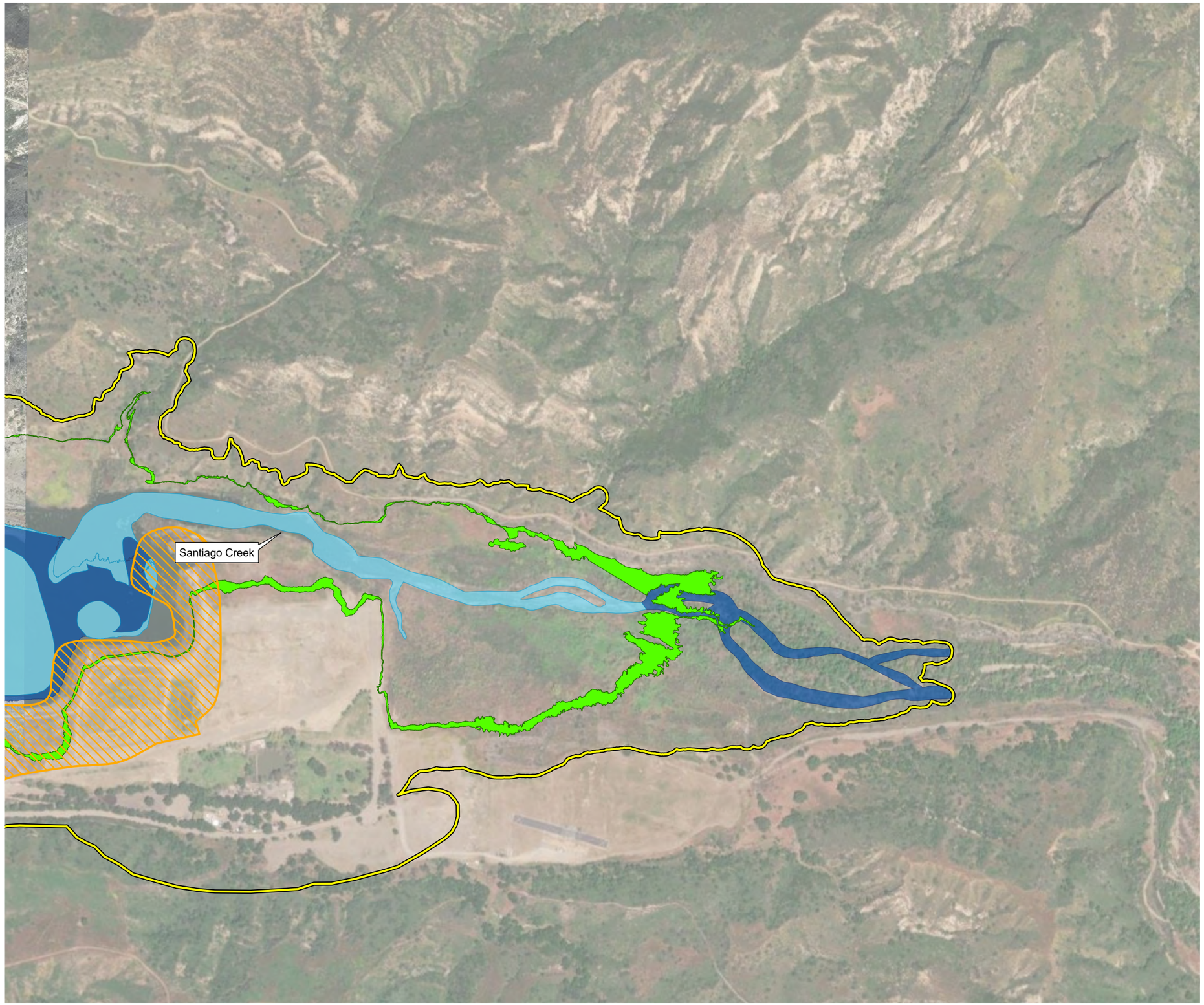
Exhibit 12a

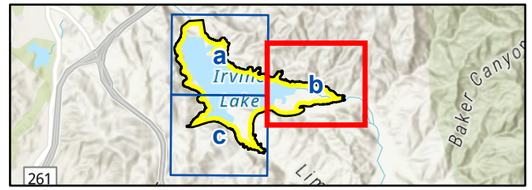
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

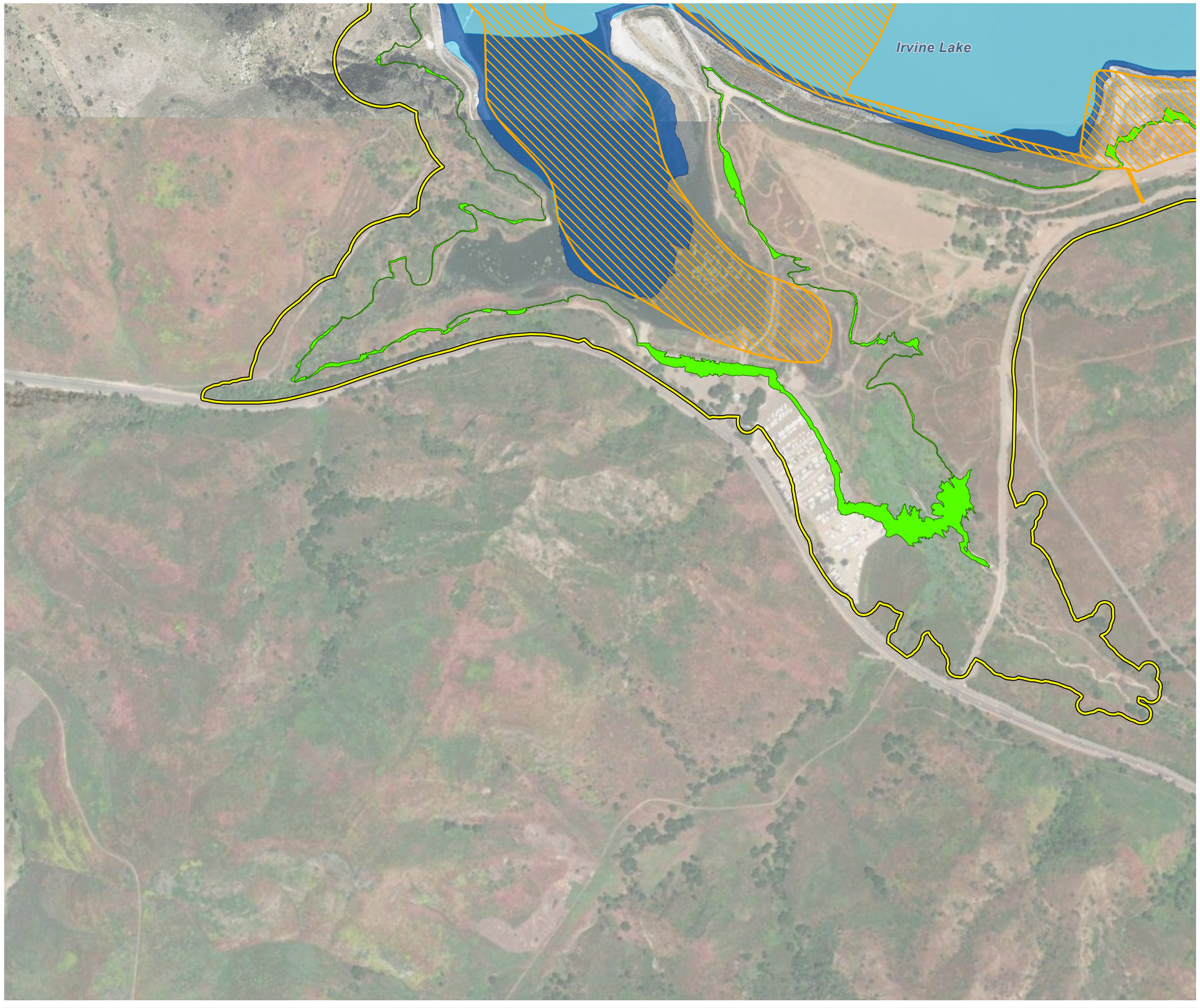
Exhibit 12b

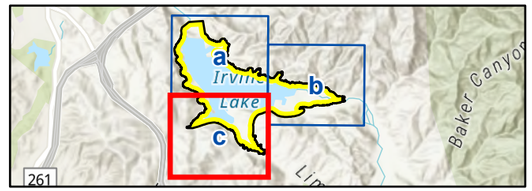
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

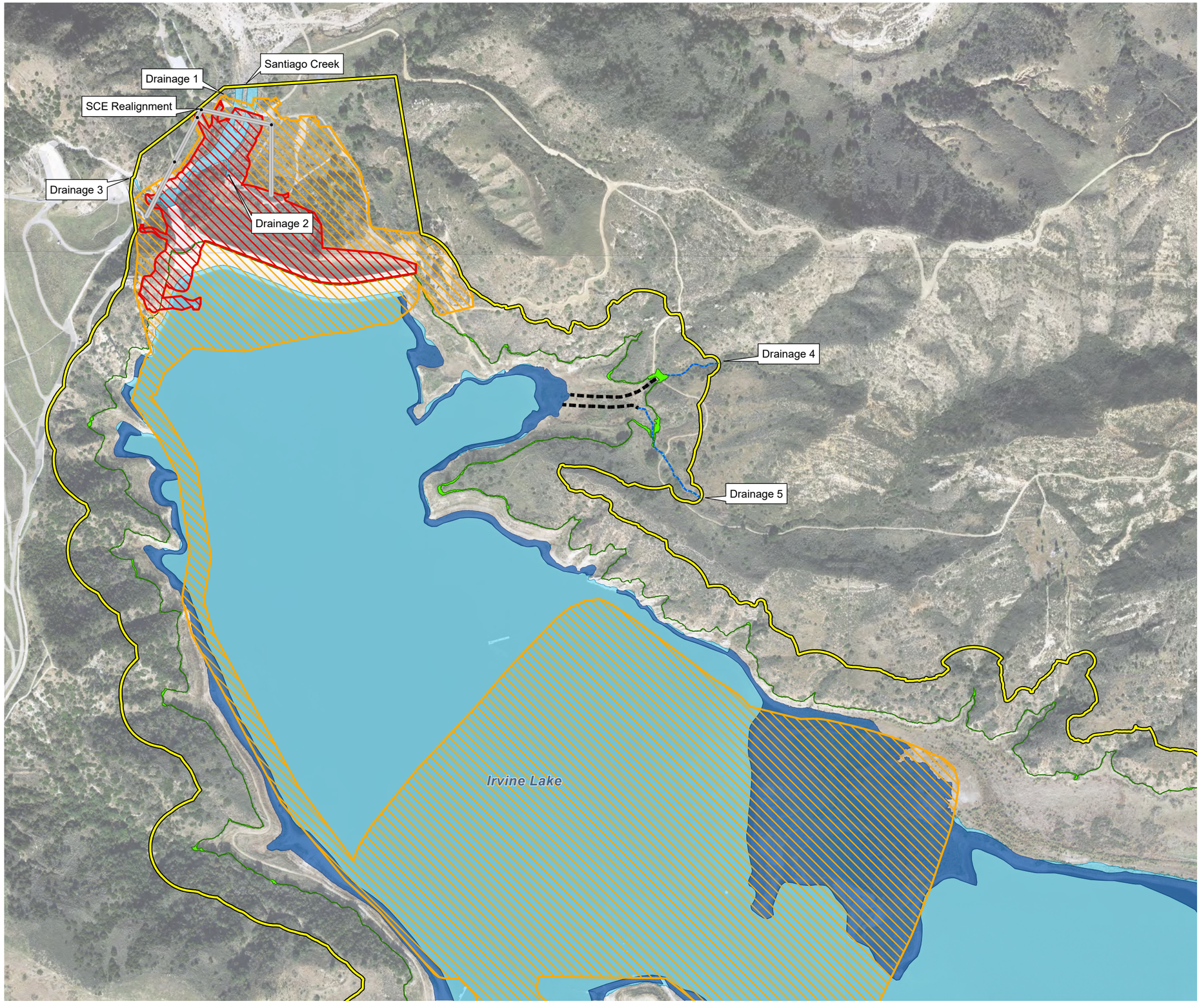
Exhibit 12c

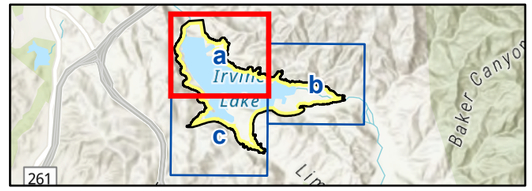
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

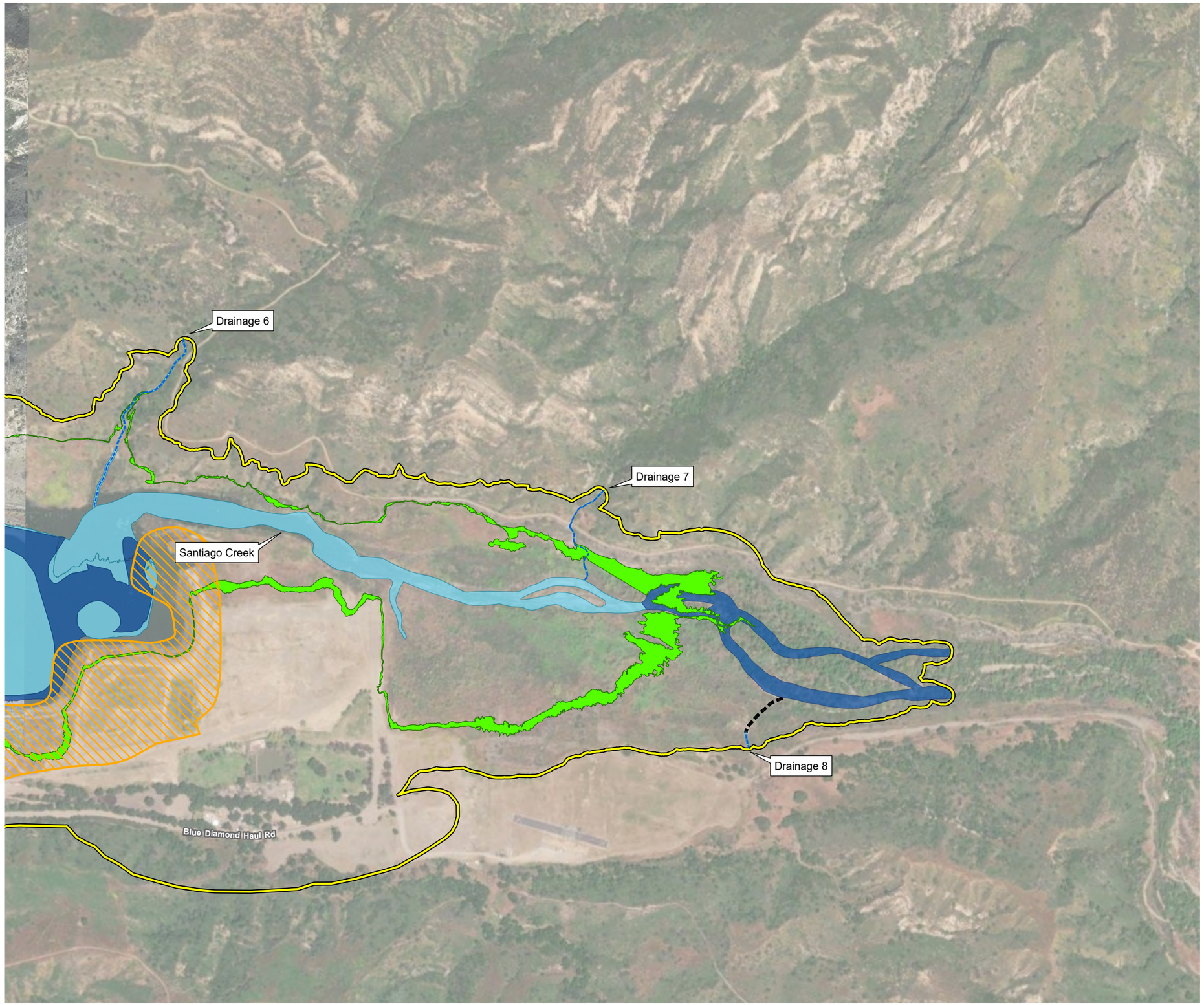
Exhibit 13a

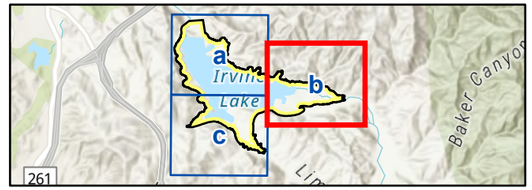
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW10205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

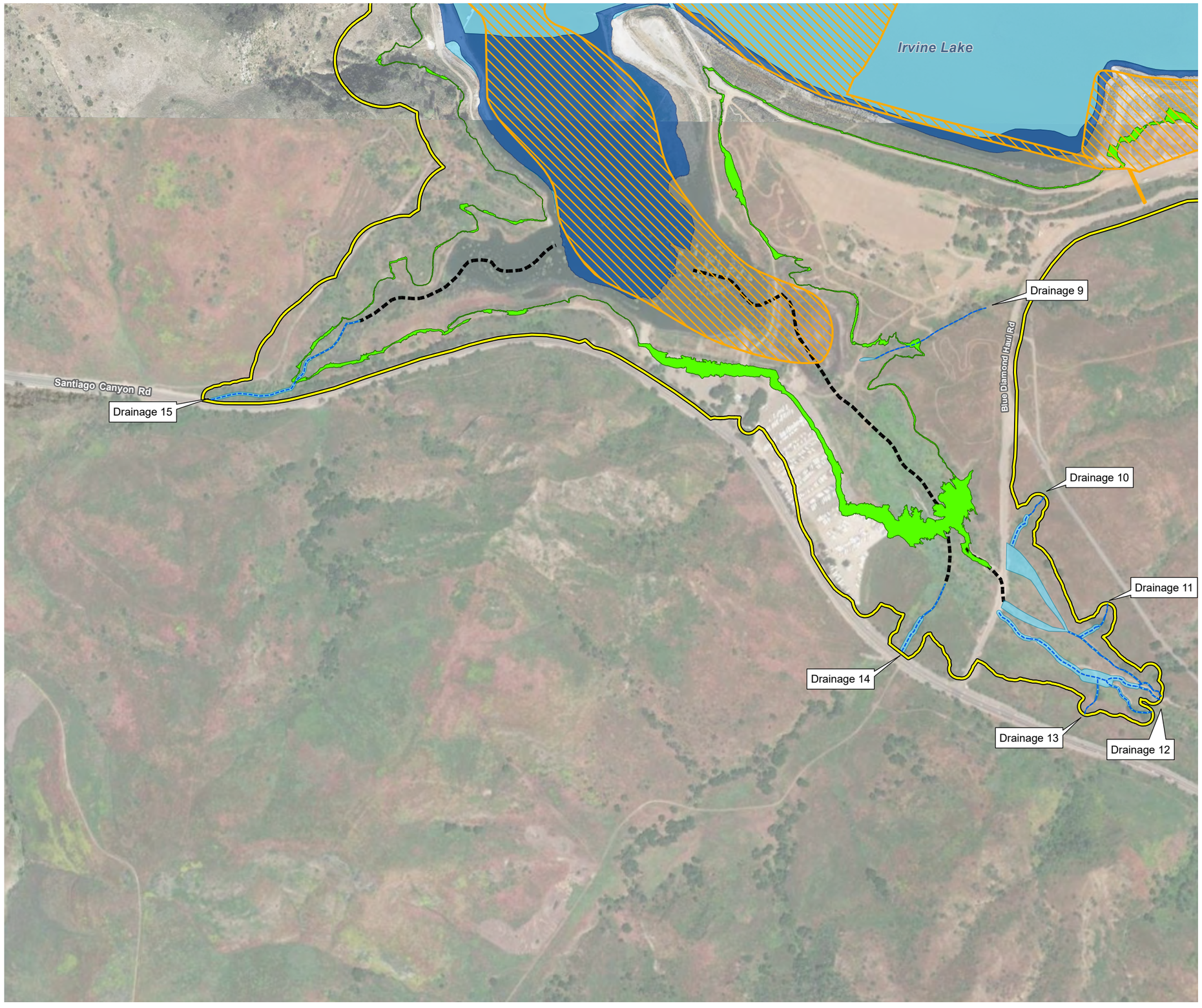
Exhibit 13b

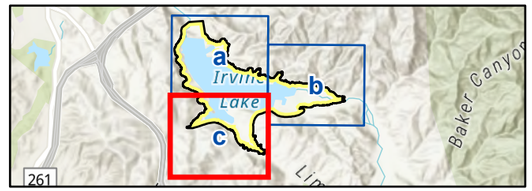
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW01020S\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

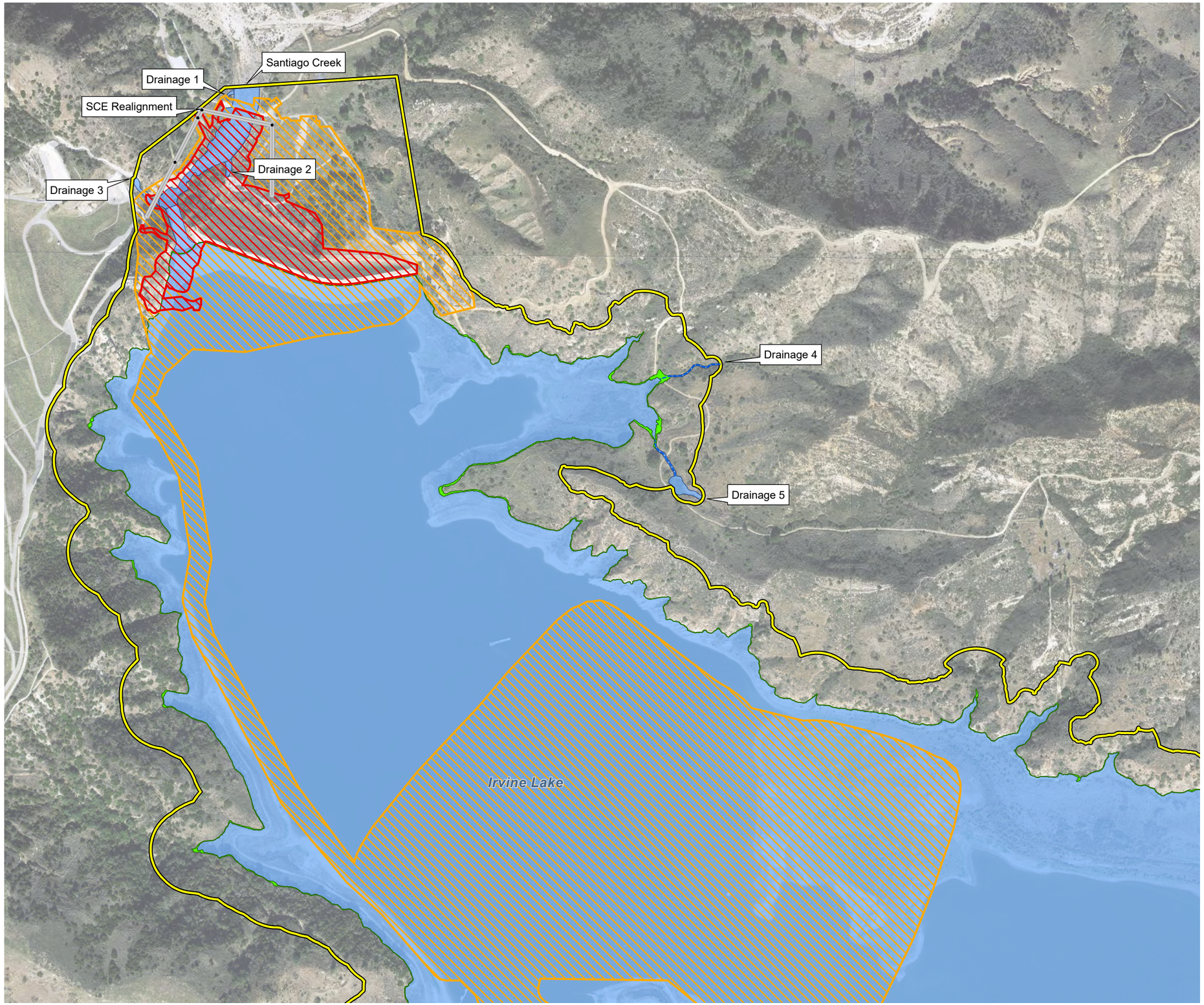
Exhibit 13c

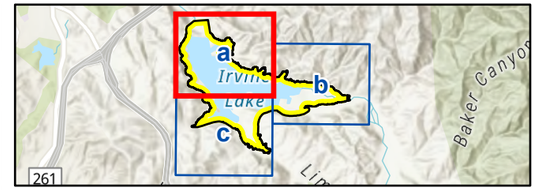
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

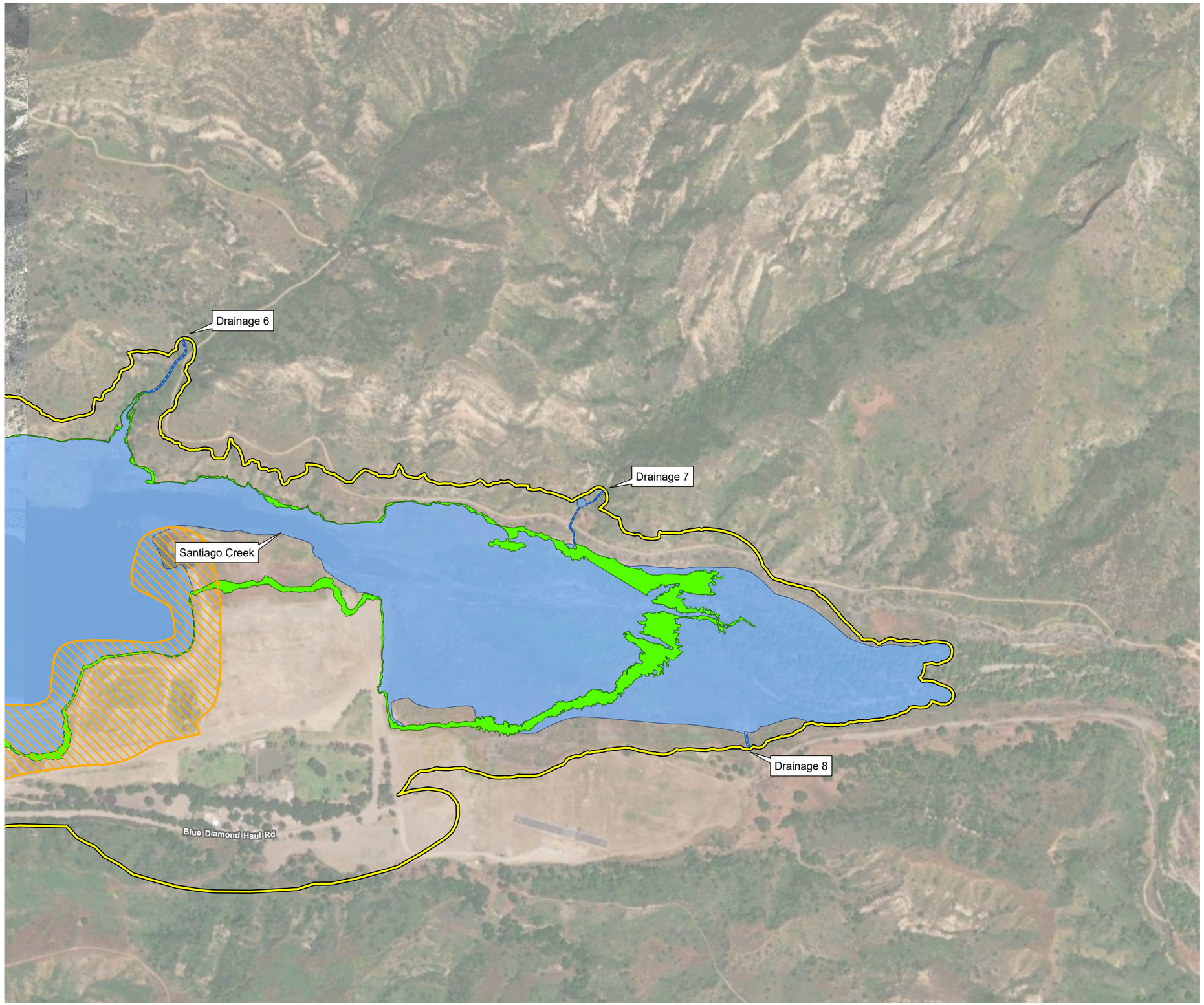
Exhibit 14a

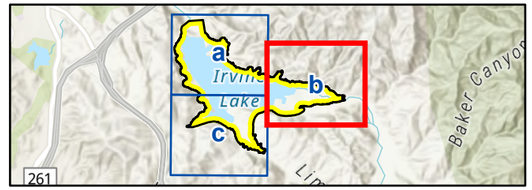
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Survey Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

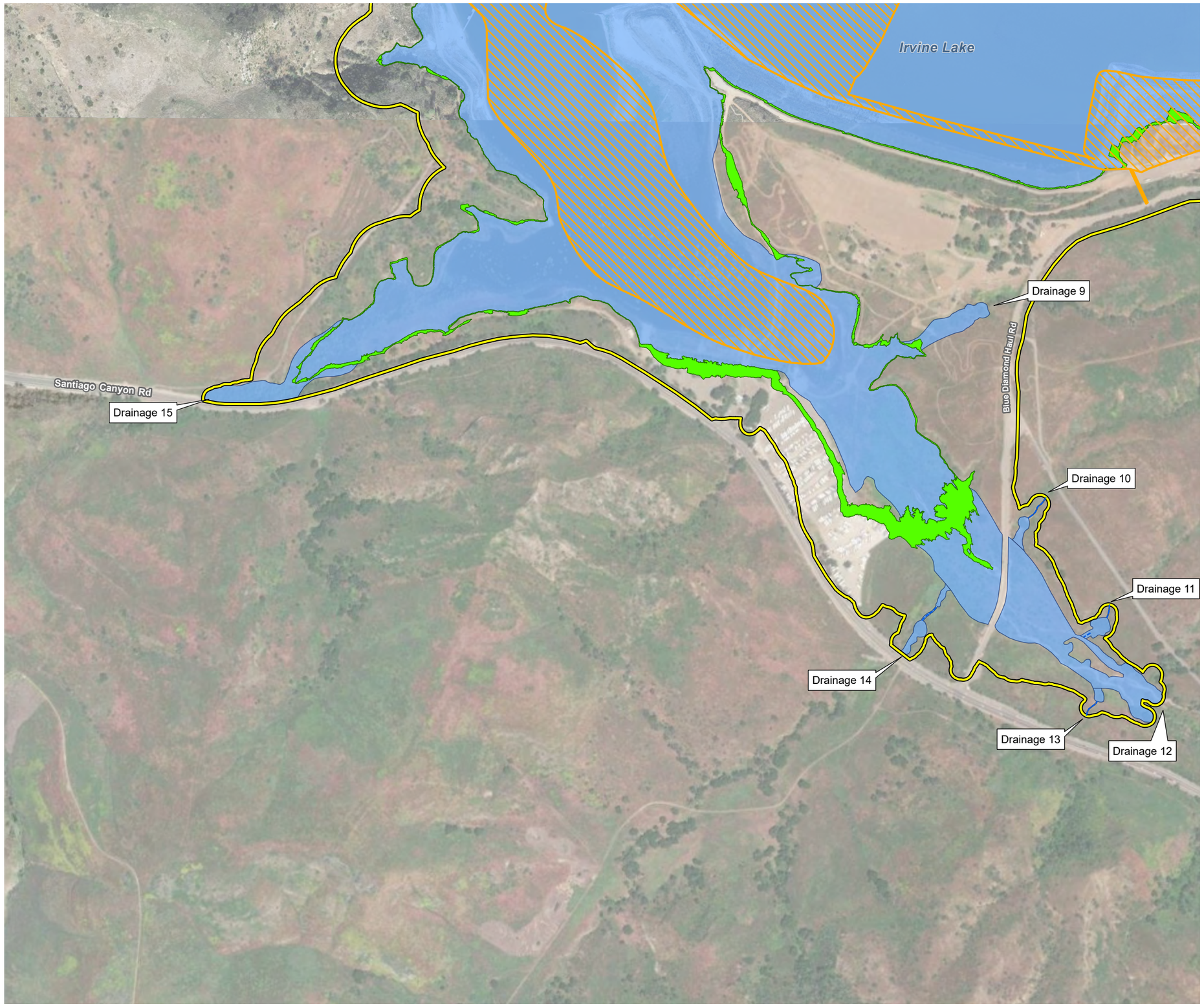
Exhibit 14b

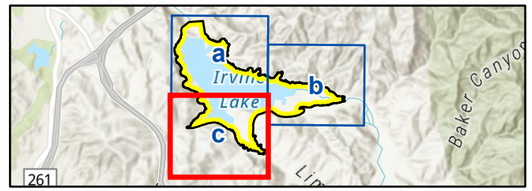
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Survey Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

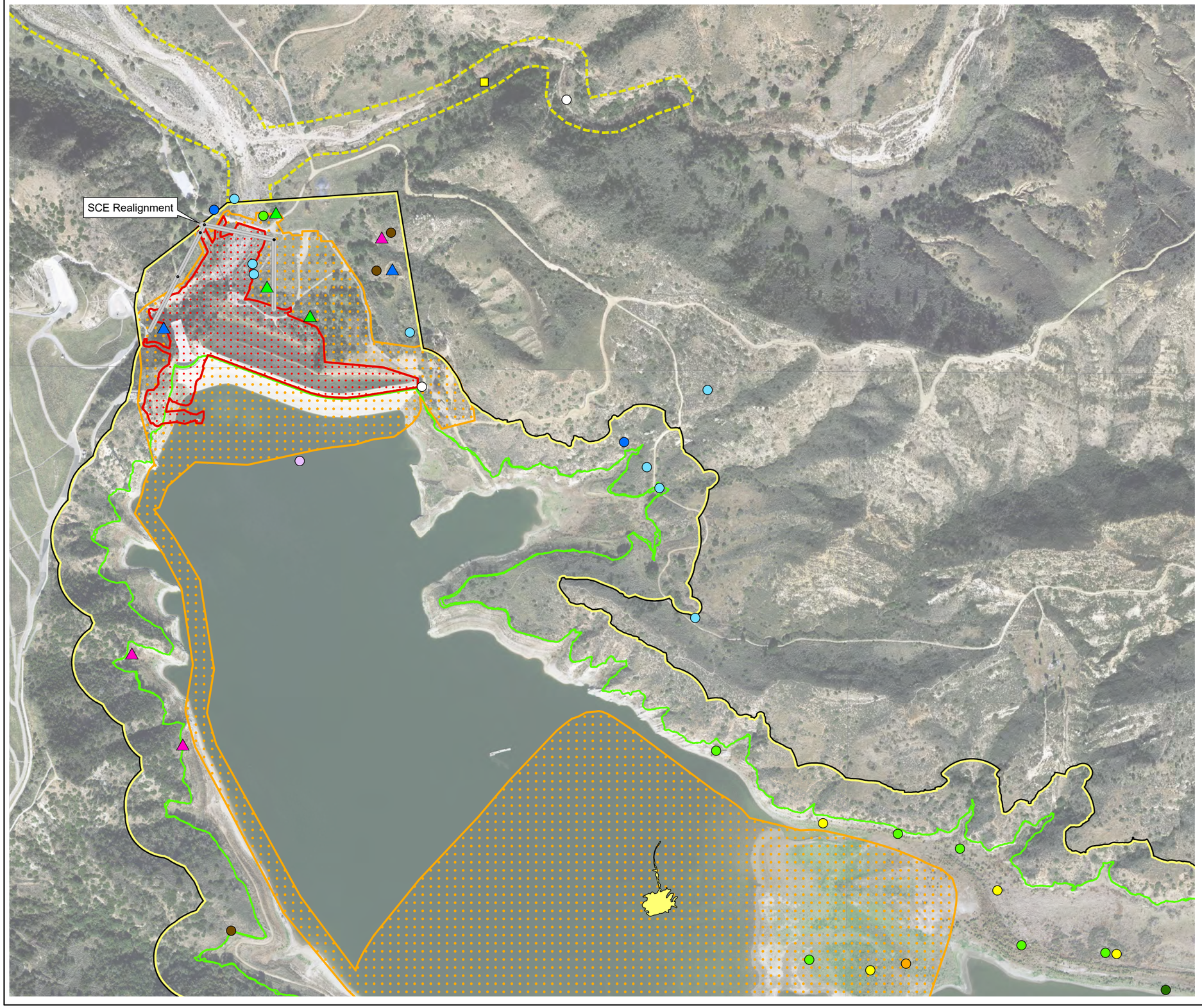
Exhibit 14c

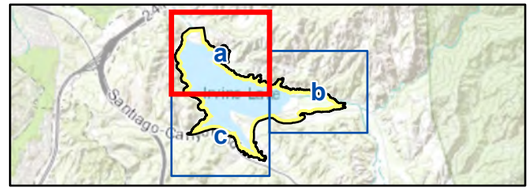
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Permanent Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Many-Stemmed Dudleya Population
Mud Nama Population (mapped polygon)

Special Status Species
American Peregrine Falcon
American White Pelican
Coastal Cactus Wren
Coastal California Gnatcatcher
Grasshopper Sparrow
Least Bell's Vireo
Southern California Rufous-Crowned Sparrow
White-Tailed Kite
Yellow-Breasted Chat
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

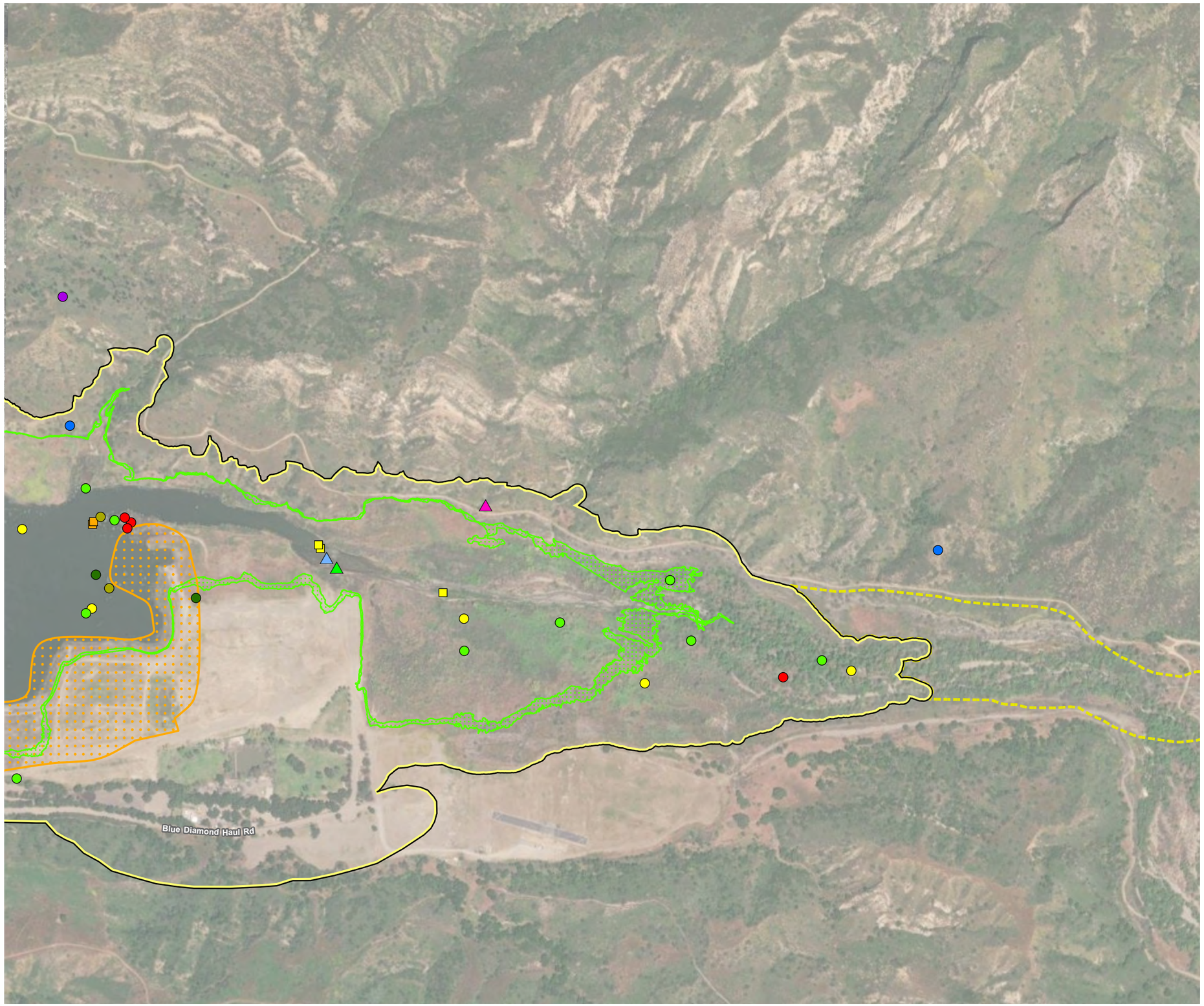
Exhibit 15a

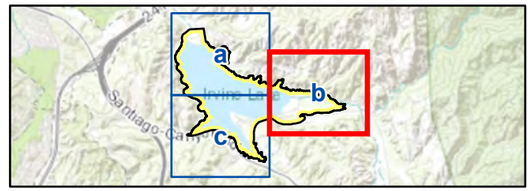
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\CD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Braunton's Milkvetch Population

Special Status Species
Bald Eagle (Nest)
Coastal Cactus Wren
Grasshopper Sparrow
Least Bell's Vireo
Willow Flycatcher (migrant)
Yellow Warbler
Yellow-Breasted Chat
Belding's Orange-Throated Whiptail
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

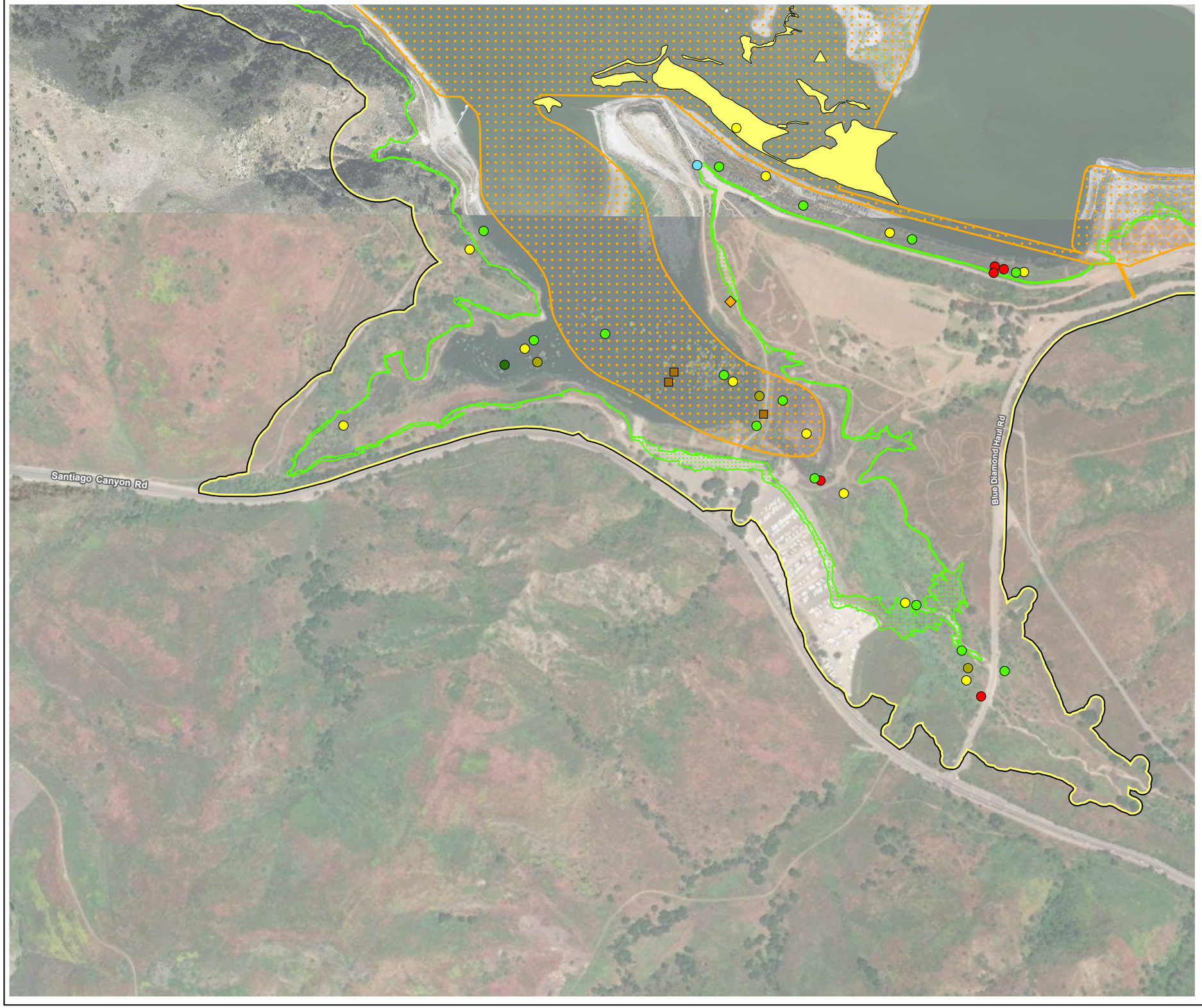
Exhibit 15b

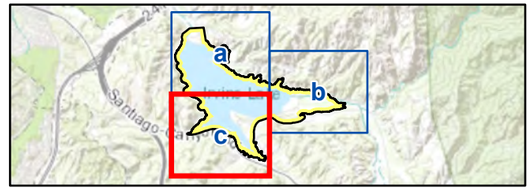
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Special Status Plants

Mud Nama Population (point location)

Mud Nama Population (mapped polygon)

Special Status Species

Crotch's Bumble Bee

Coastal California Gnatcatcher

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

Yellow Warbler

Yellow-Breasted Chat

Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

Exhibit 15c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_SS_Species_Impacts

Draft EIR Appendix C, Biological Technical Report, Page 135, Section 5.7

5.7 MITIGATION MEASURE #7: BALD EAGLE

Initial dewatering activities shall be scheduled to avoid the bald eagle nesting season (December 1 to August 15) to the maximum extent feasible. IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW. **IRWD will comply will all eagle disturbance permit conditions should such a permit be required by USFWS.**

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or April to confirm the nesting stage (i.e., eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing weekly until the young fledge or until May 15, whichever comes last. The Biologist conducting the surveys will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

Draft EIR Appendix C, Biological Technical Report, Tables ES-1, 12, and 17

Tables ES-1, 12, and 17 to be replaced with the tables included in Section 3.0, Corrections, Clarifications, and Additions.

TABLE ES-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	~~115.81~~**119.00**	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	~~20.11~~**24.89**	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.5~~9~~	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.6~~2~~**3**	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		*~~175.10~~**183.03***	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	~~30.35~~**32.61**	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		*~~30.35~~**32.61***	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	~~92.38~~**100.10**	0.25	25.72	0.00	25.97	3.07
Subtotal Grassland		*~~107.97~~**115.69***	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	~~26.01~~**25.85**	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		*~~212.65~~**212.49***	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

TABLE ES-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	~~31.09~~**39.22**	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		***~~31.45~~39.58***	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.6**~~2~~3**	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.6**~~2~~3***	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.**09**~~13~~	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		*383.5**~~0~~5***	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	~~20.77~~**29.19**	0.03	1.21	0.00	1.24	0.47
Developed	15.6	~~20.98~~**25.31**	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		***~~41.75~~54.50***	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	~~25.42~~**33.75**	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		***~~25.42~~33.75***	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**~~1,016.85~~ 1,063.74**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N.

[b] Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

TABLE 12
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Coastal Sage Scrub			
Sagebrush Scrub	2.3.6	No	~~115.81~~**119.00**
Disturbed Sagebrush Scrub	2.3.6	No	~~20.11~~**24.89**
Sagebrush – Coyote Brush Scrub	2.3.12	No	10.5~~9~~**5**
Southern Cactus Scrub	2.4	Provisional[a]	17.48
Disturbed Southern Cactus Scrub	2.4	Yes	10.6~~3~~**2**
Disturbed Floodplain Sage Scrub	2.6	Yes	0.48
Subtotal Coastal Sage Scrub			***~~175.10~~183.03***
Chaparral			
Toyon – Sumac Chaparral	3.12	No	~~30.35~~**32.61**
Subtotal Chaparral			***~~30.35~~32.61***
Grassland			
Annual Grassland	4.1	No	15.59
Ruderal	4.6	No	~~92.38~~**100.10**
Subtotal Grassland			***~~107.97~~115.69***
Riparian			
Riparian Herb	7.1	No	13.15
Southern Willow Scrub	7.2	Yes	0.43
Mulefat Scrub	7.3	No	1.50
Disturbed Mulefat Scrub	7.3	No	26.67
Southern Sycamore Riparian Woodland	7.4	Yes	20.48
Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest	7.4/7.5	Yes	5.46
Southern Black Willow Forest	7.7	Yes	83.61
Disturbed Southern Black Willow Forest	7.7	Yes	35.3~~5~~**4**
Southern Black Willow Forest/Riparian Herb	7.7/7.1	No[b]	~~26.01~~**25.85**
Subtotal Riparian			***~~212.66~~212.49***
Woodland			
Coast Live Oak Woodland	8.1	No	~~31.09~~**39.22**
Western Sycamore	8.x	Yes	0.36
Subtotal Woodland			***~~31.45~~39.58***
Cliff and Rock			
Cliff	10.0	No	1.6~~3~~**2**
Subtotal Cliff and Rock			***1.6~~3~~2***
Lakes, Reservoirs, and Basins			
Open Water	12.1	No	312.11
Fluctuating Shoreline	12.2	No	26.31
Vegetated Fluctuating Shoreline	12.2	No	45.~~13~~**09**
Subtotal Lakes, Reservoirs, and Basins			*383.5~~5~~**0***
Watercourses			
Perennial Stream	13.1	No	6.97
Subtotal Watercourses			*6.97*

TABLE 12
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Developed Areas			
Ornamental	15.5	No	~~20.77~~**29.19**
Developed	15.6	No	~~20.98~~**25.31**
Subtotal Developed Areas			~~*41.75*~~***54.50***
Disturbed Areas			
Disturbed	16.1	No	~~25.42~~**33.75**
Subtotal Disturbed Areas			~~*25.42*~~***33.75***
Total			~~**1,016.85**~~**1,063.74**

[a] Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2025b).
[b] This blended community would be characterized more as riparian herb than southern black willow forest; therefore, it would not be considered a sensitive community.

BSA: Biological Survey Area

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	~~115.81~~**119.00**	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	~~20.11~~**24.89**	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.5~~9~~**9**	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.6~~2~~**3**	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		*~~175.10~~**183.03***	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	~~30.35~~**32.61**	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		*~~30.35~~**32.61***	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	~~92.38~~**100.10**	0.25	25.72	0.00	25.97	3.07
Subtotal Grassland		*~~107.97~~**115.69***	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	~~26.01~~**25.85**	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		*~~212.65~~**212.49***	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	~~31.09~~**39.22**	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		***~~31.45~~39.58***	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.6**2**~~3~~	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.6**2**~~3~~*	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.**09**~~13~~	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		*383.5**05***	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	~~20.77~~**29.19**	0.03	1.21	0.00	1.24	0.47
Developed	15.6	~~20.98~~**25.31**	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		***~~41.75~~54.50***	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	~~25.42~~**33.75**	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		***~~25.42~~33.75***	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**~~1,016.85~~1,063.74**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N.

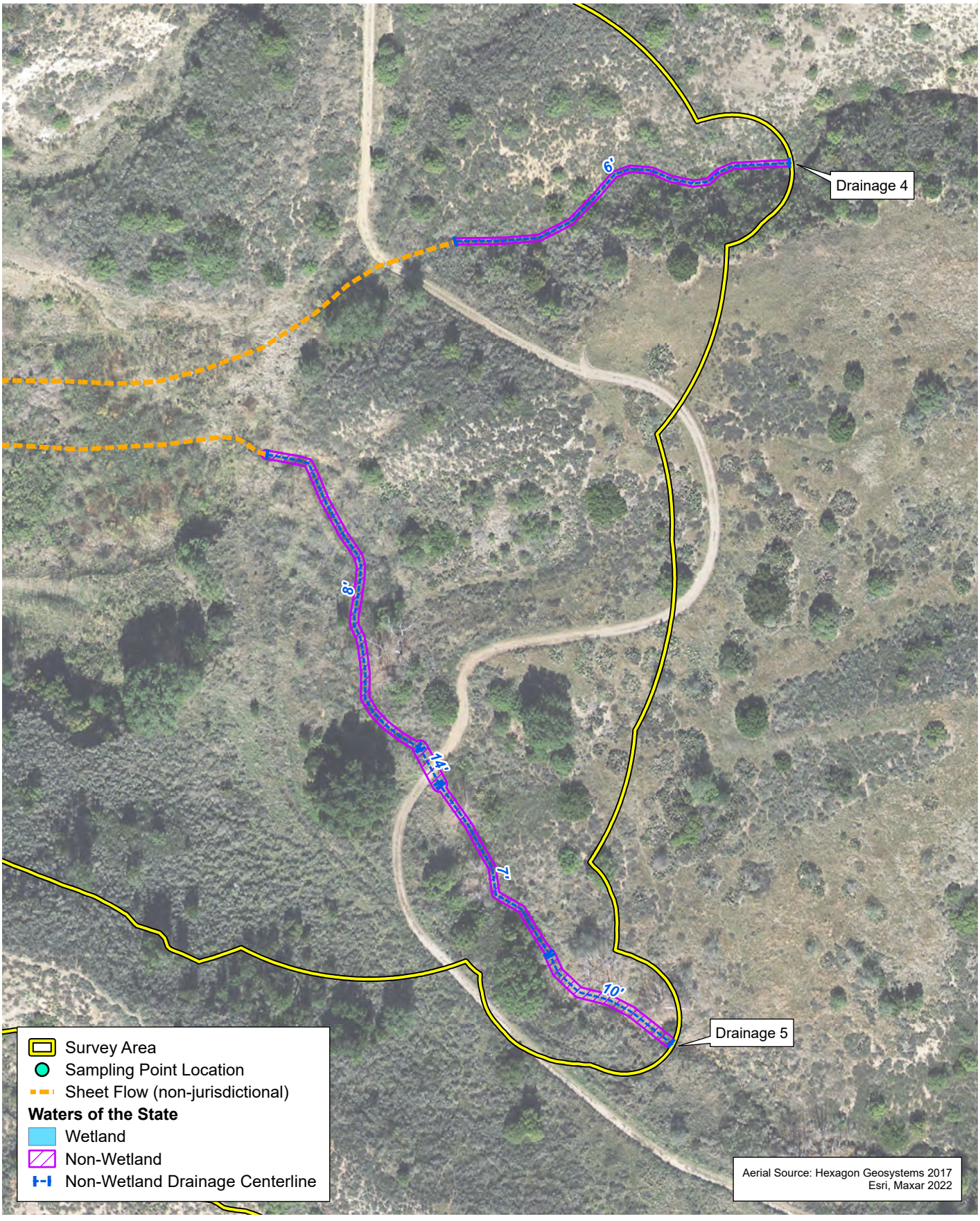
[b] Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

Draft EIR Appendix C – Biological Technical Report, Appendix M, Exhibits D-1, D-2, 1 through 3 and 5 through 12

Exhibit D-1, D-2, 1 through 3 and 5 through 12 to be replaced with the following page.

Draft EIR Appendix C – Biological Technical Report, Appendices O and P

Results of Western Spadefoot Surveys for the Santiago Creek Dam Improvement Project, Orange County, California dated June 10, 2025 (Attachment A to this Final EIR) and Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for a portion of the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California, dated September 18, 2025 (Attachment B to this Final EIR) are added to Appendix C – Biological Technical Report of the Draft EIR as Appendices O and P, respectively.



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail – Drainages 4, 5

Attachment D-1a

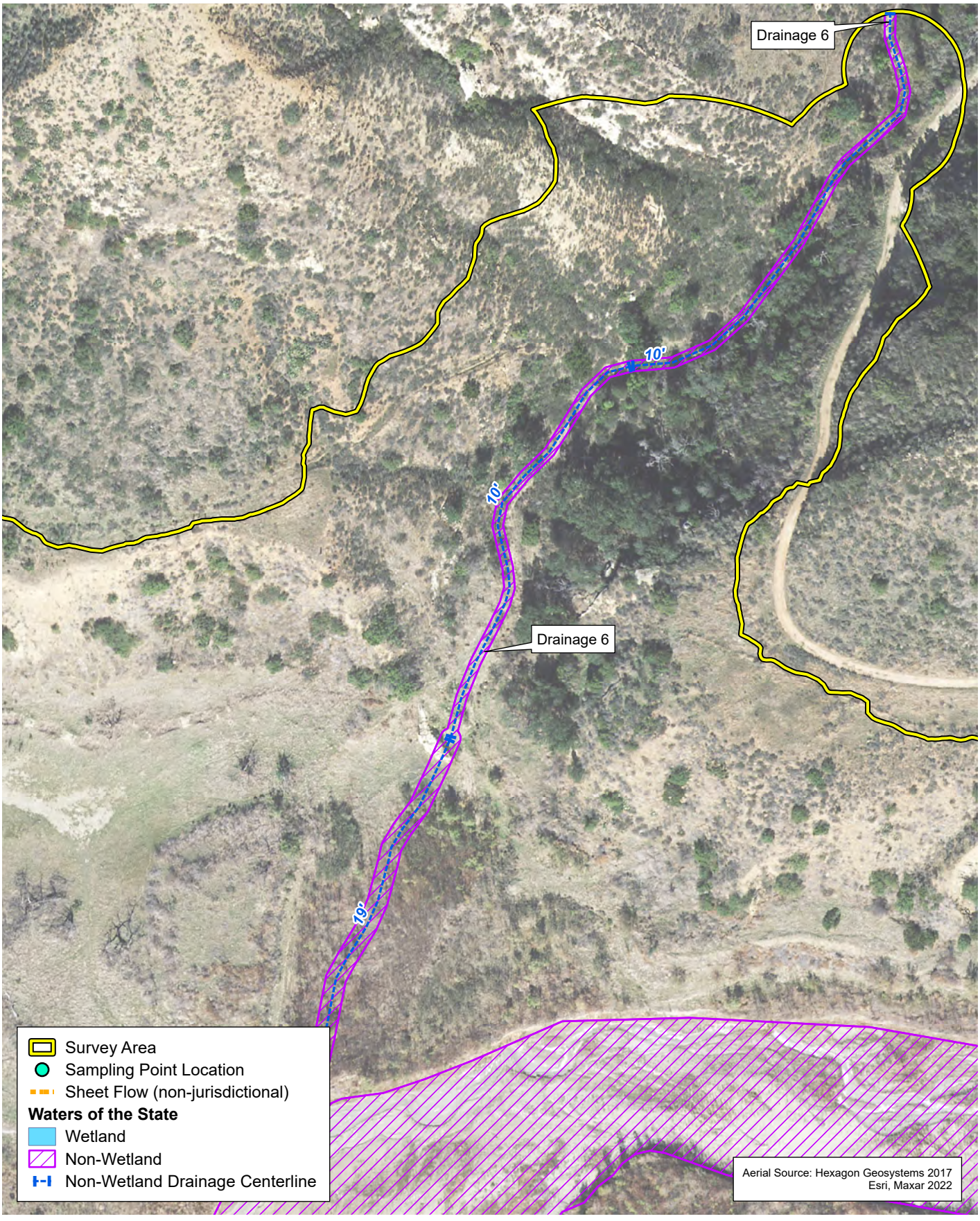
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 6

Attachment D-1b

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 7

Attachment D-1c

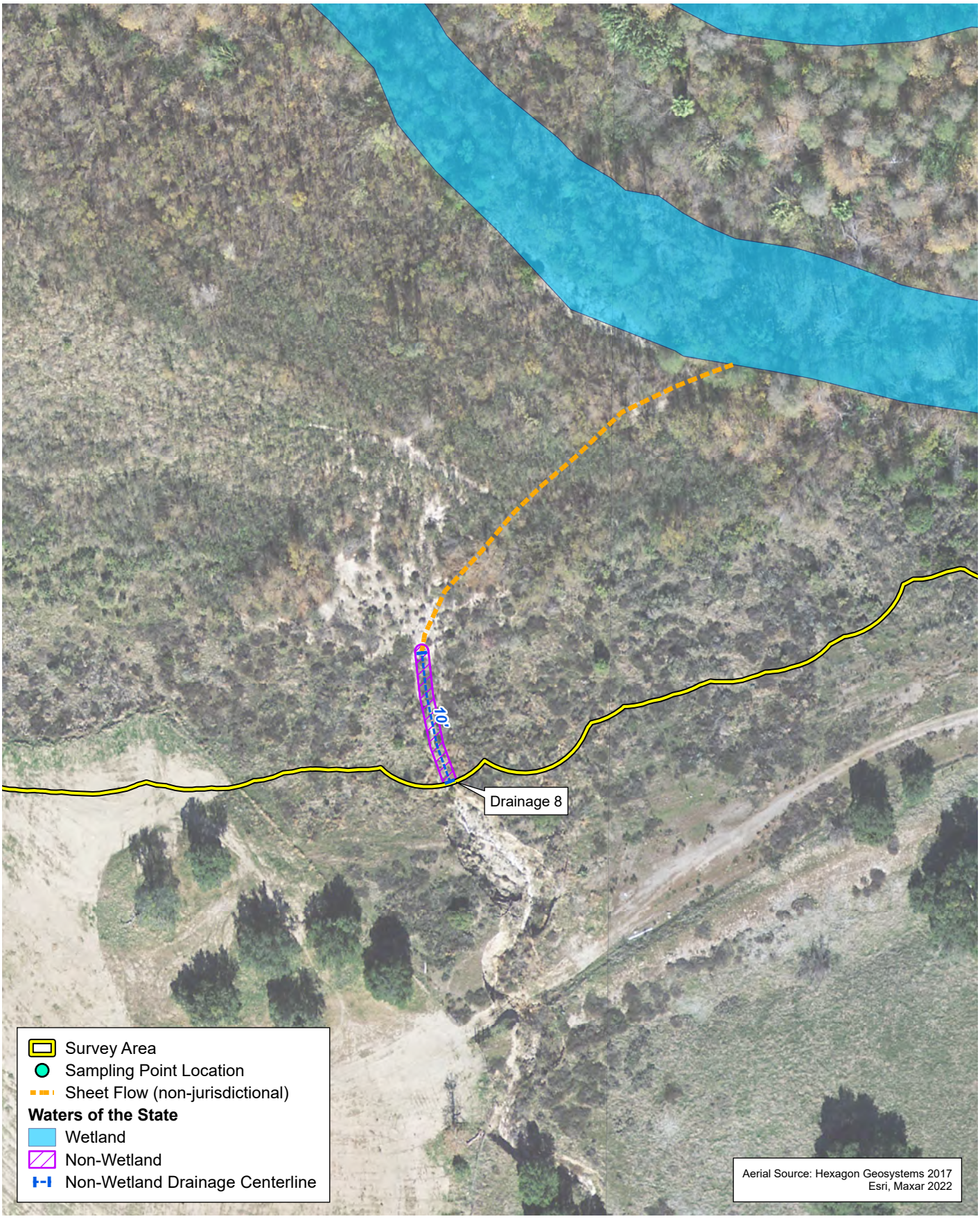
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 8

Attachment D-1d

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 9

Attachment D-1e

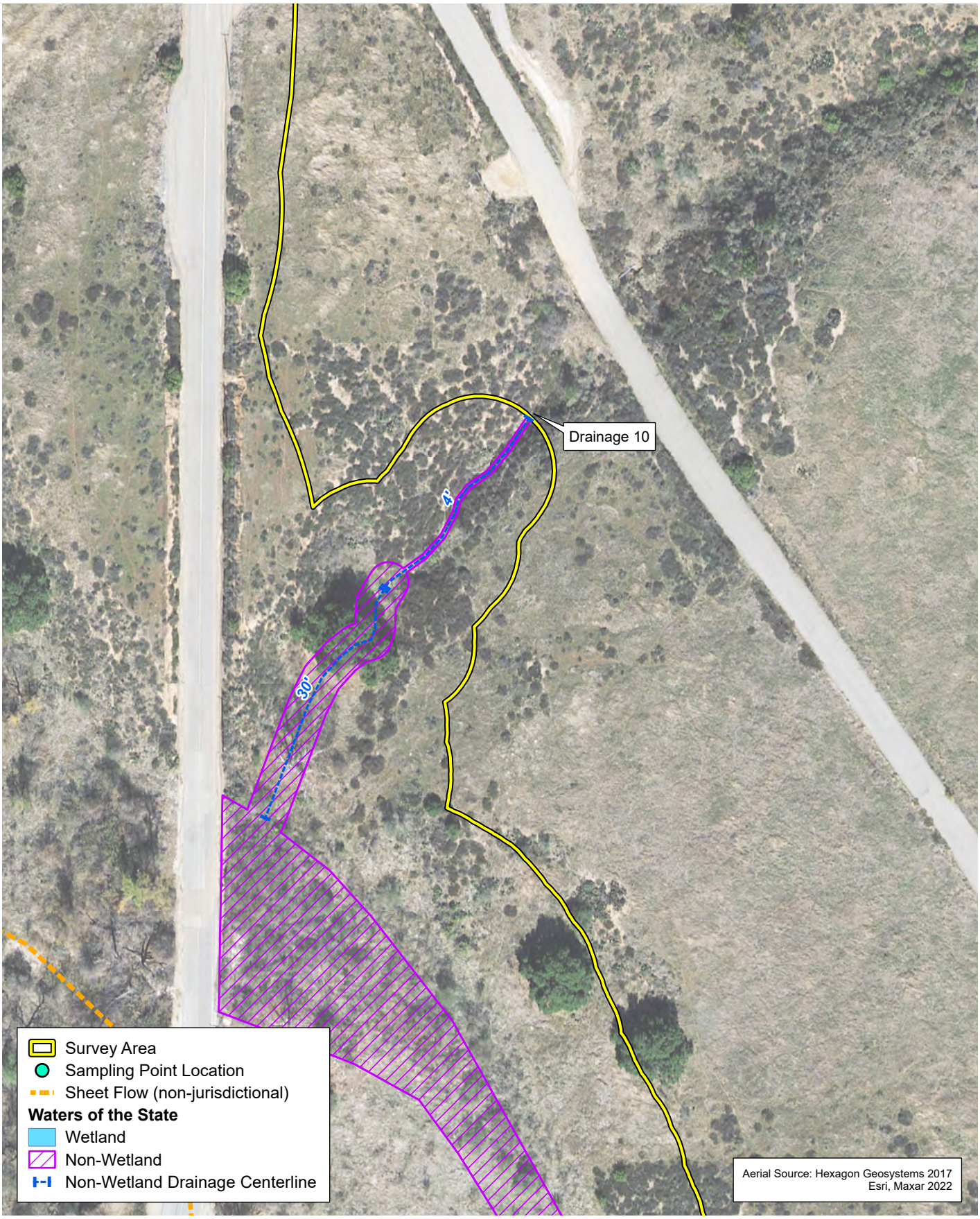
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 10

Attachment D-1f

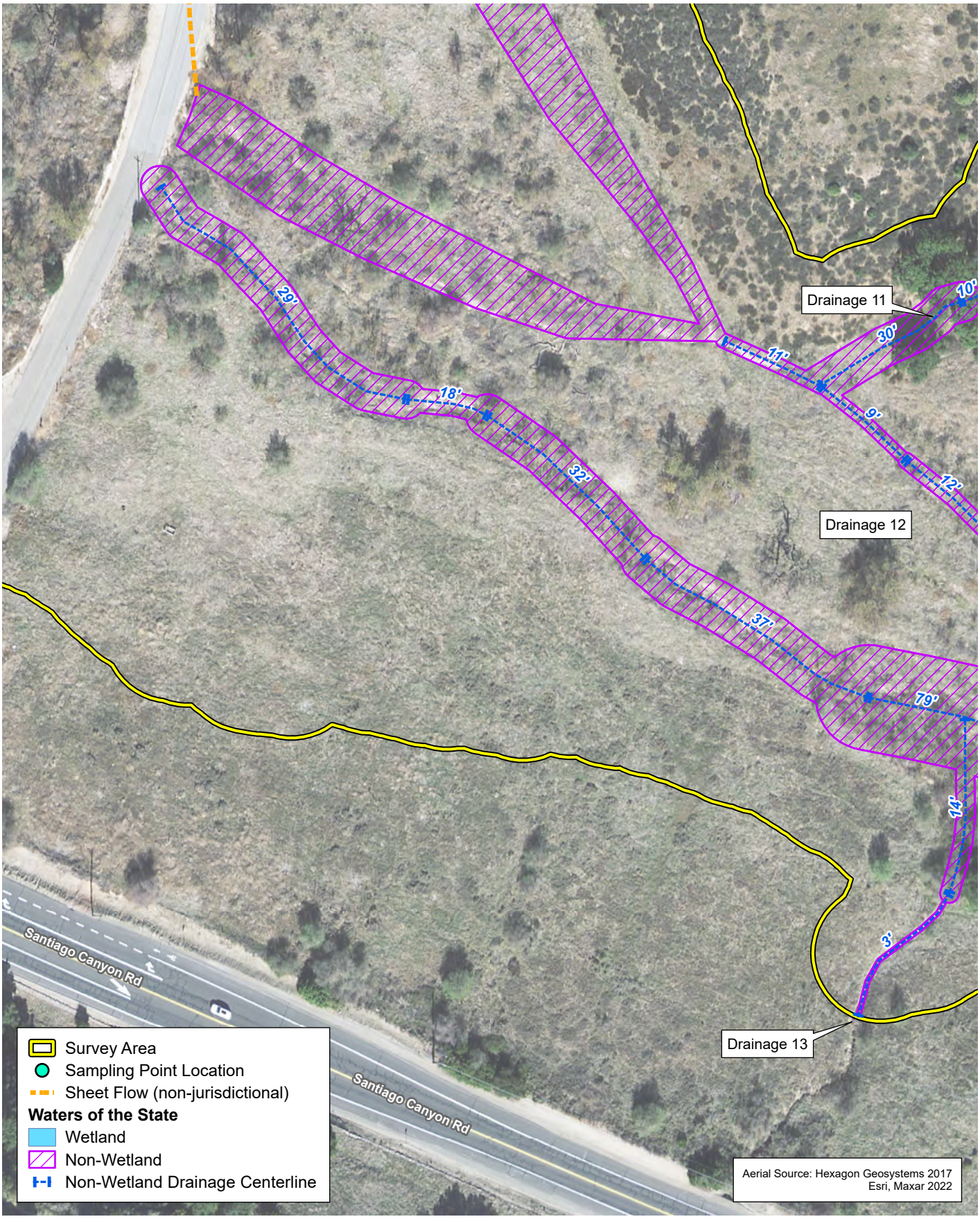
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail – Drainages 11, 12, 13 Attachment D-1g

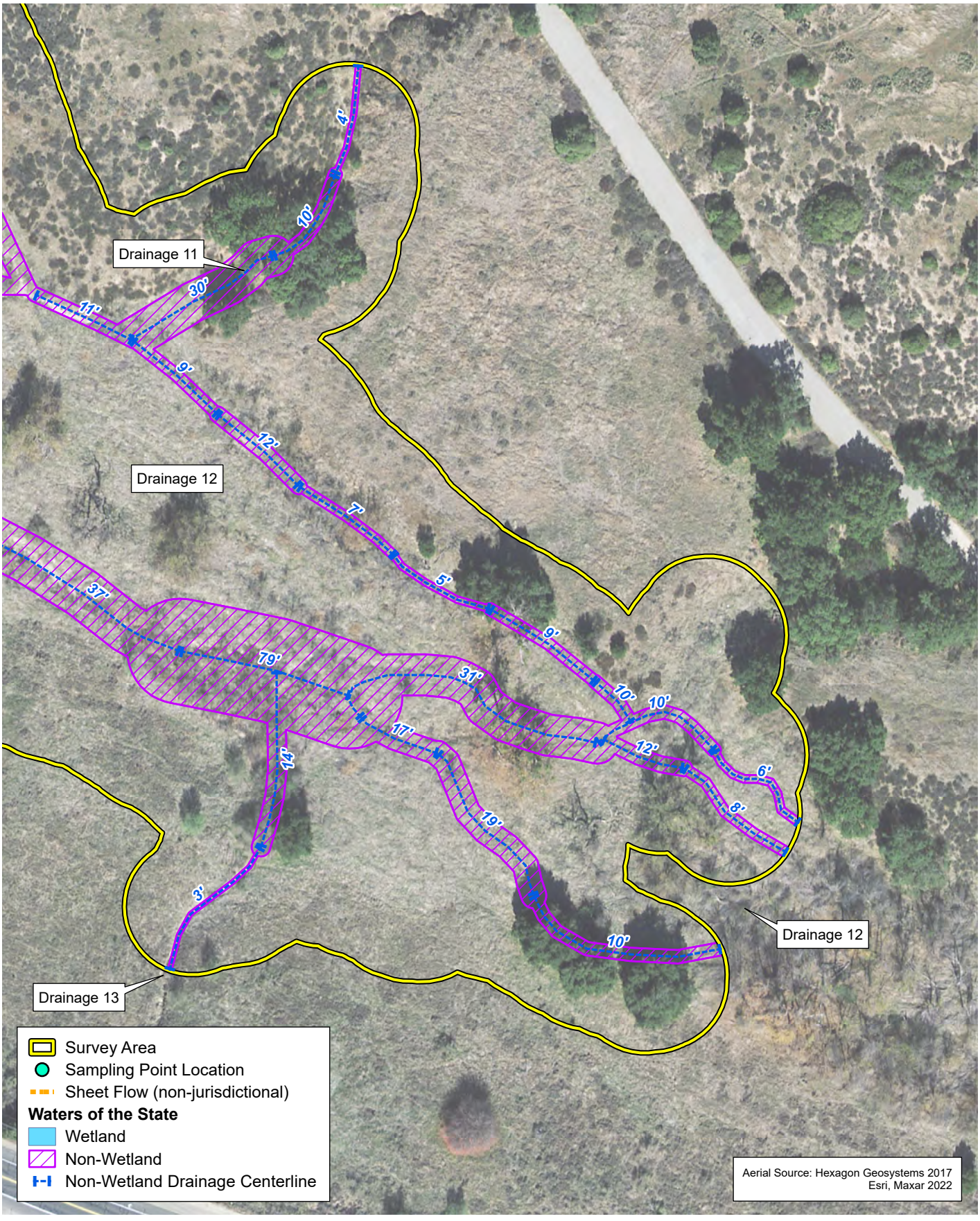
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainages 11, 12, 13

Attachment D-1h

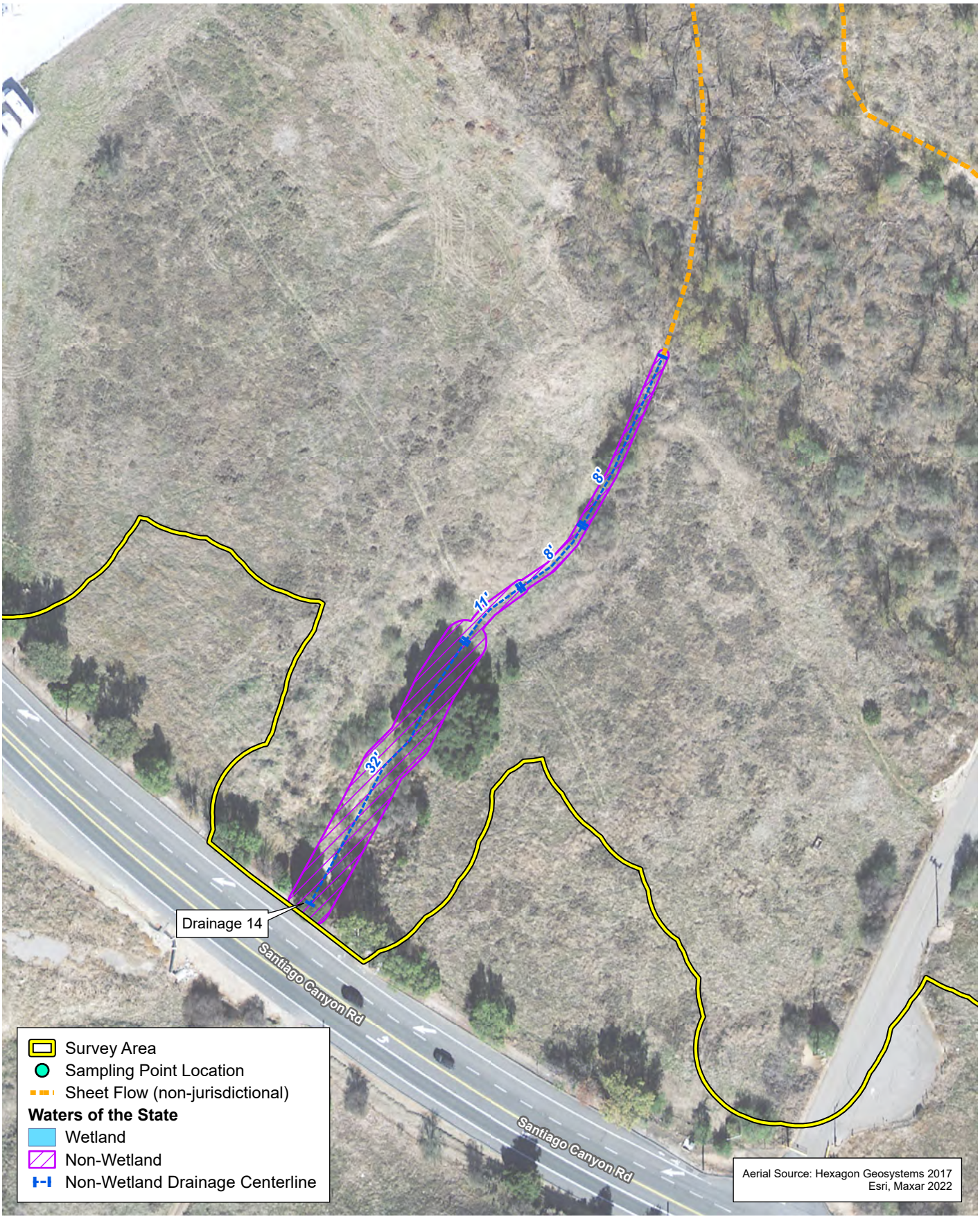
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail – Drainage 14

Attachment D-1i

Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 15

Attachment D-1j

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 15

Attachment D-1k

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainages 4, 5

Attachment D-2a

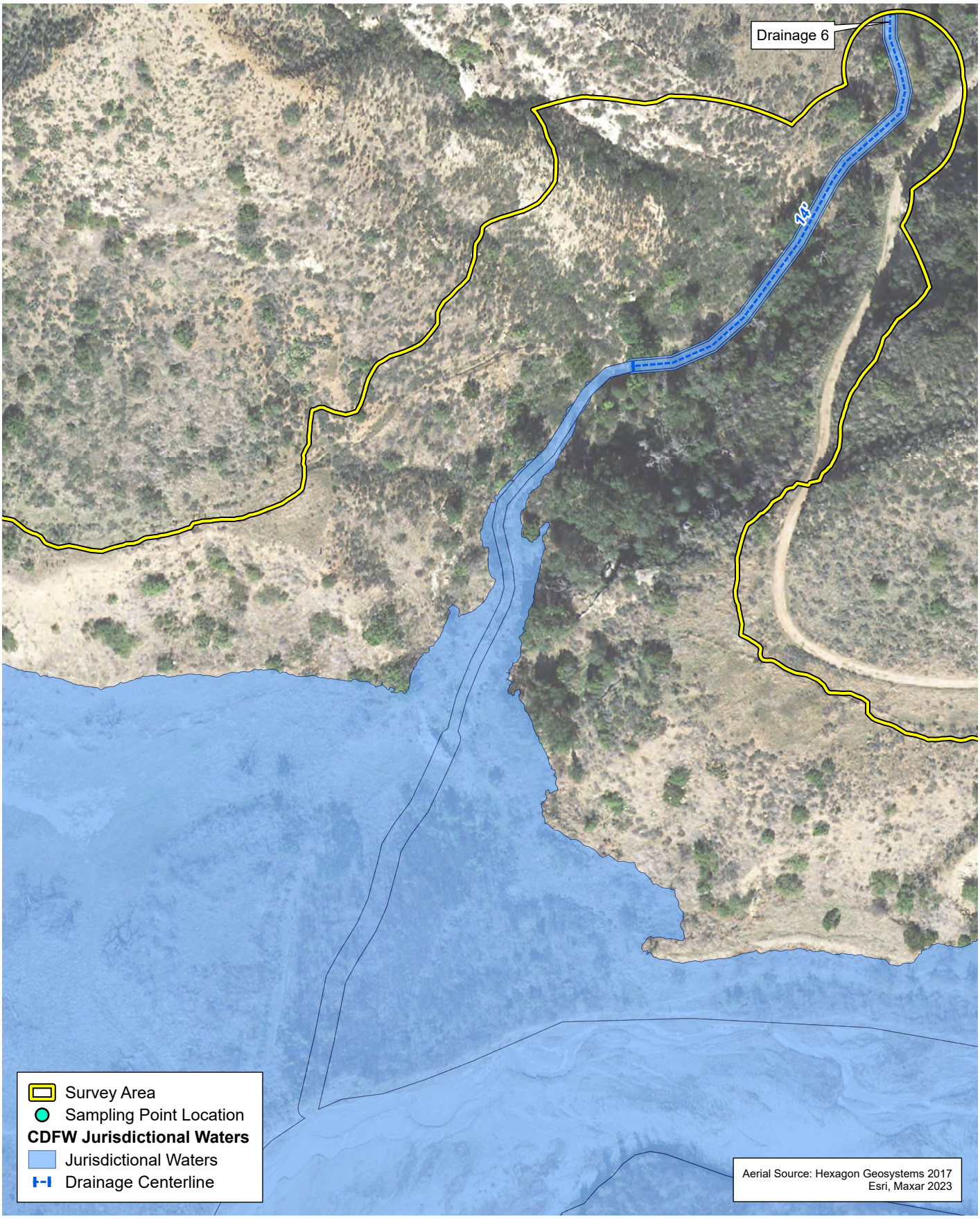
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 6

Attachment D-2b

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 7

Attachment D-2c

Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 8

Attachment D-2d

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 9

Attachment D-2e

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail - Drainage 10

Attachment D-2f

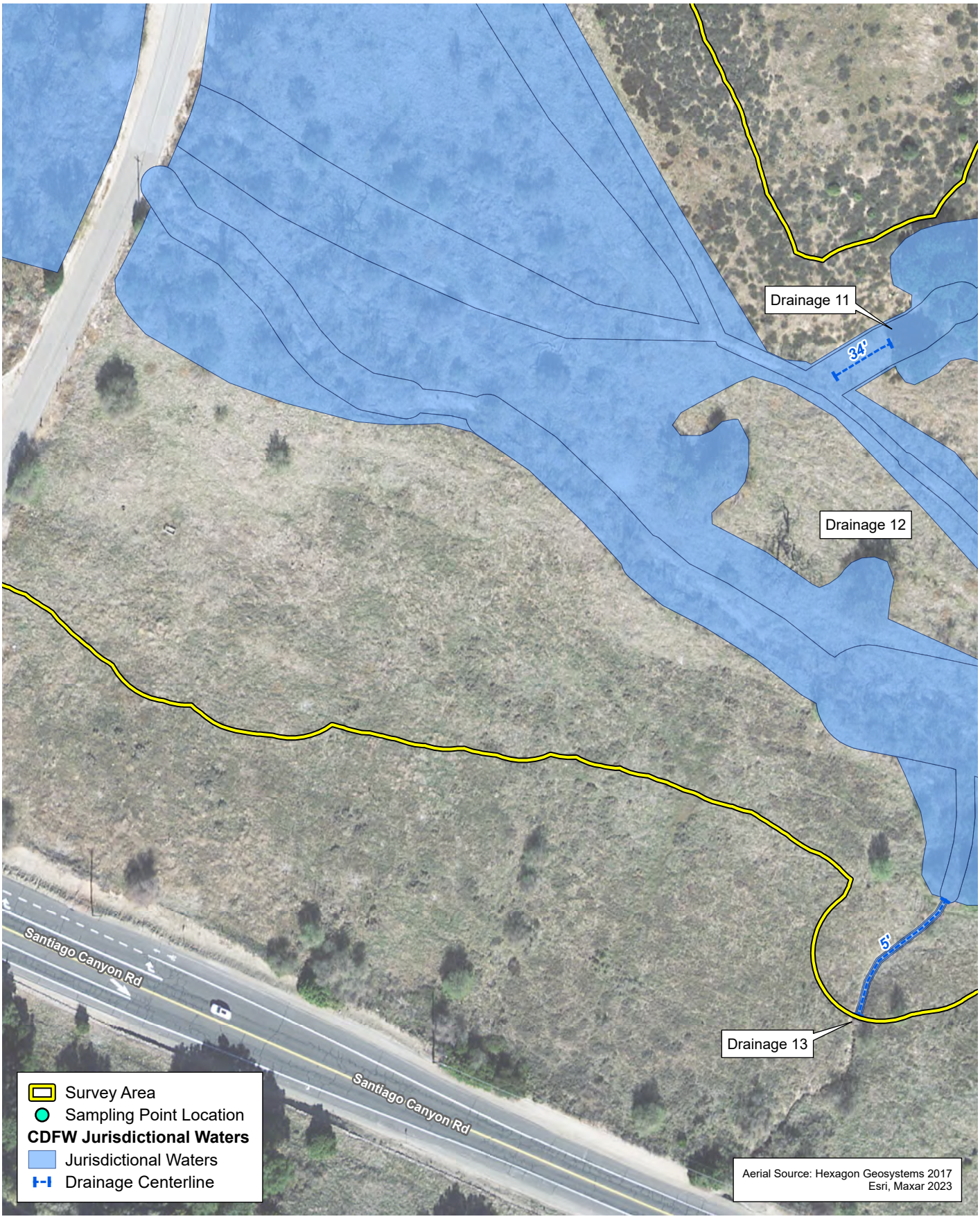
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainages 11, 12, 13

Attachment D-2g

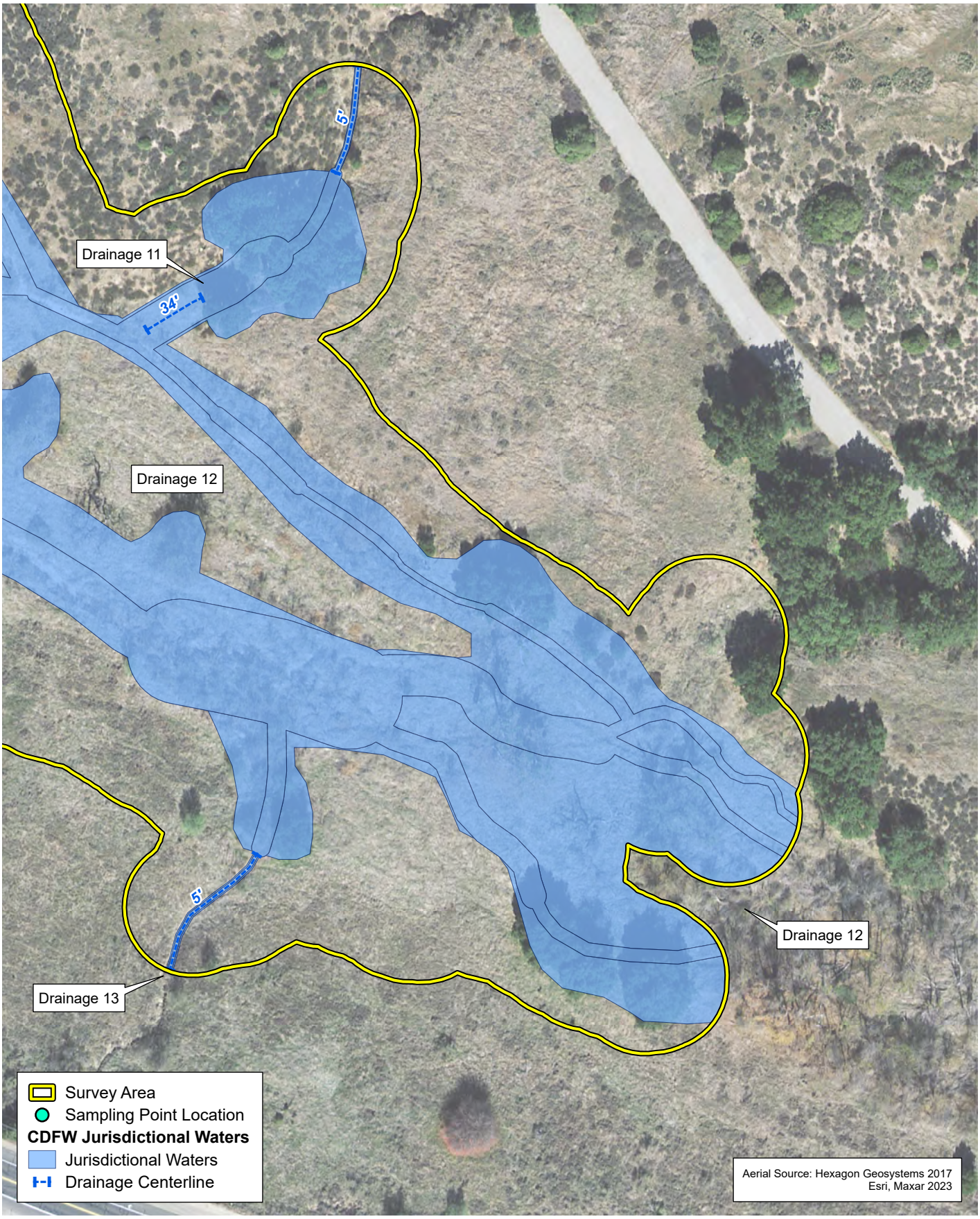
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainages 11, 12, 13

Attachment D-2h

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 14

Attachment D-2i

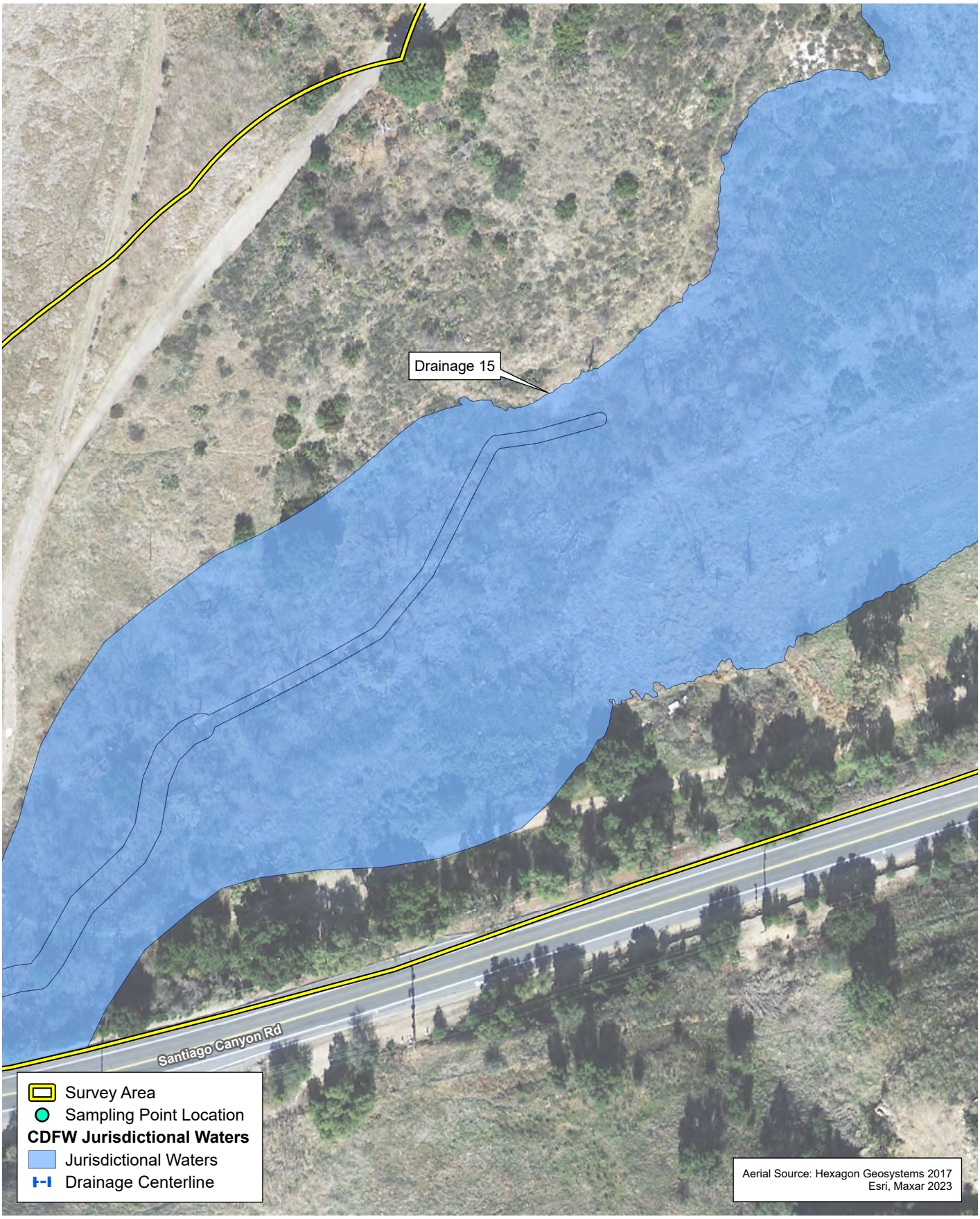
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 15

Attachment D-2j

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 15

Attachment D-2k

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Improvement Project

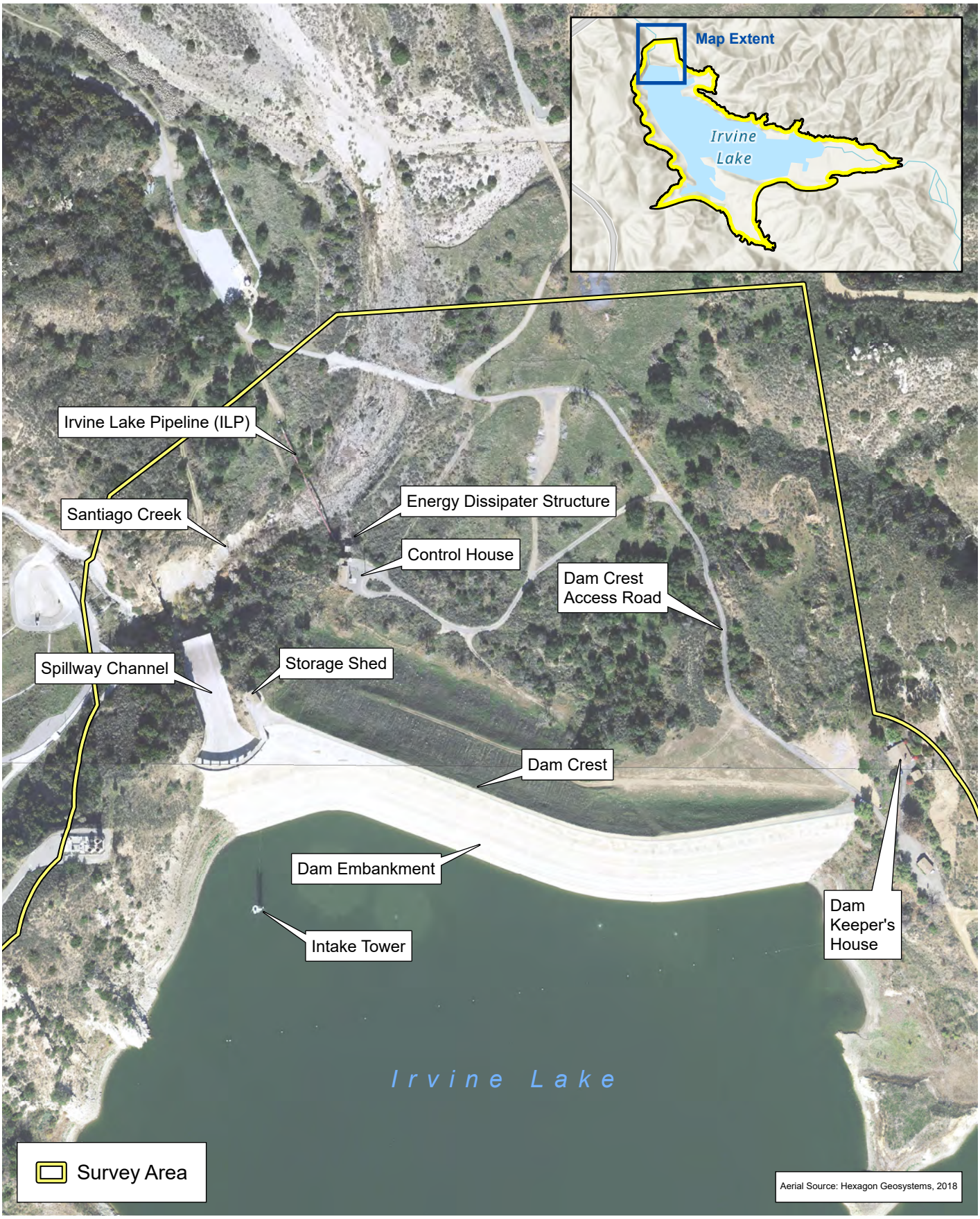
N
W
E
S

0 2,000 4,000 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_LV_RL.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_LV_RL



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Existing_Dam_Features

Existing Dam Features

Exhibit 2

Santiago Creek Dam Improvement Project

N W E S

0 150 300 Feet

PSOMAS

(Rev: 9-29-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_ExistingDamFeatures.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_USGS

U.S. Geological Survey 7.5-minute Digital Quadrangle

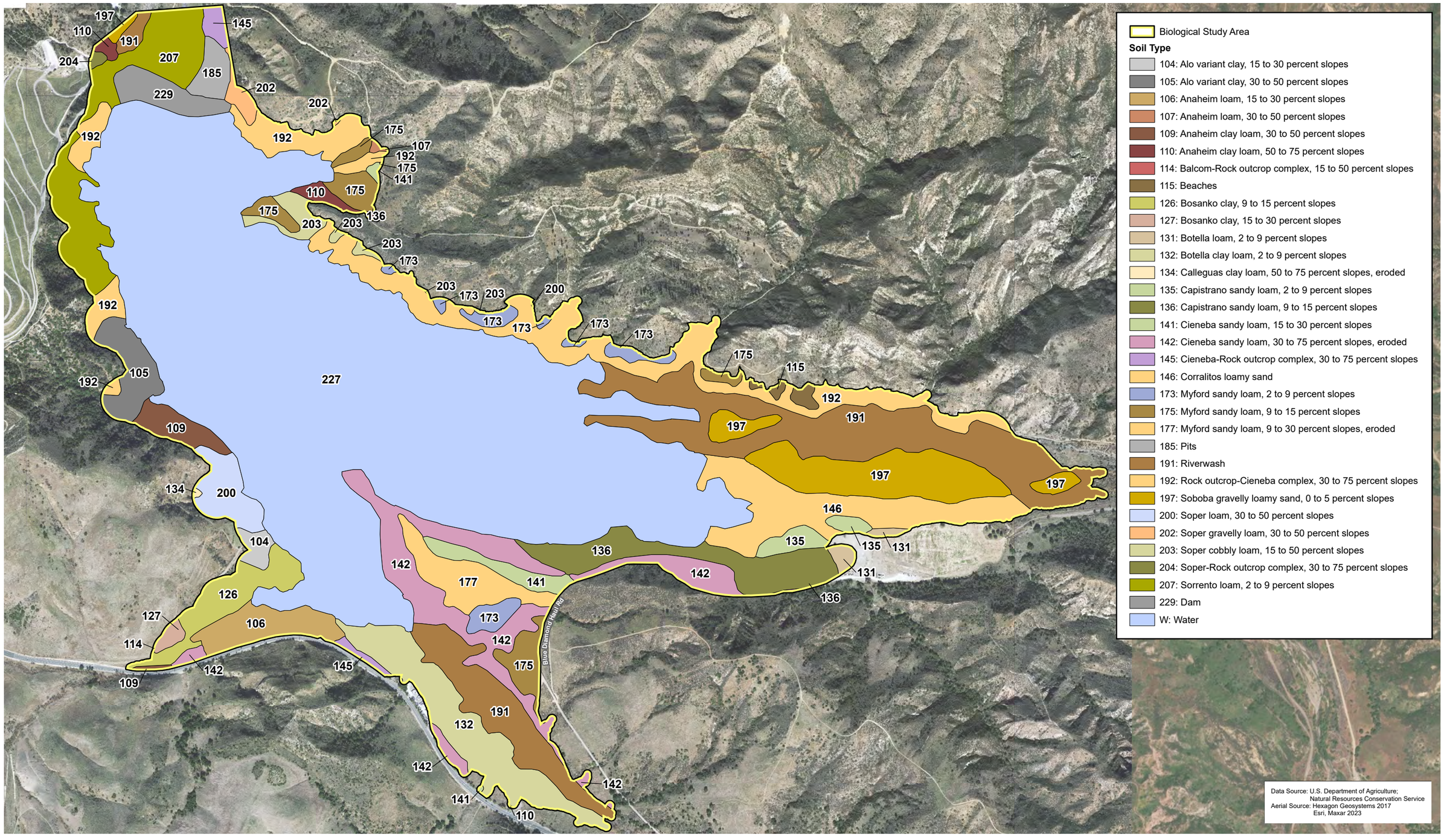
Exhibit 3

Santiago Creek Dam Improvement Project

N W E S

0 1,000 2,000 Feet

PSOMAS



D:\Projects\IRW\SantiagoCreek\PROSCD\SCD_Project aprx\ex_Soils

Soil Types

Santiago Creek Dam Improvement Project

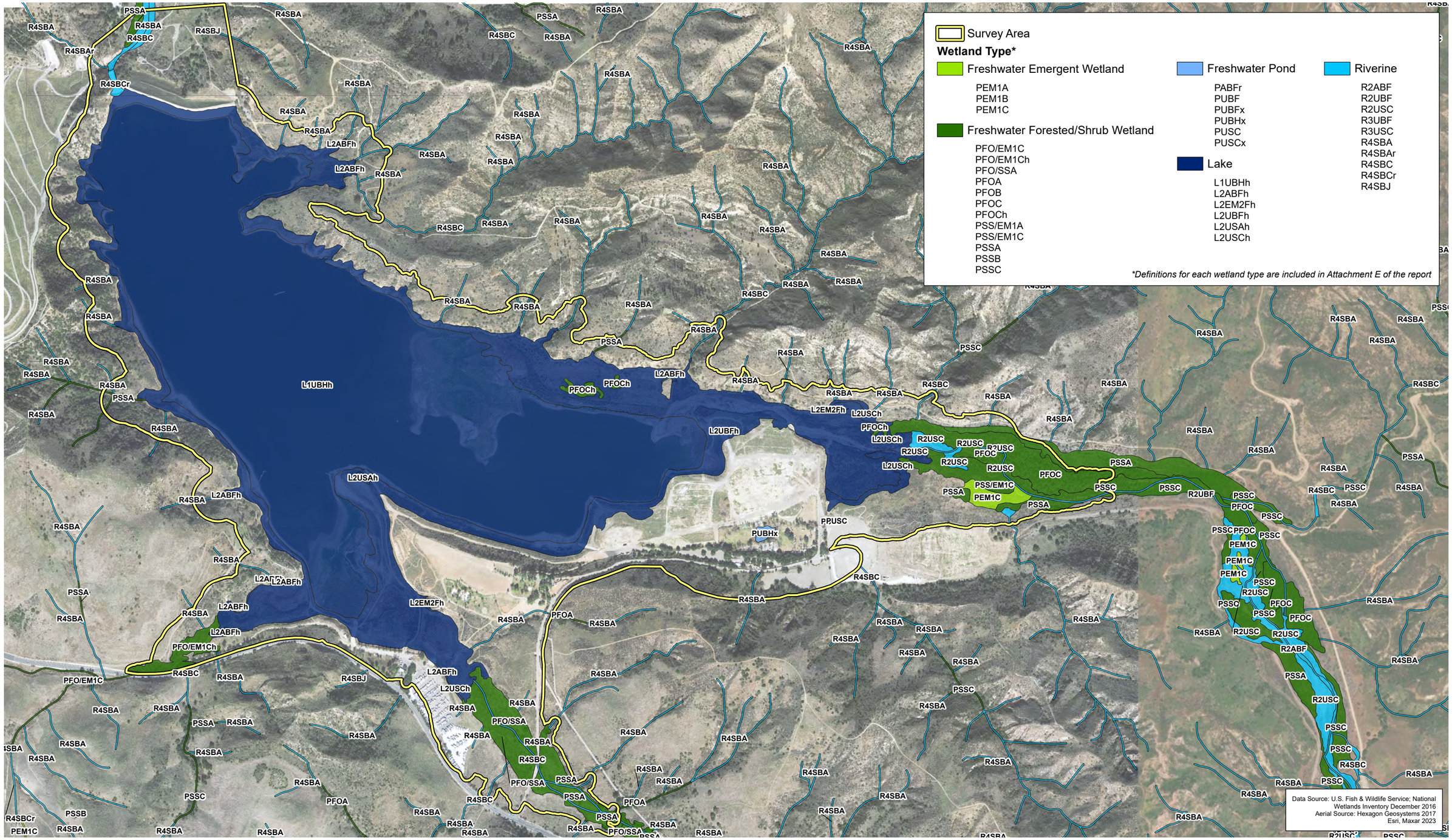
Exhibit 5

N W E S

0 550 1,100 Feet

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_SoilTypes.pdf



D:\Projects\3IRW\SantiagoCreek\PROS\CD\SCD_Project.aprx\ex_NWI

National Wetlands Inventory

Santiago Creek Dam Improvement Project

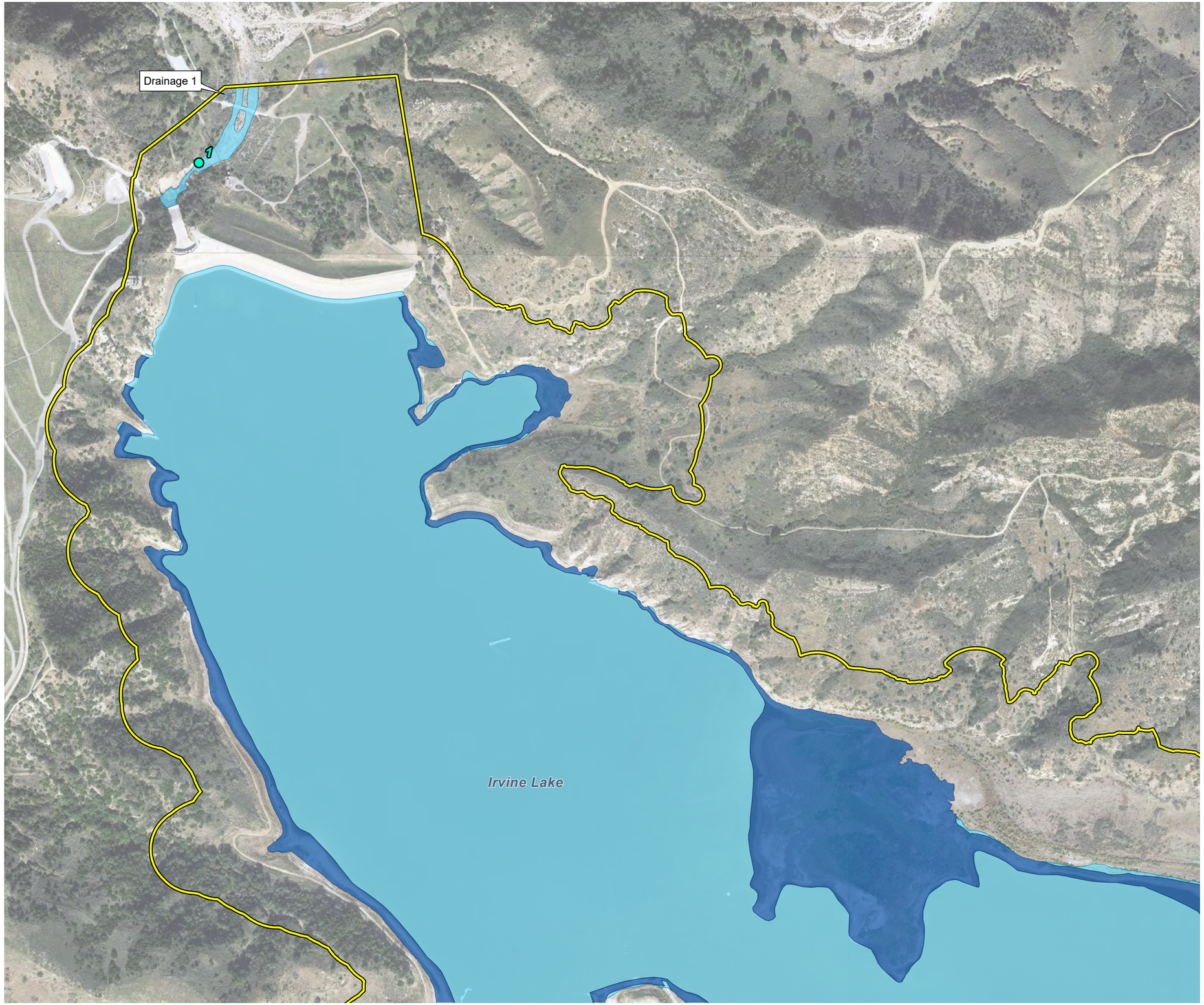
N W E S

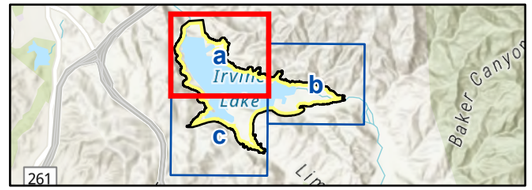
0 550 1,100 Feet

Exhibit 6

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_NWI.pdf





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

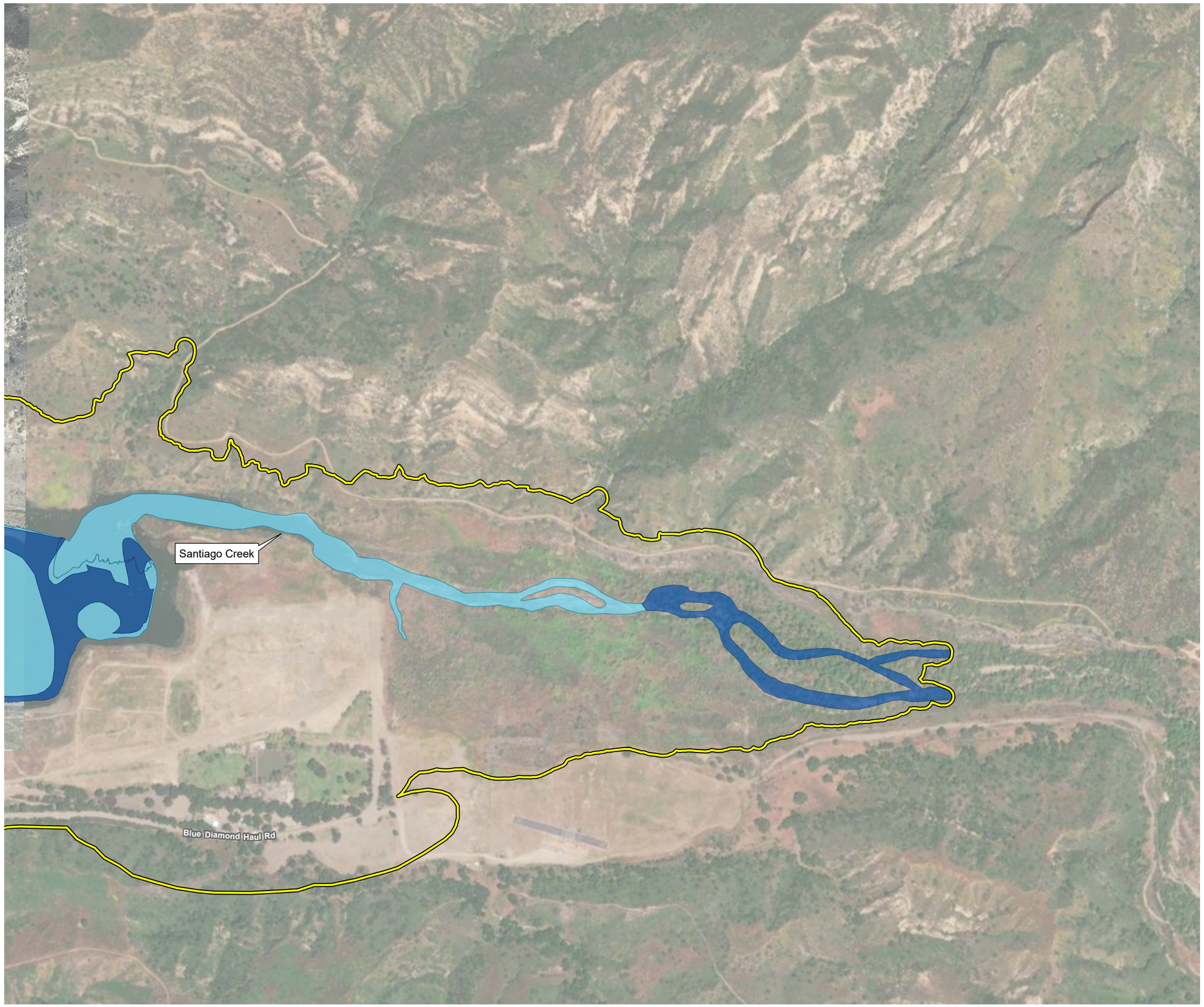
Exhibit 7a

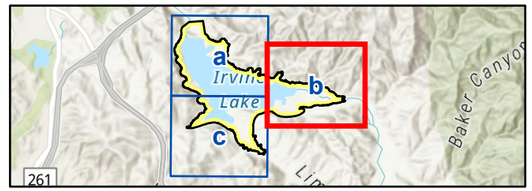
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

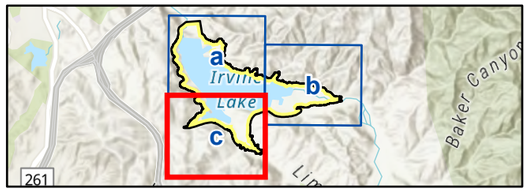
Exhibit 7b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE



Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – USACE Waters of the United States

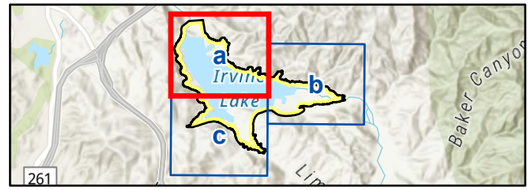
Exhibit 7c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE



- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)

Waters of the State

- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

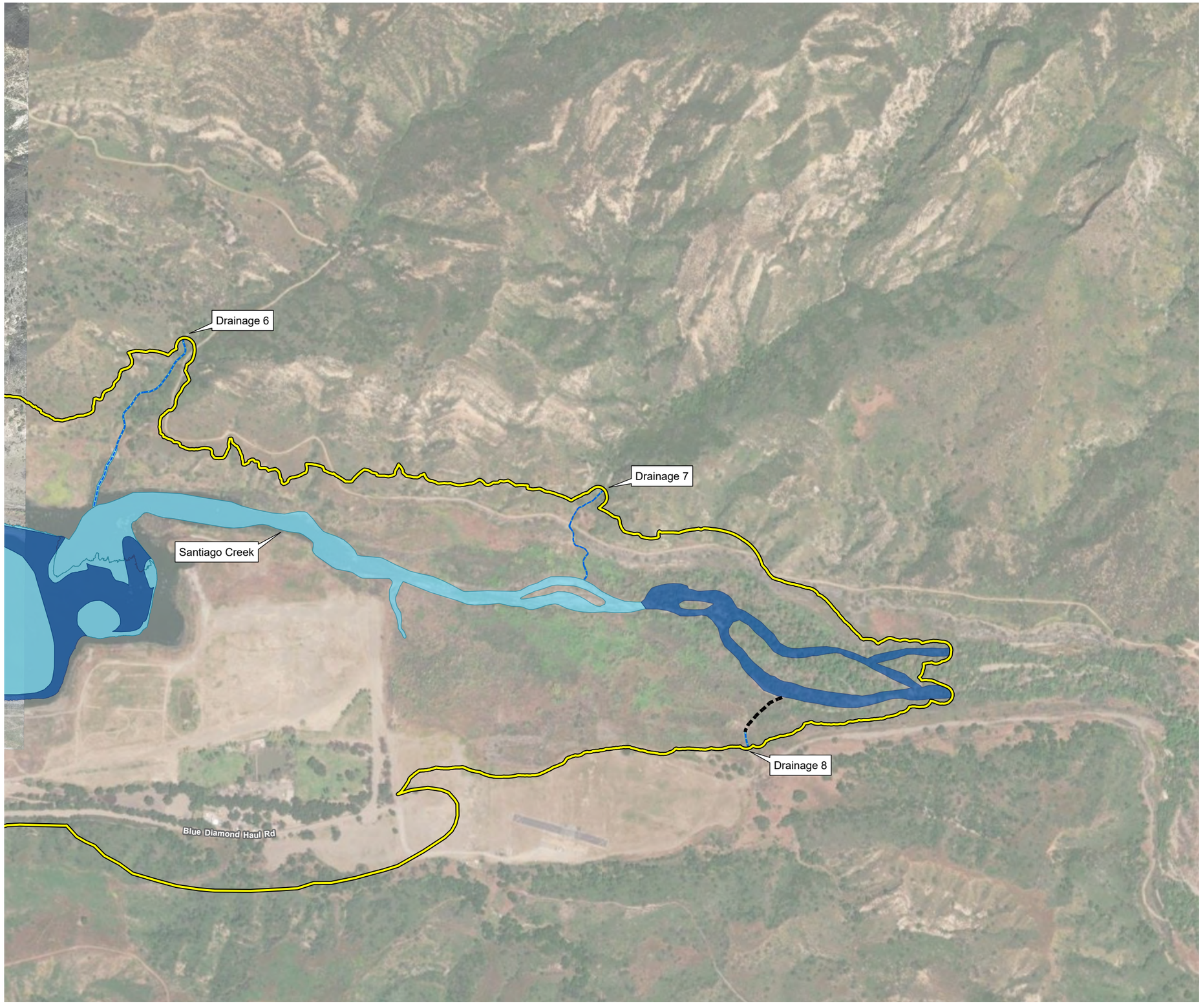
Exhibit 8a

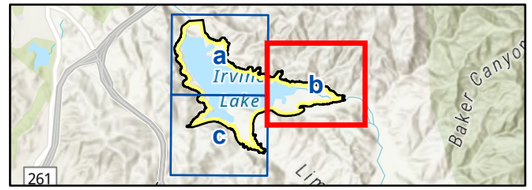
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

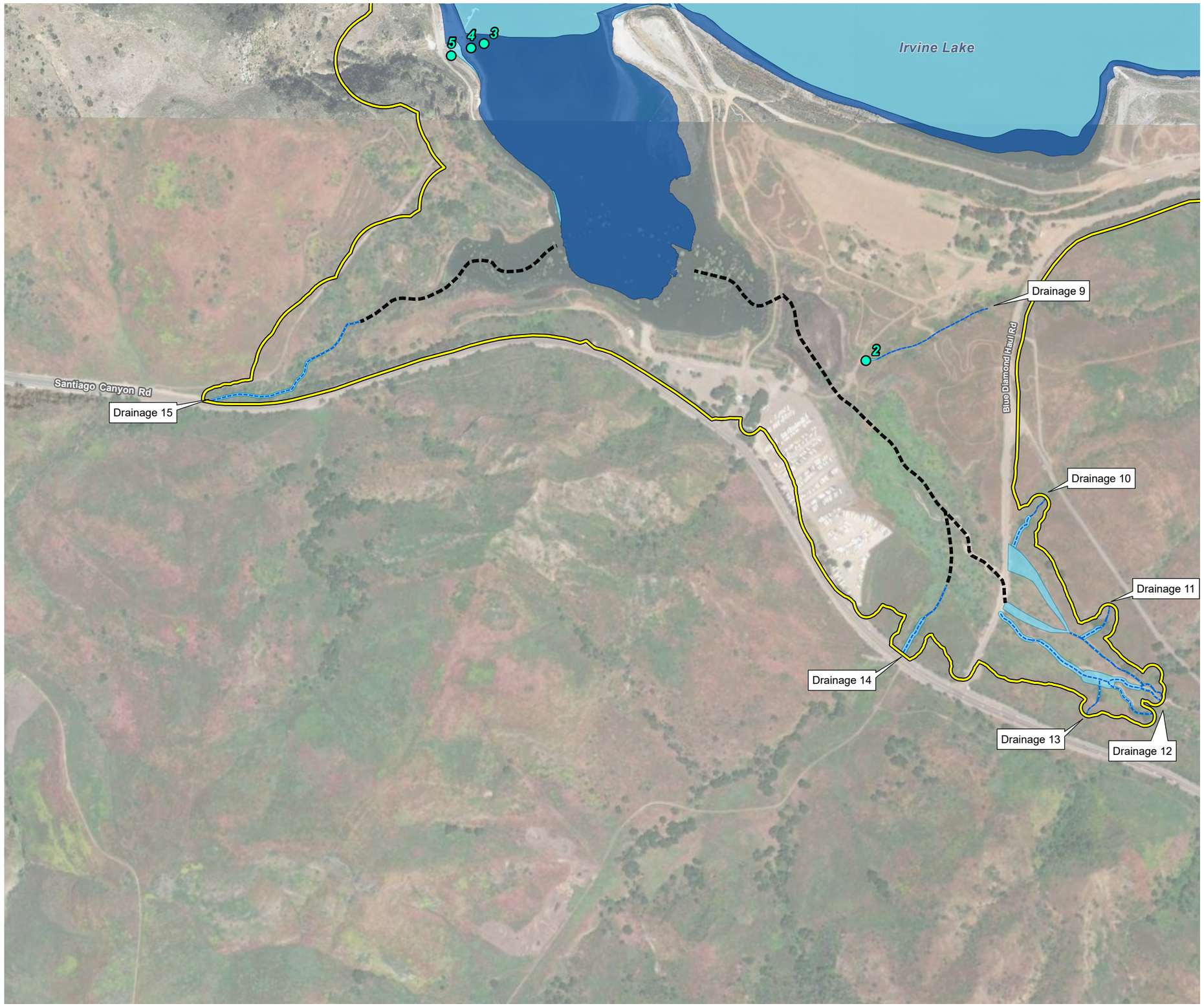
Exhibit 8b

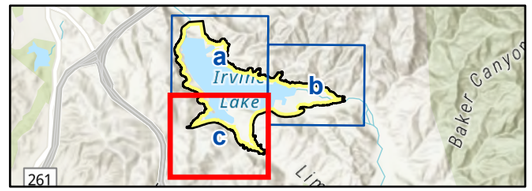
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)

Waters of the State

- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

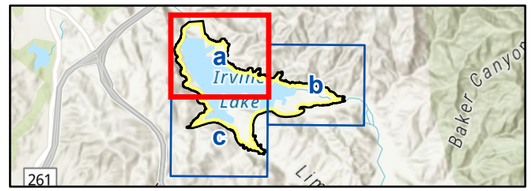
Exhibit 8c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\SCD_Project.aprx\ex_JD_RWQCB



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

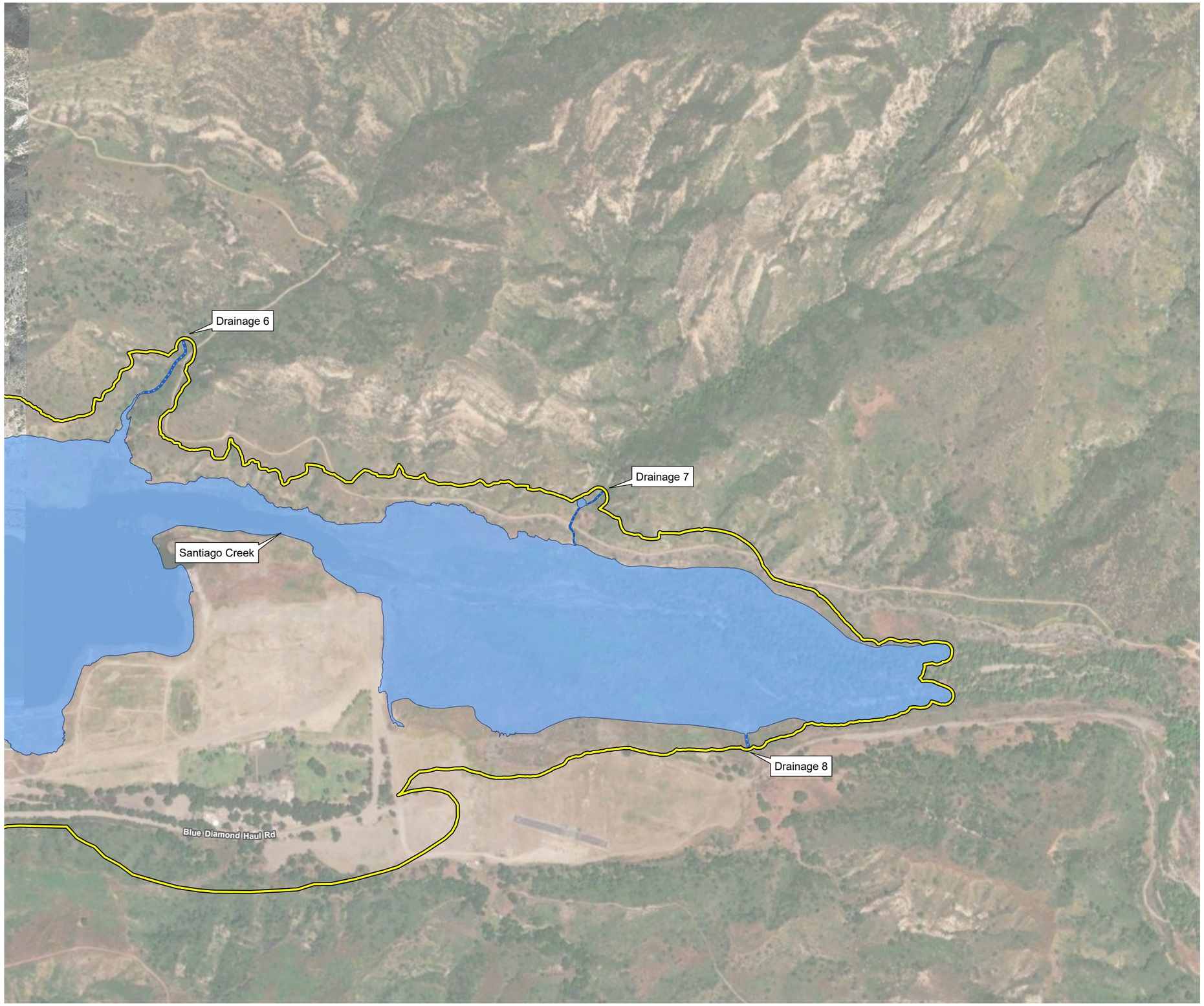
Exhibit 9a

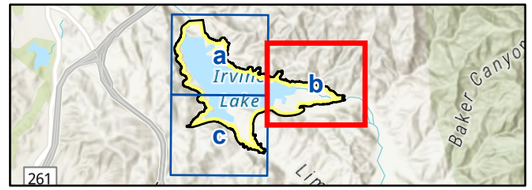
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW





Survey Area

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

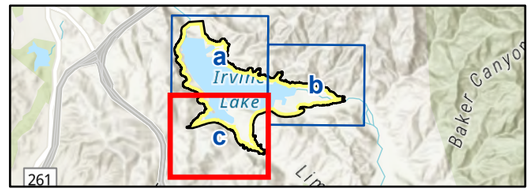
Exhibit 9b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

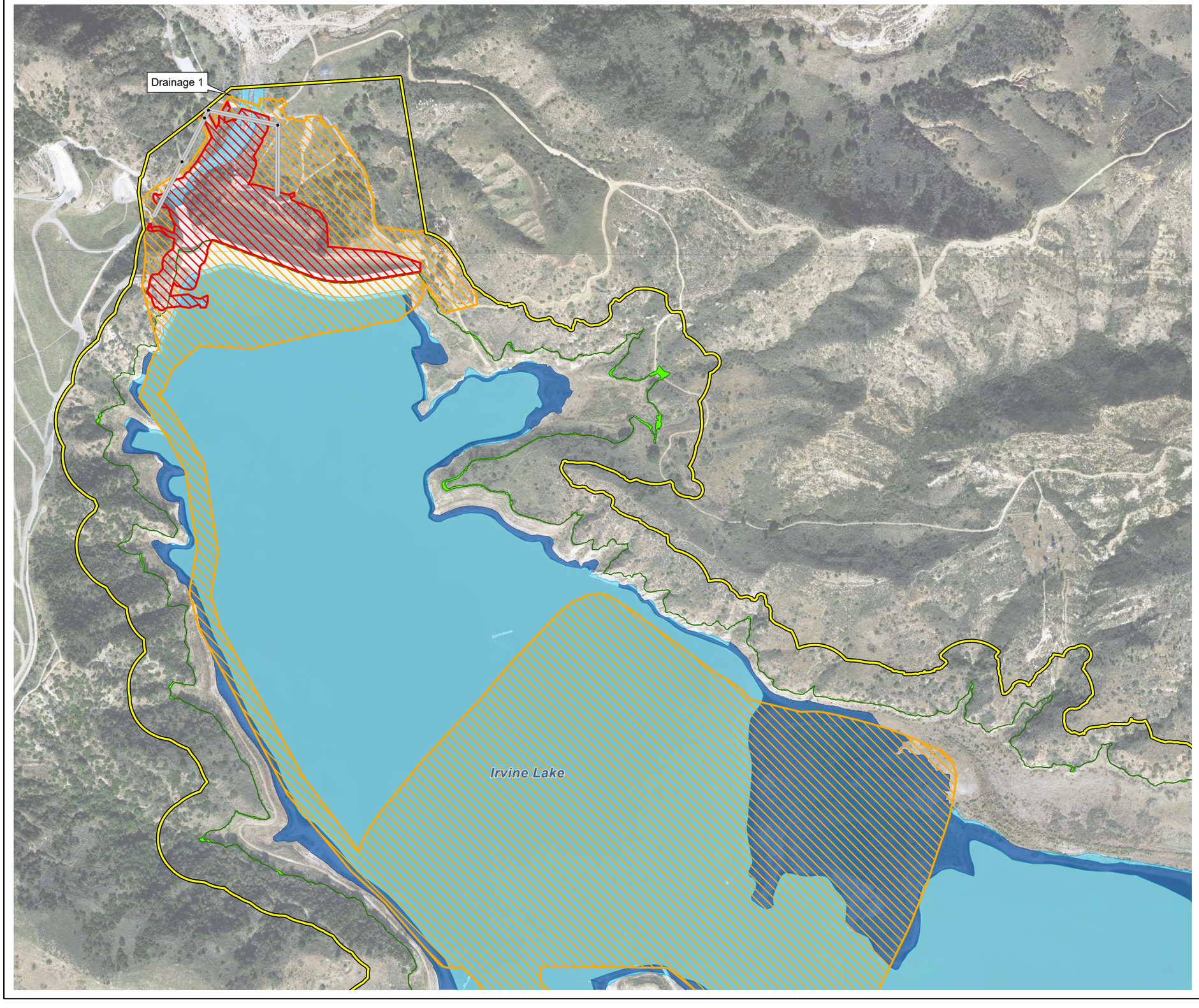
Exhibit 9c

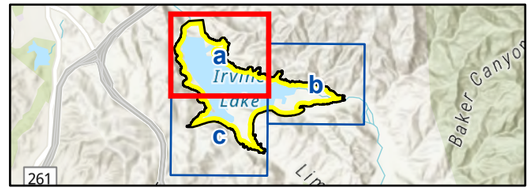
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

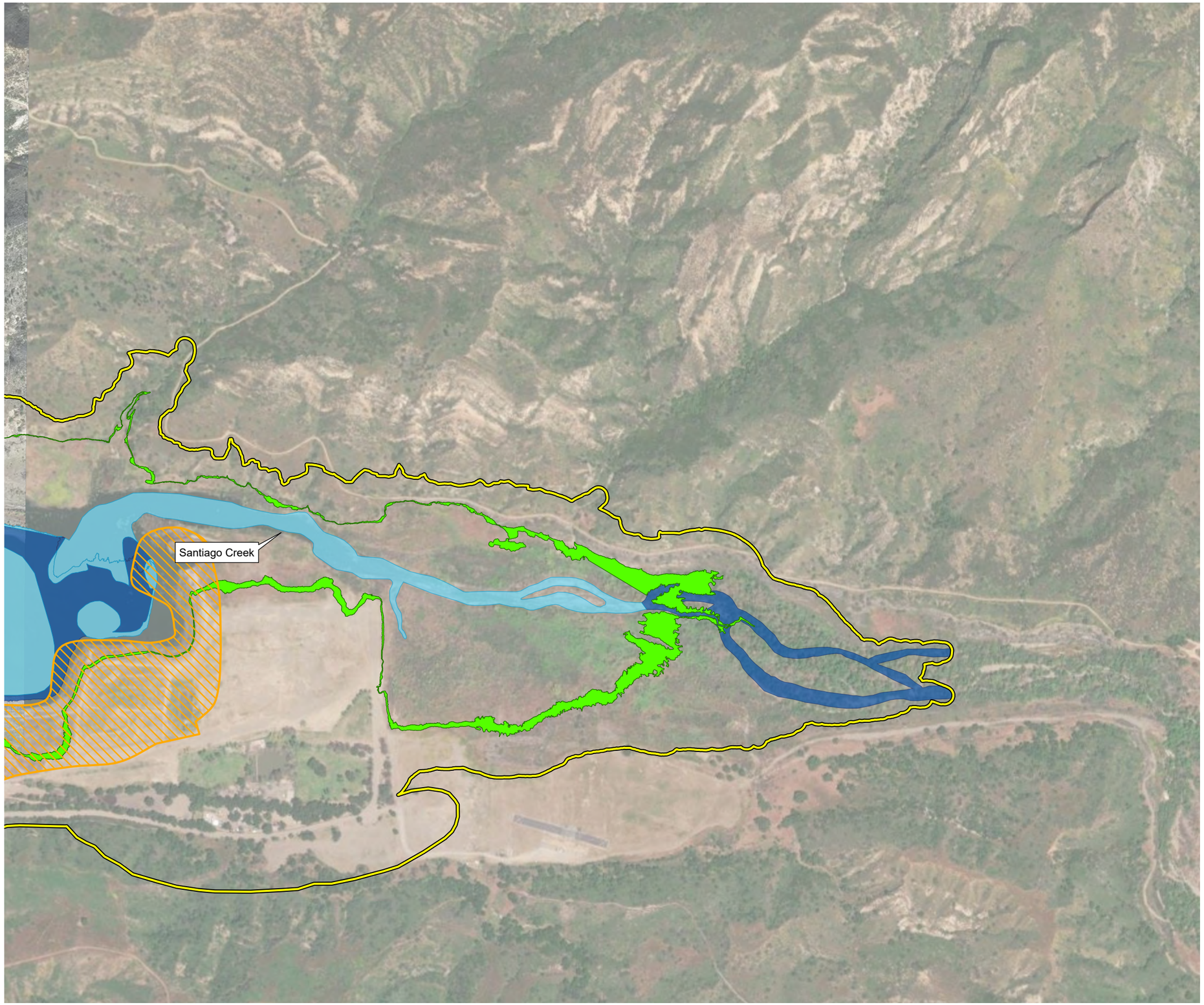
Exhibit 10a

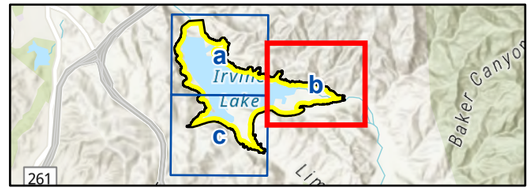
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

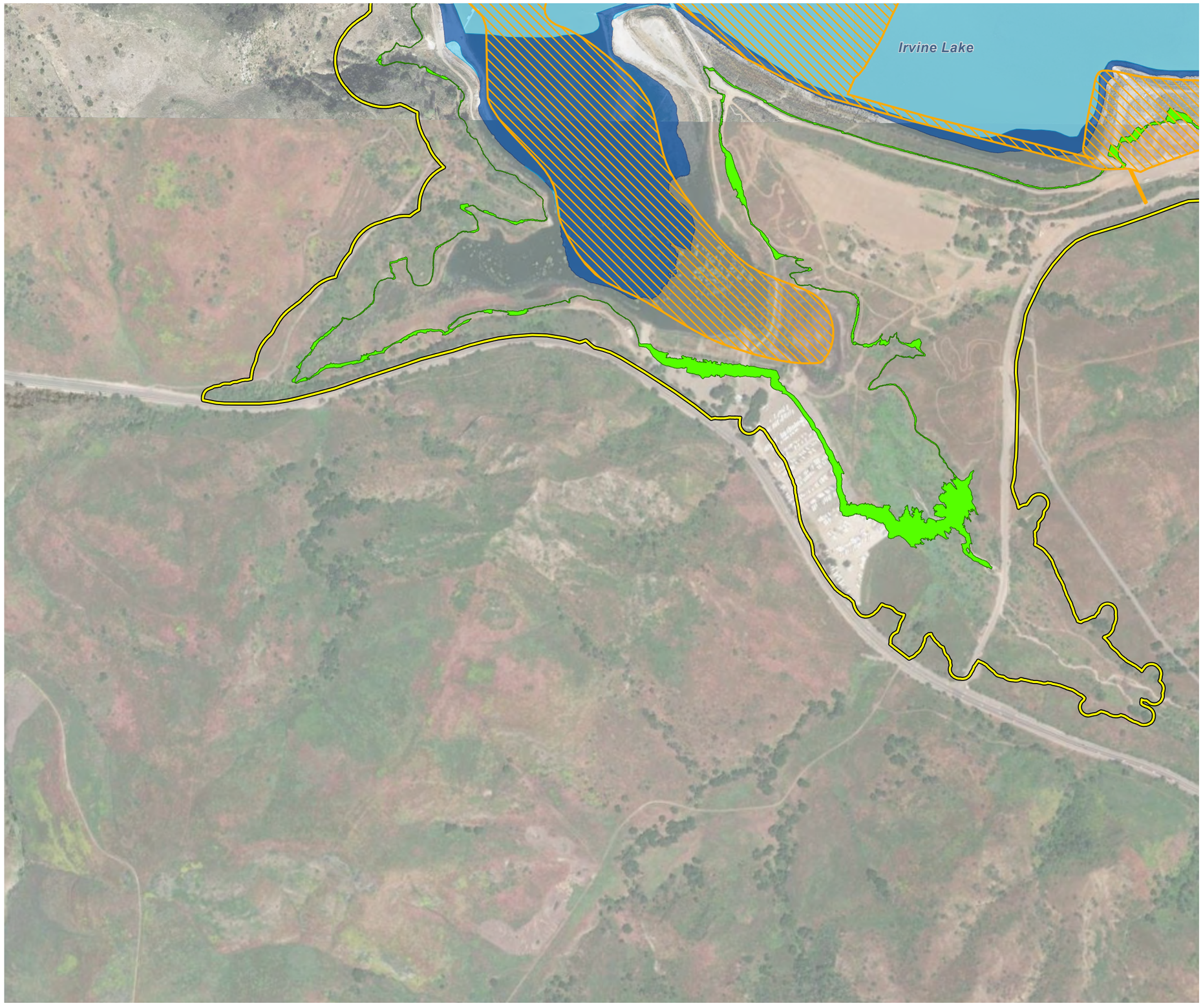
Exhibit 10b

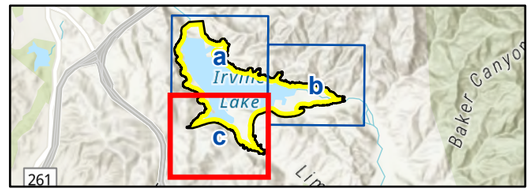
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

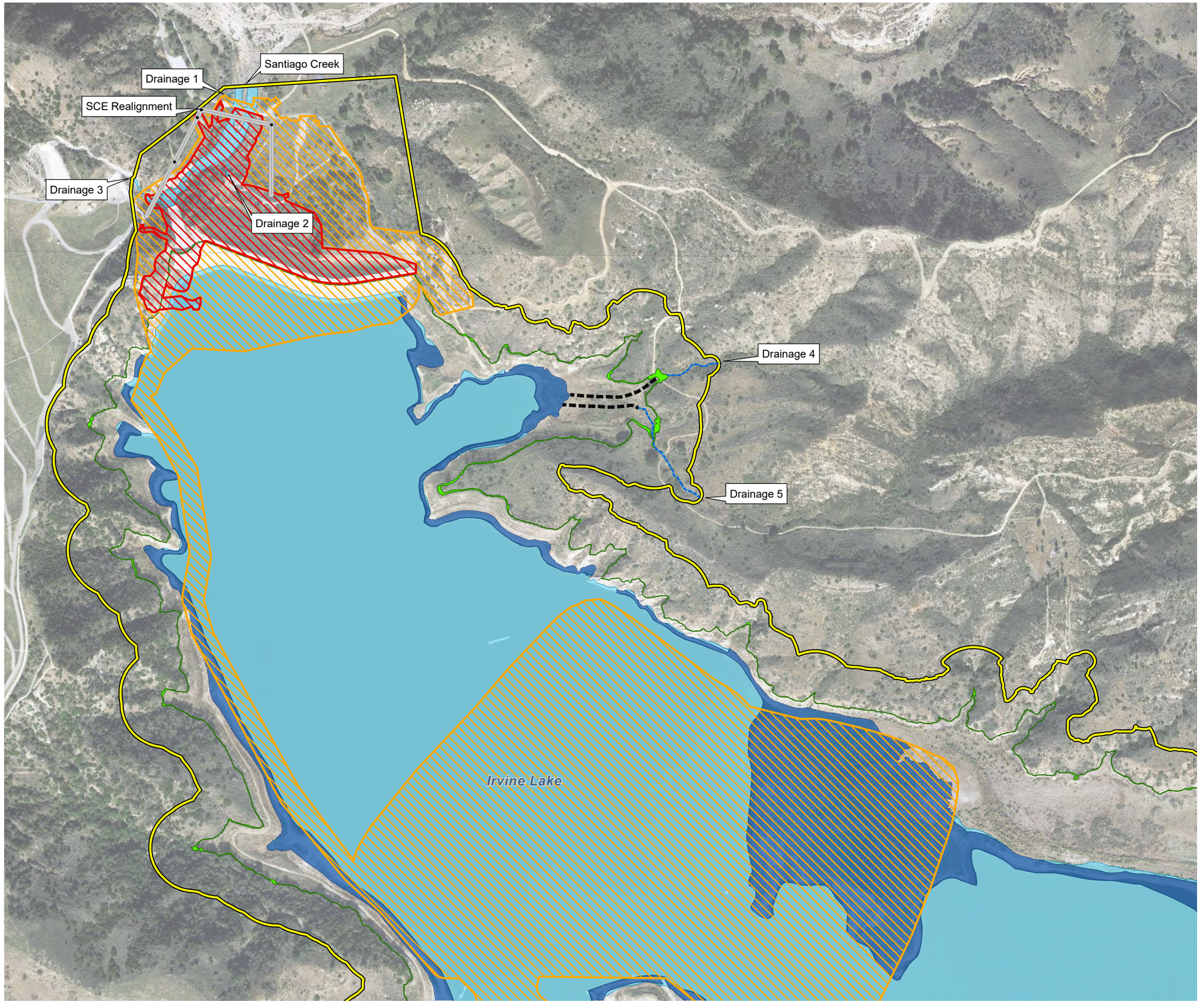
Exhibit 10c

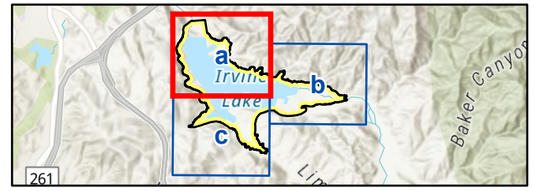
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

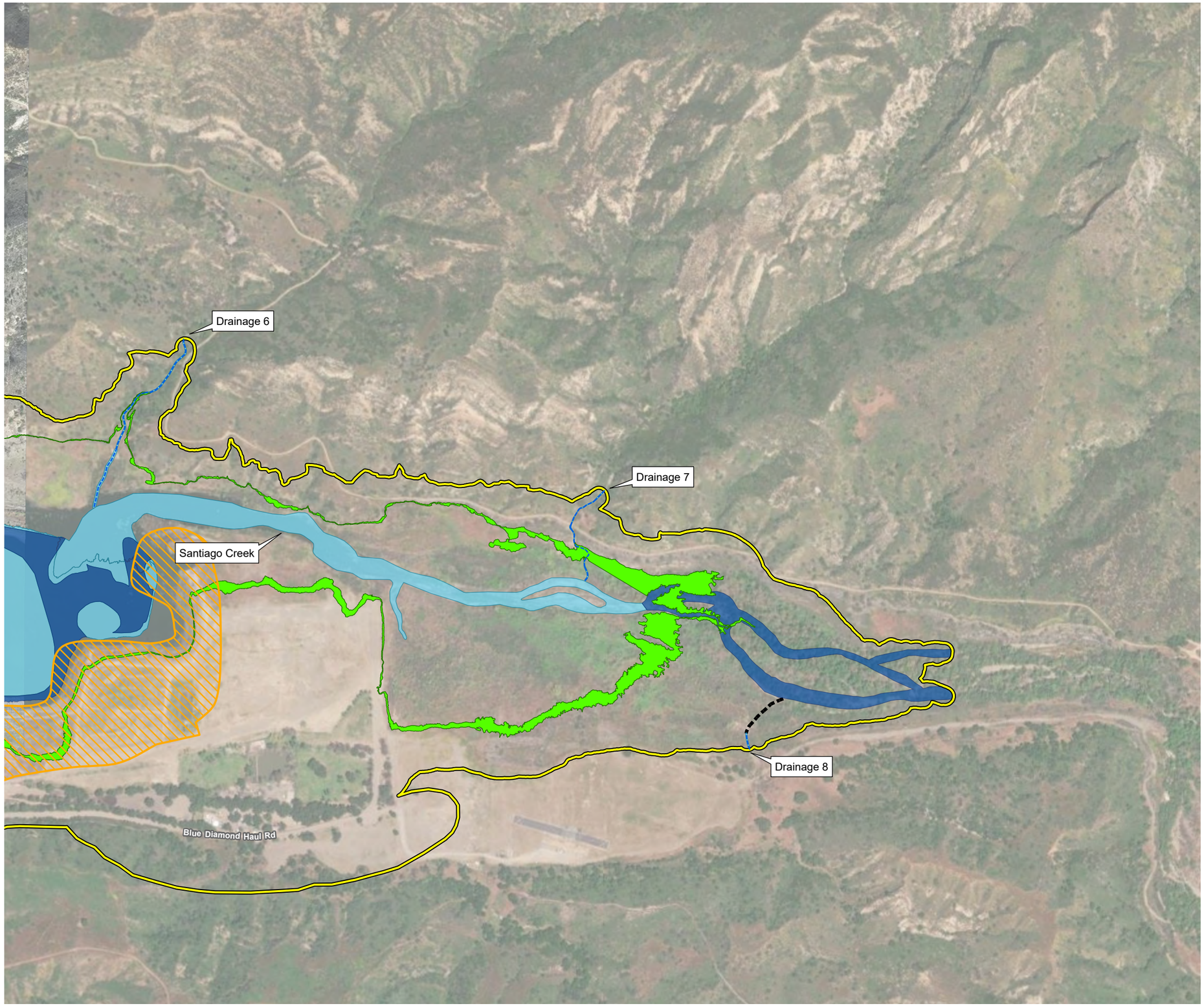
Exhibit 11a

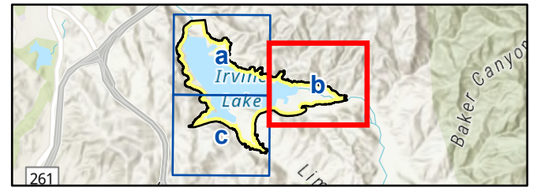
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

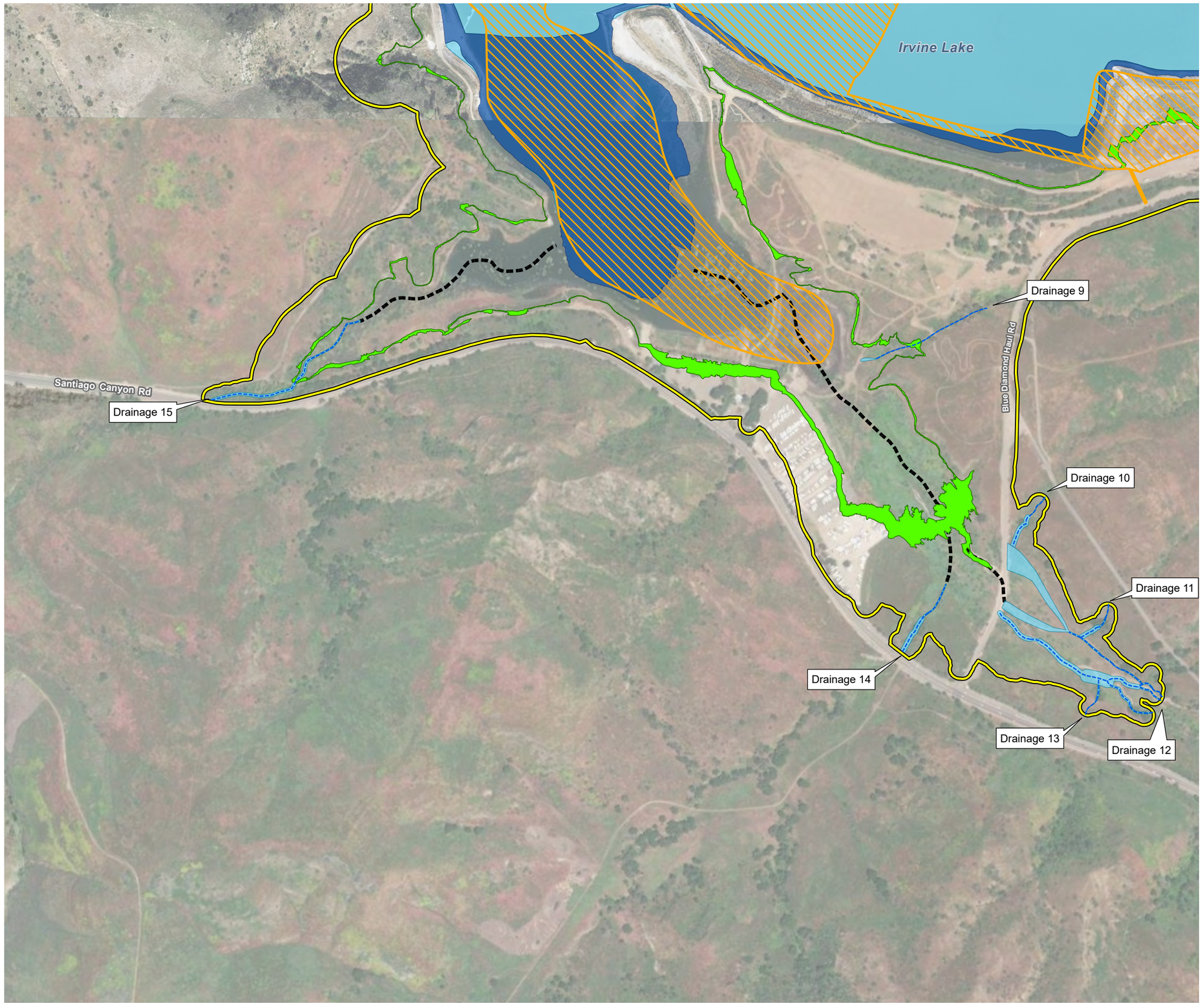
Exhibit 11b

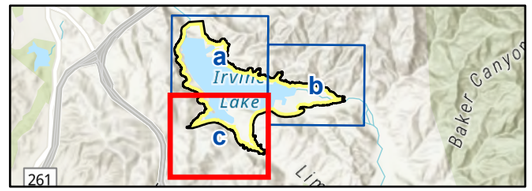
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

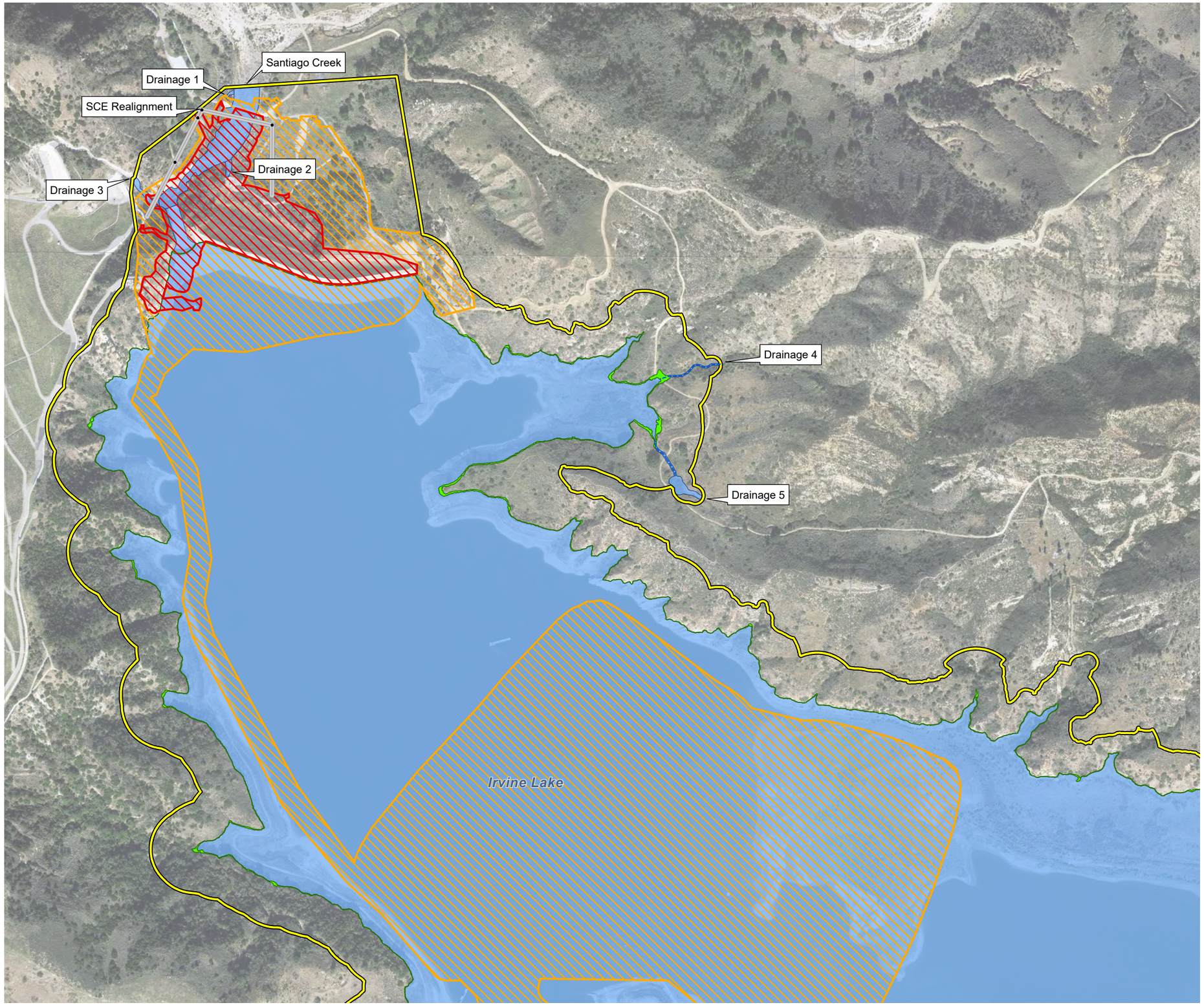
Exhibit 11c

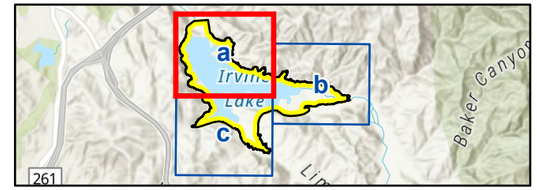
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010209\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

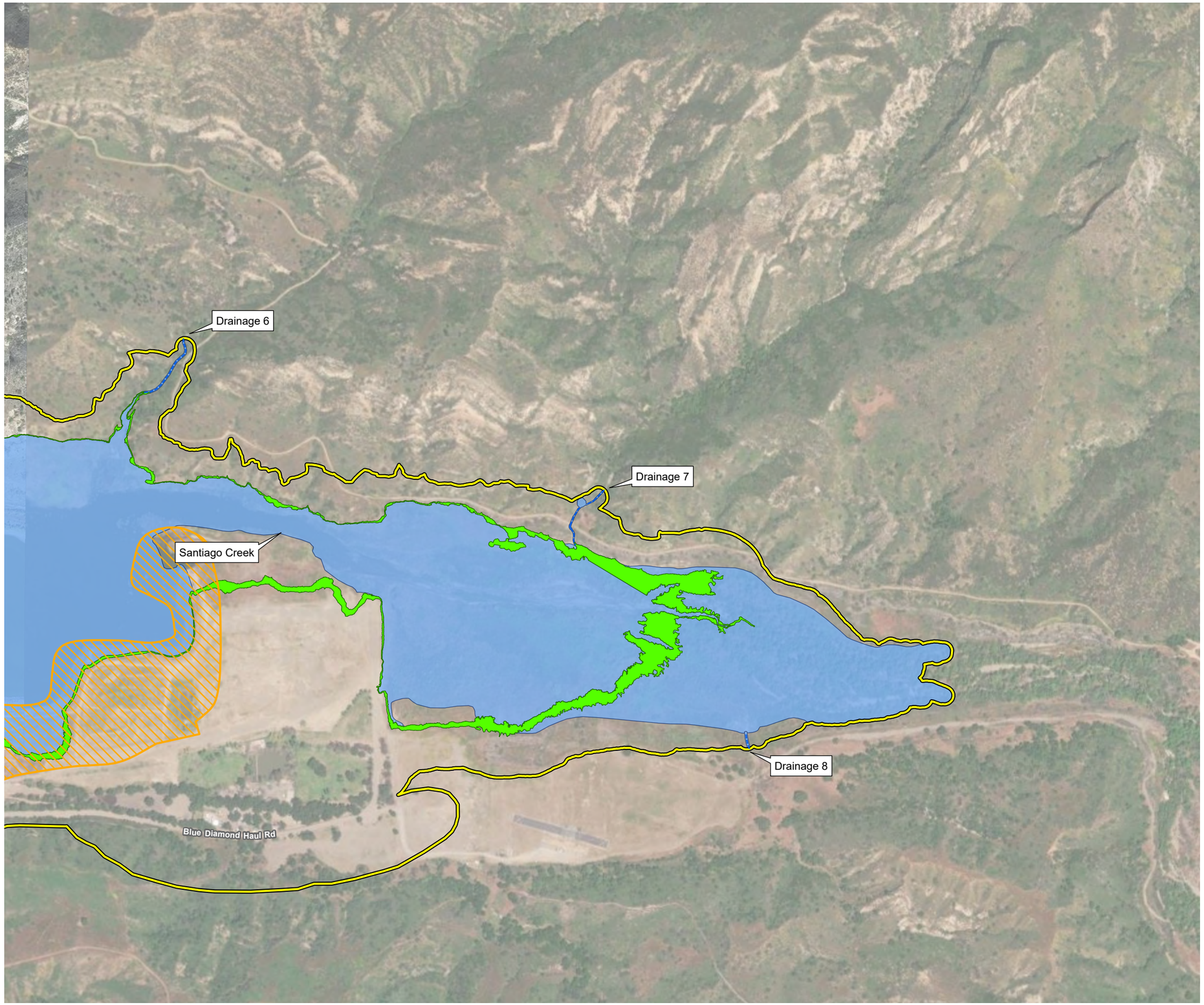
Exhibit 12a

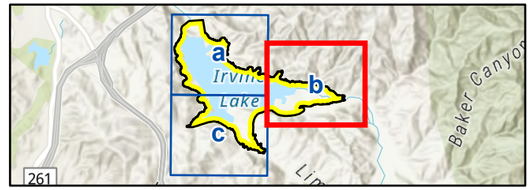
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Survey Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts CDFW Jurisdictional Waters

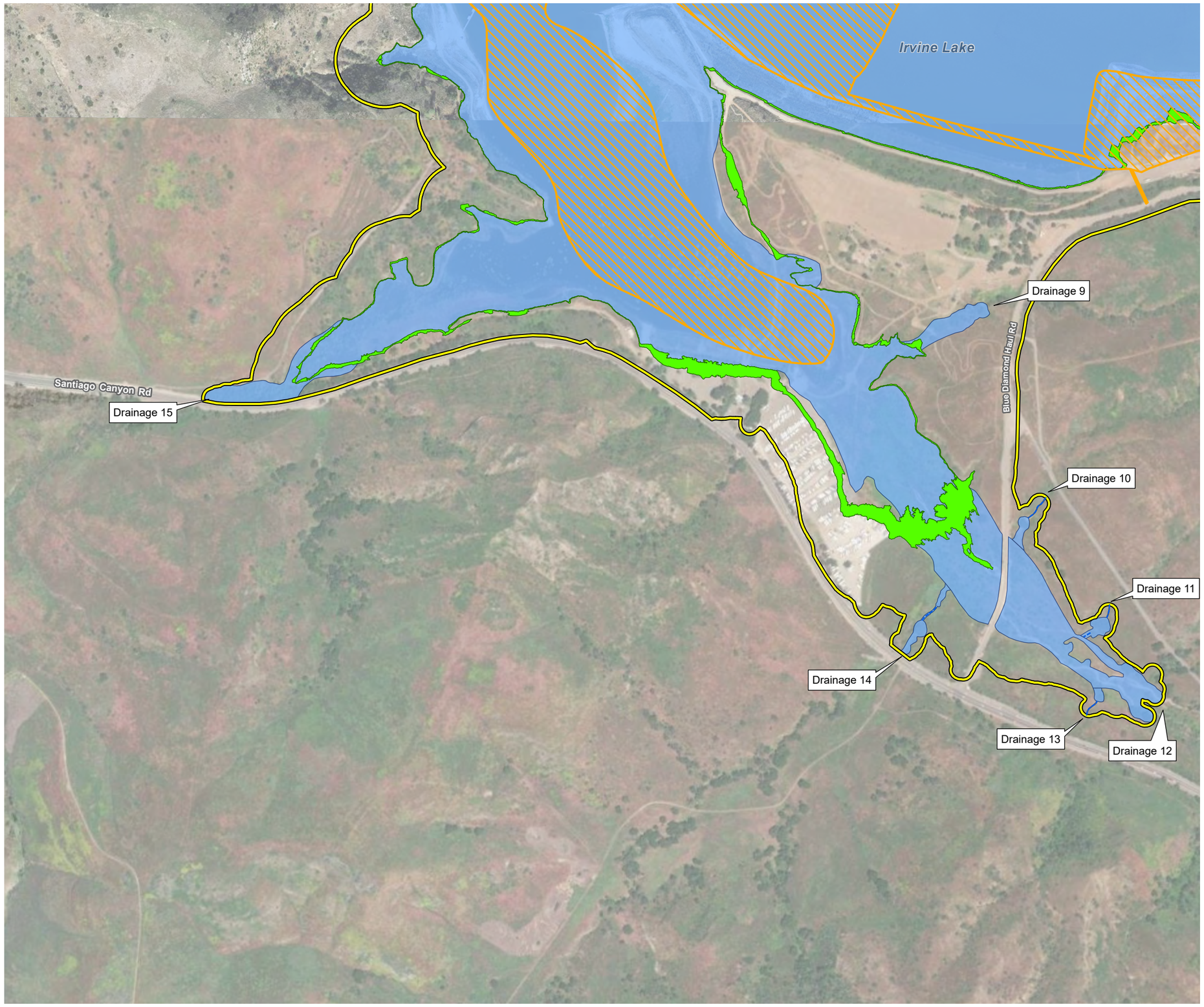
Exhibit 12b

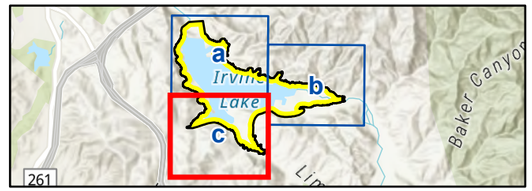
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Survey Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

Exhibit 12c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 09/29/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts

ATTACHMENT A

SANTIAGO SPADEFOOT REPORT

June 10, 2025

Jennifer Pareti
Senior Environmental Scientist, Specialist
California Department of Fish and Wildlife
South Coast Region
3030 Old Ranch Parkway, Suite 400
Seal Beach, California 90740

VIA EMAIL
Jennifer.Pareti@wildlife.ca.gov

Laura Van Vranken
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
Laura.Vanvranken@Wildlife.ca.gov

Chad Hirano
Scientific Collecting Permit (SCP) Coordinator
California Department of Fish and Wildlife
1010 Riverside Parkway
West Sacramento, California 95605

VIA EMAIL
Chad.Hirano@wildlife.ca.gov

Subject: Results of Western Spadefoot Surveys for the Santiago Creek Dam Improvement Project, Orange County, California

Dear Jennifer Pareti, Laura Van Vranken, and Chad Hirano:

This Letter Report presents the results of focused surveys for the western spadefoot (*Spea hammondii*) for the Santiago Creek Dam Improvement Project (hereinafter referred to as the "Project") located in Orange County, California. Qualified Biologists with the necessary experience with western spadefoot conducted the focused surveys.

PROJECT LOCATION AND DESCRIPTION

The Project is located at Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area (BSA) includes Santiago Creek Dam, downstream areas of Santiago Creek, Irvine Lake, and upstream areas along Santiago Creek. The BSA is located south of State Route (SR) 261, east of SR-241, and north of Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located immediately west of Irvine Lake.

The BSA is located on the U.S. Geological Survey's *Black Star Canyon* 7.5-minute quadrangle map (Exhibit 2). Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters

Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north, and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the BSA in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project site. Elevations in the BSA range from approximately 657 to 996 feet above mean sea level.

The BSA supports a variety of vegetation types, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcovers include cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas. The BSA is located in the Central Subregion of the Orange County Central/Coastal Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of the NCCP/HCP is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD) is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

IRWD is proposing to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities and to modify the embankment to permit operation of the facilities for a long-term water resource benefit. Staging areas are currently planned to be placed north (downstream) of the existing dam and in disturbed areas on the southeast side of Irvine Lake, adjacent to where Santiago Creek flows into the lake.

SPECIES BACKGROUND

The western spadefoot is a moderately-sized toad (snout to vent lengths generally do not exceed 2.5 inches) with loose skin, irregular dark markings, and tubercles tipped with orange or red. The overall dorsal coloration is dusky green, gray, or brown, with a white to gray and unmarked underside. The main distinguishing features are the presence of wedge-shaped, glossy-black “spades” on each hind foot and vertical pupils (Stebbins 2003).

The western spadefoot is restricted to California and northwestern Baja California, Mexico between sea level and 4,500 feet above mean sea level. The western spadefoot is primarily terrestrial and uses nearby aquatic habitat only for breeding; terrestrial and aquatic habitat components must be in close proximity and accessible to each other (Halstead et al. 2021; United States Fish and Wildlife Service [USFWS] 2023). Terrestrial habitats include open grasslands, scrub, or mixed woodland and grassland on flat or gently-rolling topography (Stebbins and McGinnis 2012; USFWS 2023). Aquatic habitat consists of vernal pools or other ephemeral pool areas that hold water for a minimum of three weeks (USFWS 2023). However, the species is highly adaptable and uses many other types of ponded water features for breeding, including ponded features within intermittent streams, artificially-created pools or

ponds (e.g., basins, livestock or agricultural ponds), drainage ditches, roadside pools or ruts, and other locations where water pools or ponds after rain events and provides sufficient time for reproduction and metamorphosis (Morey 1998 and 2005; USFWS 2023). Adult toads forage and burrow in open areas with sandy or gravelly soils in a variety of habitats. They feed primarily on insects, worms, and other invertebrates. Western spadefoot are rarely seen, spending most of their lives underground in earth-filled burrows up to three feet deep.

Adults emerge from dry season refuges during late winter or spring rains, typically in February and March, and proceed to nearby breeding pools. Additional breeding may occur after March, particularly during years with late-season or above-average rainfall. Breeding habitat consists primarily of shallow, temporary rain pools that should persist for a minimum of 30 days following egg-laying. The temporary nature of the breeding habitat ensures a lack of predators such as fish, American bullfrog (*Lithobates catesbeiana*), and red-swamp crayfish (*Procambarus clarkii*), that would otherwise reduce the likelihood of tadpoles reaching metamorphosis and adulthood. Male western spadefoot arrive at breeding pools first to establish breeding territories and vocalize to attract females. The breeding call is hoarse and snore-like (Stebbins 2003). Females select males and perform external fertilization (amplexus) in the water, attaching fertilized eggs to submerged plant stems or other objects. Females lay 300 to 500 eggs in small clusters of 10 to 42 eggs per cluster. Eggs hatch within 3 to 4 days, and metamorphosis of tadpoles is dependent on the carrying capacity of the breeding pool, typically occurring between 30 to 79 days. Tadpoles eat plankton, algae, and dead aquatic larvae. The most important predators of tadpoles and post-metamorphs include garter snakes (*Thamnophis* spp.), great blue herons (*Ardea herodias*), and raccoons (*Procyon lotor*) (Childs 1953; Feaver 1971).

Juveniles will leave their natal pool a few days after metamorphosis, but little is known about how far juveniles travel or how they survive the dry conditions that are typical in April through June when dispersal movements take place. A study was conducted in Orange County that examined the movement of western spadefoot in two study sites through the use of telemetry. Adult spadefoot movements were found to range from 82 to 21,387 feet (i.e., up to 4 miles); however, individuals typically moved a maximum distance of 860 feet from breeding pools (Baumberger 2013).

In Southern California, over 80 percent of habitat once known to be occupied by western spadefoot has been lost through loss of breeding habitat and/or fragmentation of breeding and foraging/burrowing habitat by development. Mosquito abatement programs that released mosquito fish (*Gambusia affinis*) in spadefoot breeding pools have been implicated in severe population declines (Jennings and Hayes 1994). Other non-native species such as bullfrog may also pose a threat to some populations.

The USFWS recently proposed the southern Distinct Population Segment (DPS) of western spadefoot as a Threatened species (USFWS 2023). The southern DPS includes populations in Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego counties, and Baja California, Mexico (USFWS 2023). Western spadefoot is also listed as a California Species of Special Concern. Threats to the species include habitat loss, habitat condition (i.e., fragmentation, degradation, or alteration), nonnative predators, disease, wildfire, chemical contaminants, noise disruptions, the effects from climate change (drought and increasing temperature), and cumulative impacts of these effects (USFWS 2023).

The Central-Coastal NCCP/HCP proposed to include western spadefoot as a Covered Species; however, there were not enough breeding pools conserved in the Central Subregion. Therefore,

western spadefoot was designated a Covered Species only in the Coastal Subregion; it is not covered in the Central Subregion, which is where the Project site is located.

SURVEY METHODS

There is currently no standardized survey protocol in place for this species. Survey methods were based on the biology of the western spadefoot and survey protocols for other currently-listed anurans (i.e., frogs and toads) to maximize the likelihood of detection. Surveys were focused on areas of suitable breeding habitat for western spadefoot within the BSA (Exhibit 3).

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted focused surveys for western spadefoot in all potentially suitable breeding habitat (e.g., pools) within the BSA. Each of the surveys was conducted within three days following rain events. Surveys were conducted on February 14, March 13, and April 4, 2025, under favorable weather conditions conducive to spadefoot activity. The dates and weather conditions during each survey are provided in Table 1.

These surveys included diurnal and nocturnal components to search for the presence of egg masses, tadpoles, and adults. The diurnal portion of the survey focused on searches for the presence of egg masses and tadpoles. Nocturnal surveys focused on searches for active juveniles and calling adults. Flashlights and headlamps were used at night to search for and visually identify any toads detected. Because spadefoots can be sensitive to sounds and light, the Biologists stopped and remained still for extended periods to listen for calls. If any western spadefoot were encountered, the individual or population would be documented, recorded with a Global Positioning System unit, and mapped on an aerial photograph. The number of individuals would be noted on each subsequent visit, and data would be collected on general habitat characteristics for any western spadefoot observed.

TABLE 1
SUMMARY OF SURVEY CONDITIONS FOR THE WESTERN SPADEFOOT SURVEYS

Survey Number	Date	Time (Start/End)	Biologists	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1 (Day)	February 14, 2025	2:52 PM/6:03 PM	Aguayo Messett	58/54	7/6	70/60
1 (Night)	February 14, 2025	6:37 PM/8:56 PM	Aguayo Messett	53/52	5/3	50/40
2 (Day)	March 13, 2025	3:58 PM/7:12 PM	Aguayo Messett	52/49	13/11	60/70
2 (Night)	March 13, 2025	7:56 PM/9:55 PM	Aguayo Messett	48/47	9/5	70/80
3 (Day)	April 4, 2025	4:09 PM/7:18 PM	Aguayo Messett	67/61	8/4	10/0
3 (Night)	April 4, 2025	7:59 PM/10:34 PM	Aguayo Messett	59/53	3/2	0/0

°F: Fahrenheit; mph: miles per hour; %: percent.

SURVEY RESULTS

No western spadefoot were observed or detected within the BSA during the focused surveys. While the western spadefoot has potential to occur within the BSA for foraging, it was not observed to breed in the BSA during the 2025 focused surveys.

Pools 1 through 13 (Exhibit 3), which are suitable for western spadefoot breeding, contained water during the first two surveys but were dry by the third survey, consistent with the currently low-rainfall year. Pool 1 is an ephemeral pool ranging from 6 inches to 1 foot in depth and extending approximately 140 feet in length and up to 50 feet in width. It is situated on loam soils and supports riparian herbaceous vegetation. Pool 2 is a shallow ephemeral pool, approximately 1 inch deep, underlain by clay loam soil. Vegetation consists of a southern black willow forest. Pools 3 through 13 are also shallow ephemeral pools, ranging from 1 to 5 inches deep and 10 to 120 feet in length or width. These pools are underlain by loamy sand or gravelly loamy sand and support ruderal vegetation typical of disturbed habitats. Representative site photographs are included in Attachment A (Photos 1 through 4). Although all pools are considered potentially suitable for western spadefoot breeding, their potential to support successful reproduction and larval development is uncertain due to the shallow depths and/or limited water retention. The presence of water during only the first two surveys, followed by desiccation by the third survey, suggests rapid drying, which could prevent successful breeding.

The 2024-2025 rainy season has been notably dry. According to the OC Public Works Hydrology Data Portal (County of Orange 2025), the on-site “Irvine Lake Dam” station recorded 4.1 inches of rainfall between July 2024 and June 2025, while the nearby “Villa Park Dam” station recorded 6.2 inches during this same time period. This level of precipitation is significantly below the long-term average of 13.7 inches per year (since 1961). Such limited rainfall likely reduced breeding activity during this season across the region. During drought years or periods of insufficient rainfall, the species is known to remain underground in estivation and may forgo breeding entirely. However, because two of the three surveys were conducted during the wetter periods of this rainy season, during or immediately following multiple-day rain events, it is expected that if western spadefoot were present in the survey area, they would have been detectable during the first two visits. The third visit was later in the season and following a smaller rainfall event; it is unknown if there was enough rainfall for western spadefoot to become active.

Although not detected during surveys, the western spadefoot is expected to have potential to occur foraging within the BSA, particularly in areas with suitable soil (e.g., sandy or gravelly soils) for burrowing and in terrestrial habitats, all of which are present within the BSA.

Other amphibian species observed during the surveys included western toad (*Anaxyrus boreas*), Baja California treefrog (*Pseudacris hypochondriaca*), and non-native African clawed frog (*Xenopus laevis*). Adults of these species were observed along Santiago Creek and Fremont Canyon Creek, while western toad tadpoles were noted along the edges of Santiago Creek.

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please contact Amber Heredia at Amber.Heredia@psomas.com.

Sincerely,
PSOMAS

Amber O. Heredia
Associate Principal, Resource Management

Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–3
Attachment A – Site Photographs

cc: Kyle Rice (kyle.rice@wildlife.ca.gov)
Will Miller (william_b_miller@fws.gov)
Laura Patterson (laura.patterson@wildlife.ca.gov)
Annaliese Torres (torresa@irwd.com)
Fiona Nye (Nye@irwd.com)
Emily Le (Leem@irwd.com)
WildlifeResearchPermits@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW010205\Documentation\Spadefoot\Santiago_Spadefoot Report-061025.docx

REFERENCES

Baumberger, K. 2013. Uncovering a Fossorial Species: Home Range and Habitat Preference of Western Spadefoot, *Spea Hammondii* (Anura: Pelobatidae) in Orange County Protected Areas. Master's Thesis. California State University, Fullerton.

Childs, H. E., Jr. 1953. Selection by Predation on Albino and Normal Spadefoot Toads. *Evolution* 7(3):228–233. St. Louis, MO: Society for the Study of Evolution.

County of Orange. 2025. County of Orange Water Data Portal. OC Public Works. http://hydstra.ocpublicworks.com/web.htm

Feaver, P.E. 1971. Breeding Pool Selection and Larval Mortality of Three California Amphibians: *Ambystoma tigrinum californiense*, *Hyla regilla*, and *Scaphiopus hammondii* (Masters Thesis). Fresno, CA: Fresno State College.

Halstead, B. K.L. Baumberger, A.R. Backlin, P.M. Kleeman, M.N. Wong, E.A. Gallegos, J.P. Rose, and R.N. Fisher. 2021. Conservation Implications of Spatiotemporal Variation in the Terrestrial Ecology of Western Spadefoots. Journal of Wildlife Management: 85(7):1377–1393.

Jennings, M.R. and M.P. Hayes. 1994 (November). *Amphibian and Reptile Species of Special Concern* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.

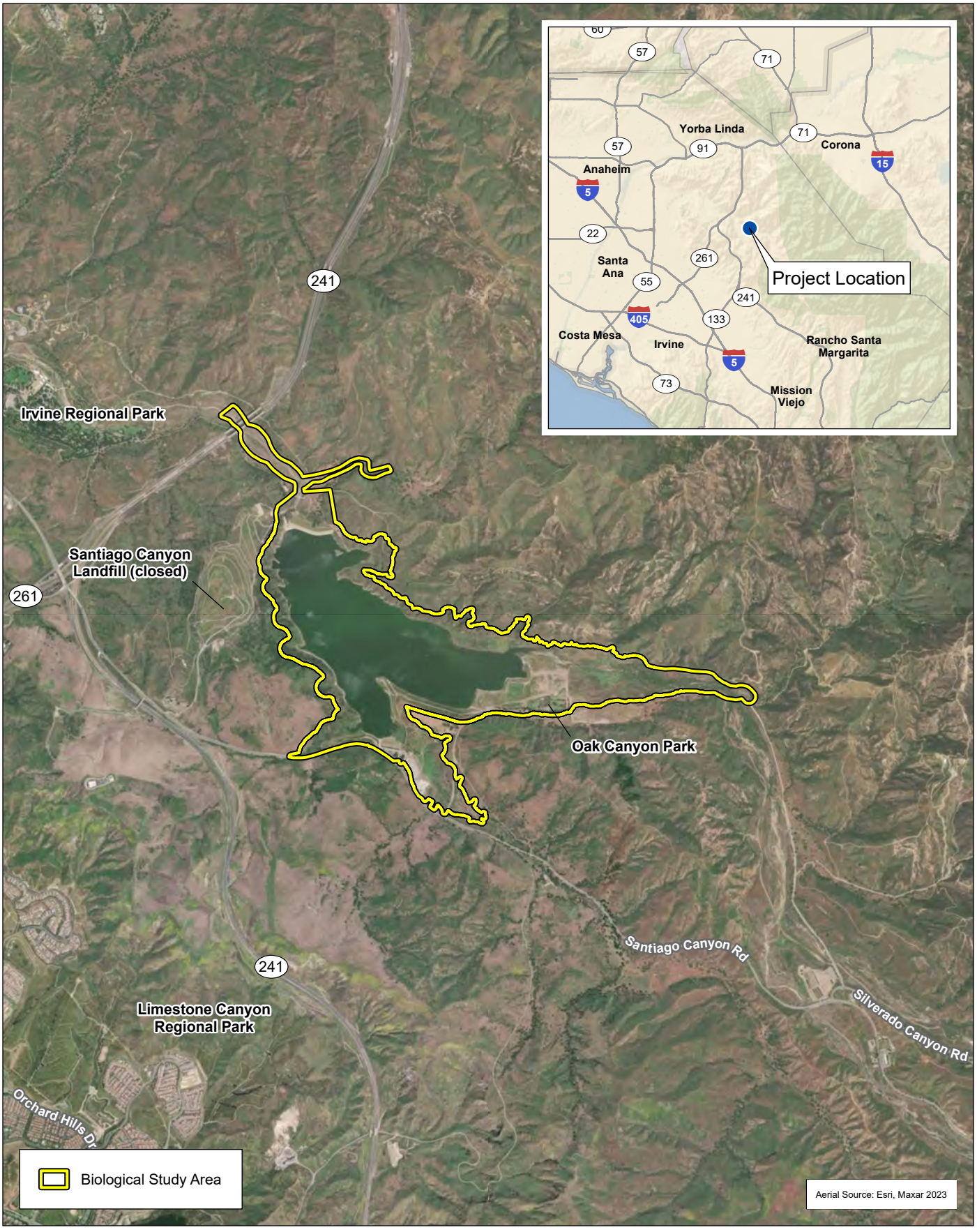
Morey, S.R. 2005. *Spea hammondii* (Baird, 1859, "1857") Western Spadefoot. Species Account in M.J. Lannoo, (editor) Amphibian Declines: The Conservation Status of Unites States Species. University of California Press: Berkeley: Pages 514– 517.

———. 1998. Pool duration influences age and body mass at metamorphosis in the western spadefoot toad: implications for vernal pool conservation. In Ecology, Conservation, and Management of Vernal Pool Ecosystems-Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, CA (pp. 86–91).

Stebbins, R. C. 2003. *A Field Guide to Western Reptiles and Amphibians* (3rd ed.). Boston, MA: Houghton-Mifflin Company.

Stebbins, R.C., and S.M. McGinnis. 2012. *Field Guide to Amphibians and Reptiles of California*. Berkeley, CA: University of California Press.

U.S. Fish and Wildlife Service (USFWS). 2023 (December 4). Proposed Rule (FWS-R8-ES-2023-0095-0001). Endangered and Threatened Species: Threatened Status with Rule for the Northern and Southern Distinct Population Segments of the Western Spadefoot (*Spea hammondii*). Sacramento, CA: USFWS, Sacramento Fish and Wildlife Office.



D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_Surveys\Santiago_Dam_Surveys.aprx\ex_RL_LV_Aerial

Regional Location and Local Vicinity

Exhibit 1

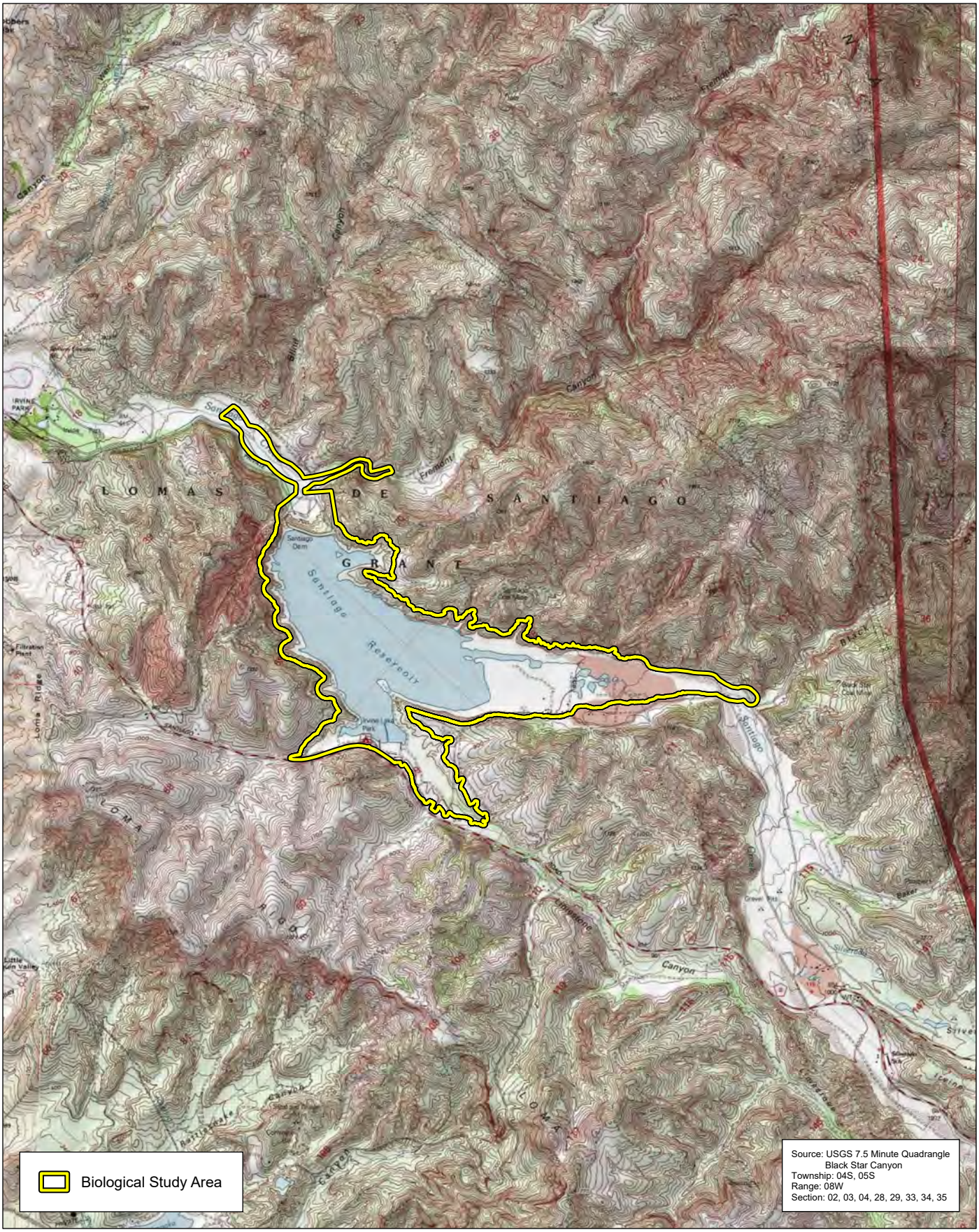
Santiago Creek Dam Improvement Project

N W E S

0 2,000 4,000 Feet

PSOMAS

(Rev: 6-10-2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Spadefoot\ex_RL_LV.pdf



U.S. Geological Survey 7.5-Minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Improvement Project

N
W E
S

0 2,000 4,000
Feet

PSOMAS

(Rev: 6-10-2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Spadefoot\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_Surveys\Santiago_Dam_Surveys.aprx\ex_USGS

D:\Projects\3IRW\SantiagoCreek\PROS\Santiago_Dam_Surveys\Santiago_Dam_Surveys.aprx\ex_Survey_Results

Survey Results

Exhibit 3

Santiago Creek Dam Improvement Project

N W E S

0 250 500 Feet

PSOMAS

(Rev: 6-10-2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Spadefoot\ex_Survey_Results.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1. View of a suitable breeding Pool 1, located in the southern portion of the BSA. The pool contained water during the first two surveys but was dry by the third survey.

Photo 2. View of a suitable breeding Pool 4, located in the eastern portion of the BSA. The pool contained water during the first two surveys but was dry by the third survey.

D:\Projects\3IRW\SantiagoCreek\Graphics\Spadefoot\ex_RP1.ai

Representative Site Photographs — Attachment A-1

Santiago Creek Dam Improvement Project

PSOMAS

(06/10/2025 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Spadefoot\ex_RP.pdf

Photo 3. View of suitable breeding habitat along Fremont Canyon Creek, located in the northern portion of the BSA.

Photo 4. View of suitable breeding habitat along Santiago Creek, located in the eastern portion of the BSA.

Photo 5. View of western toad tadpoles found along Santiago Creek.

Photo 6. View of a western toad found along Santiago Creek.

D:\Projects\3IRW\SantiagoCreek\Graphics\Spadefoot\ex_RP3.ai

ATTACHMENT B

SANTIAGO CBB REPORT

September 18, 2025

Justin Garcia
California Endangered Species Act,
Memorandum of Understanding Coordinator
California Department of Fish and Wildlife
1010 Riverside Pkwy
West Sacramento, California 95605

VIA EMAIL
Justin.Garcia@wildlife.ca.gov

Hillary Sardiñas
Bumble Bee Coordinator
California Department of Fish and Wildlife
1010 Riverside Pkwy
West Sacramento, California 95605

VIA EMAIL
Hillary.Sardinas@wildlife.ca.gov

Laura Van Vranken
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
Laura.VanVranken@Wildlife.ca.gov

Subject: Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for a portion of the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Justin Garcia, Hillary Sardiñas, and Laura Van Vranken:

This Letter Report presents the results of focused surveys for the Crotch's bumble bee (*Bombus crotchii*) for a portion of the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "Project site"), located in Orange County, California (Exhibit 1). The purpose of these focused surveys was to determine the presence or absence of Crotch's bumble bee on the Project site or the immediate surrounding area. It should be noted that Crotch's bumble bee was observed within the Project's Biological Study Area during the 2024 focused surveys for Crotch's bumble bee. The Project's Draft Environmental Impact Report is currently available for public review. A meeting with the California Department of Fish and Wildlife (CDFW) will be scheduled to discuss the Project's Incidental Take Permit (ITP) for this species; the ITP application is anticipated to be submitted in late 2025. The 2025 focused surveys were conducted to assess the presence or absence of Crotch's bumble bee within two portions of the Project and assist with Project planning. These portions are scheduled for

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
www.Psomas.com

construction during the first two stages of the Project: (1) installation of a temporary waterline from Santiago Canyon Road, along Blue Diamond Haul Road, to the staging area; and (2) realignment of a utility line. Surveys were conducted by Psomas Senior Biologist Lindsay Messett, who holds the necessary Memorandum of Understanding (MOU) to handle this species. All surveys were completed according to the guidelines established by the CDFW (CDFW 2023).

PROJECT LOCATION AND DESCRIPTION

The Project site is located at the north and south ends of Irvine Lake in unincorporated Orange County, California. It is south of State Route 261 and east of State Route 241 and Santiago Canyon Road. The Project site is located in the Central–Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of the NCCP/HCP is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD) is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The Project is jointly proposed by the Irvine Ranch Water District (IRWD) who owns and operates Irvine Lake and the Santiago Creek Dam. The primary objective of the Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities. The Project would also raise the spillway two feet, which would result in a small increase in maximum inundation area of the reservoir. In implementing the Project, the Districts would: (1) ensure the new facilities meet or exceed the current seismic, safety and design requirements; (2) satisfy IRWD and Santiago Water District’s operational requirements; (3) extend the useful life of the facilities; (4) improve water supply reliability; and (5) minimize impacts to local environmental resources and surrounding property owners.

SURVEY AREA

A variety of vegetation types occur in the Project site, including annual grassland, coast live oak woodland, disturbed floodplain sage scrub, disturbed mule fat scrub, disturbed sagebrush scrub, mule fat scrub, sagebrush-coyote bush scrub, sagebrush scrub, southern black willow forest, southern sycamore-coast live oak riparian woodland, southern willow scrub, toyon-sumac chaparral, and western sycamore. Other land covers include cliff, fluctuating shoreline, ornamental, ruderal, developed, and disturbed areas.

Protocol focused surveys the Crotch’s bumble bee were conducted for the main Project in summer 2024 (Psomas 2024). The current focused survey area covered two small areas to determine the presence or absence of Crotch’s bumble bee within portions of the Project that would be constructed in the first stages of the Project. The survey area includes the following two components:

- Installation of a temporary waterline extending from Santiago Canyon Road along Blue Diamond Haul Road to the staging area, with a 300-foot buffer on each side of the waterline where feasible. The temporary construction waterline would be installed

beneath the ground surface within the existing, disturbed Blue Diamond Road route. The temporary waterline would be installed via an open trench within the roadway, which would be returned to existing conditions following installation.

Realignment of a Southern California Edison (SCE) utility line, including a 300-foot buffer on each side of the alignment where feasible. The survey area is depicted on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle (Exhibit 3). The survey area contained suitable habitat, and/or nectar sources for Crotch's bumble bee. These areas were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*), and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*), as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses (*Avena* sp. and *Bromus* spp.).

While all habitat was surveyed, greater time was spent in habitats that provided suitable feeding areas (i.e., those areas with flowering plants) and potential nesting areas (i.e., those areas with rodent burrows, leaf litter, and brush piles) within the survey area. Less time was spent in marginal/lower quality habitat where suitable nectar sources were not readily available (i.e. coast live oak woodland, disturbed mule fat scrub, mule fat scrub, southern black willow forest, southern sycamore-coast live oak riparian woodland, southern willow scrub, toyon-sumac chaparral, toyon-chamise chaparral, western sycamore, cliff, as well as developed and disturbed areas).

Plants with flowers blooming during these surveys included the following: short-podded mustard (*Herschfeldia incana*), black mustard (*Brassica nigra*), Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*), telegraph weed (*Heterotheca grandiflora*), narrow leaf milkweed (*Asclepias fascicularis*), California buckwheat, deerweed, brittlebush (*Encelia californica*), black sage (*Salvia melifera*), thick-leaved year santa (*Eriodictyon crassifolium*), white sage (*Salvia apiana*), tree tobacco (*Nicotiana glauca*), California cudweed (*Pseudognaphalium californicum*), laurel sumac, clustered small tarweed (*Madia exigua*), toyon, Wright's jimsonweed (*Datura wrightii*), bristly ox-tongue (*Helminthotheca echioides*), prickly lettuce (*Lactuca serriola*), golden yarrow (*Eriophyllum confertiflorum var. confertiflorum*), monkey flower (*Diplacus australis*), vinegar weed (*Trichostema lanceolatum*), saltcedar (*Tamarix ramosissima*), and scaly scale-broom. These flowering plants were distributed throughout the survey area and decreased in number over the time between the first and third surveys. Photographs of representative habitat in the survey area are provided in Attachment A.

Justin Garcia
Hillary Sardiñas
Laura Van Vranken

BACKGROUND

The Crotch's bumble bee is a near endemic species in California. It occurs throughout most of southwestern California including the Mediterranean region, along the Pacific coast, western deserts, Great Valley, and adjacent foothills (Williams *et al.* 2014; Zungri 2005). It was historically common in the Central Valley of California, but currently appears to be absent from most of it, especially in the center of its historic range (Hatfield *et al.* 2014). It has also been documented in southwest Nevada near the California border and in Baja California, Mexico in the Sierra de Jaurez Mountain Range (Labougle 1990; Williams *et al.* 2014); however, there are only 12 records of this species in Mexico (ECOSUR 2014). While this species can be found in most native habitats, it prefers grassland and scrub habitat types.

Bumble bees are social insects that live in colonies composed of a queen, workers, males, and gynes/new queens. Colonies are annual and only the new, mated queens overwinter. The mated queens emerge from hibernation in the spring and begin forage for pollen and nectar and look for a new colony nest location. Bumble bees do not dig their own nest cavities, but instead utilize abandoned rodent burrows, hollow logs, leaf litter, tufted grass patches, rock piles, and above ground man-made structures. The Crotch's bumble bee is a ground nester and often makes its nest in abandoned mammal burrows. Once a nest site is located, the queen will lay the first clutch of eggs. After hatching, the larvae feed on stored pollen (i.e., brood clump) for approximately two weeks before pupating for another two weeks. The adults that emerge from these pupae are females/workers who then take over foraging for resources, and tending to new clutches of eggs and larvae, while the queen lays more eggs. The workers/females also help to regulate the temperature of the nest and defend the nest against predators (Williams *et al.* 2014). Colonies persist through the spring and summer months with successive broods of workers/females being produced as more floral resources become available. At some point in the summer, the colony switches to produce males and queens. The timing of this switch is not well understood but is generally thought to be related to the age of the queen and the size of the colony (Williams *et al.* 2014). Adult male bumble bees do not forage for the colony but instead, leave the nest to feed at flowers and search for mates. The male Crotch's bumble bee perches on pheromone-scented vegetation and waits for queens to fly by. While male bumble bees feed and search for mates, newly emerged queens leave the colony to feed during the day. The queens eat a large amount of pollen and nectar to build up fat reserves for overwintering. Queens typically mate only once with only one male, and then begin their search for an overwintering location. Little is known about overwintering sites; however, overwintering queens have been reported to use animal burrows, holes in loose dirt, leaves, or compost piles (Williams *et al.* 2014). Once the new queen has mated, the colony declines, and the remaining bees die before winter begins.

The Crotch's bumble bee is a large bumble bee with the queen measuring approximately 22 to 25 millimeters (mm) and the workers measuring approximately 12 to 20 mm (Williams *et al.* 2014). Crotch's bumble bee is a short-tongued species and prefers food plants from the following genera: *Asclepias*, *Chaenactis*, *Lupinus*, *Medicago*, *Phacelia*, and *Salvia* (Williams *et al.* 2014). The hairs on Crotch's bumble bee are very short and even, giving it a clean appearance. The head of this species is considered short, with the cheek (oculo-malar area) distinctly shorter than broad (Williams *et al.* 2014). Crotch's bumble bee females/workers show yellow only on the front of the thorax and on the second abdominal segment (terga 2), males show yellow on both the front and back of the thorax and on both abdominal segments 1 and 2

(terga 1 and 2). In certain parts of its range, Crotch's bumble bee may also show some reddish-brown coloration on the lower abdomen segments (terga 4 and 5). Bumble bee species most similar in appearance to the Crotch's bumble bee include the brown-belted bumble bee (*Bombus griseocollis*), southern plains bumble bee (*Bombus fraternus*), red-belted bumble bee (*Bombus rufocintus*), frigid bumble bee (*Bombus frigidus*), and Nevada bumble bee (*Bombus nevadensis*) (Williams *et al.* 2014). These species generally do not occur in southern California; therefore, misidentification of Crotch's with these species is unlikely. Bumble bee species that are present within the southern California range of Crotch's bumble bee include California bumble bee (*Bombus californicus*), yellow-faced bumble bee (*Bombus vosnesenskii*), Vandyke bumble bee (*Bombus vandykii*), and black-tail bumble bee (*Bombus melanopygus*).

Crotch's bumble bee has been impacted by many environmental factors including rapid urbanization and the spread of agriculture. This is most evident in the Central Valley of California where this species now appears to be absent. Climate change, specifically increasing aridity, is an additional threat, especially because Crotch's bumble bee has a very narrow climatic specialization compared to most bumble bees (NatureServe 2014). Bumble bees in general are threatened by several additional factors including pesticide use, pathogens from managed pollinators, as well as competition with non-native bees (Goulson 2010; Williams *et al.* 2009; Williams and Osborne 2009; Cameron *et al.* 2011; Fürst *et al.* 2014; Hatfield *et al.* 2012). Reduced genetic diversity resulting from any of these threats is also a limiting factor for bumble bee populations, because their method of sex-determination can be disrupted by inbreeding.

The Crotch's bumble bee was proposed as a Candidate to be State listed as Endangered in June 2019. The status of the Crotch's bumble bee has changed multiple times based on court rulings between June 2019 and September 2022. In November 2020, the Sacramento Superior Court ruled that insects are not eligible for listing under the California Endangered Species Act because the law does not mention insects (*Almond Alliance of California v. CDFW*). In February 2021, the California Fish and Game Commission appealed the decision. The Third District Court of Appeals ruled that the bees could be protected because the law's definition of fish includes invertebrates. In September 2022, the California Supreme Court decided that it would not review the petition for appeal, allowing the decision from the Third District Court to stand stating that the intent of the law is to protect declining species. Therefore, the proposed Candidate status was reinstated in September 2022.

SURVEY METHODS

In June 2023, the CDFW issued survey guidelines for Candidate bumble bee species, recommending at least three visual surveys conducted two to four weeks apart during the appropriate Colony Active Period (i.e., April to August for Crotch's bumble bee) to ensure the highest probability of species detection (CDFW 2023). Surveys must be conducted at a rate of three acres per hour within optimal habitat by a qualified Biologist (i.e., one with appropriate permits and experience in the identification of bee species). Psomas Senior Biologist Lindsay Messett (Scientific Collecting Permit [SCP]; 182810004-20009-001[1]) conducted all focused surveys for Crotch's bumble bee. The survey included all suitable foraging and potential nesting

[1] Lindsay Messett's SCP includes a MOU to allow her to capture and handle Crotch's bumble bee according to the survey guidelines.

habitats for the Crotch's bumble bee in the survey area. Surveys were conducted on May 28, June 27, and July 18, 2025.

Ms. Messett conducted the surveys by walking meandering transects, slowly across the survey area, through all appropriate habitats, to obtain a 100 percent survey cover. The surveys were paced at approximately three acres per hour in optimal habitats but were more quickly paced in areas lacking available nectar sources. Ms. Messett scanned for bee activity on the ground and spent additional time at any flowering plants to look for foraging bees. Potential nest sites (e.g., forest edges, unmowed areas, and cavities such as mammal burrows) were inspected with binoculars for evidence of bumble bee use. If multiple exiting/entering bumble bees were observed at a cavity, further observation was made until nesting could be confirmed (e.g., multiple individuals entering the cavity).

Surveys were non-lethal (capture, photograph, release) and were conducted in accordance with the CDFW Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023) and authorizations in Ms. Messett's SCP and MOU issued by CDFW. Bumble bee species were identified by Ms. Messett using *Bumble Bees of North America: An Identification Guide* (Williams *et al.* 2014).

Surveys were conducted at least one hour after sunrise and two hours before sunset (ideally between 9:00 AM and 1:00 PM) during suitable weather conditions. Surveys should be conducted on warm, but not hot, sunny days (i.e., between 65 and 90 degrees Fahrenheit [°F]) with low wind (i.e., wind speed less than 8 miles per hour). Surveys may be conducted during partly cloudy or overcast conditions if a person's shadow is visible; however, surveys should not be conducted during wet, foggy, or rainy conditions. A summary of weather conditions during each survey is provided in Table 1. Survey data was recorded on Bumble Bee Survey Field Datasheets (adapted for Crotch's bumble bee from Protocols for the Rusty Patched Bumble Bee) and are included as Attachment B.

Ms. Messett is a Certified Wildlife Biologist® with the Wildlife Society and has over 25 years of experience in surveying special status wildlife species throughout southern and central California including invertebrates, birds, amphibians, and mammals. She currently holds a U.S. Fish and Wildlife Service 10(a)(1)(A) permit (TE 067064-6) for the following invertebrate species: Quino checkerspot butterfly and El Segundo blue butterfly. She also holds a CDFW SCP (S-182810004-20009-001) that includes the following invertebrate species: Quino checkerspot butterfly and Crotch's bumble bee in addition to a MOU for handling and processing Crotch's bumble bee. Ms. Messett has attended multiple bumble bee trainings and live webinars presented by the Xerces Society in partnership with the Western Section of the Wildlife Society including the California Rare Bumble Bees Workshop (May 4, 2021), The Bumble Bee Field Course (July 21–23, 2023), Western Bumble Bee Identification for Bumble Bee Atlas Volunteers (October 11, 2023), and Male Bumble Bee Identification along the Pacific Coast of North America (December 6, 2023). She is also a listed volunteer on the Xerces Society's SCP (S-210530001-21053-001) and MOU (Dated October 18, 2022).

Survey Number	Date	Time (Start/End)	Acres Surveyed (acres)	Surveyor	Weather Conditions		
					Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	May 28, 2025	9:15 AM/2:47 PM	42.4	Messett	65/73	0–1/2–3	100/85
2	June 27, 2025	9:10AM/1:35 PM	42.4	Messett	71/74	1–2/3–4	10/10
3	July 18, 2025	9:00 AM/1:40 PM	42.4	Messett	69/76	0–1/2–3	60/25
°F: degrees Fahrenheit; mph: miles per hour; %: percent.							

SURVEY RESULTS

No Crotch's bumble bees were observed during the focused surveys. The available floral resources in the survey area appeared to provide a suitable amount of nectaring habitat for bumble bees. During the initial visit in May, floral resource coverage was approximately 50–60 percent of the survey area. Percent cover of floral resources continued to decrease on the second and third surveys. During the focused surveys, the species in bloom consisted primarily of California buckwheat, deerweed, scaly scale-broom and laurel sumac. The entire survey area was surveyed; however, more time was spent in areas that had the most flowering resources during each survey. Potential bumble bee nest sites and overwintering habitat included small rodent burrows and leaf litter located in the survey area.

One bee species, the western honeybee (*Apis mellifera*), was observed during the focused surveys.

RECOMMENDATIONS

Per CDFW guidelines, it is recommended that a biological monitor be present onsite during vegetation clearing and/or ground-disturbing activities that take place during the queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring would be required if vegetation clearing or ground-disturbing occurs from November to January.

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please contact Brad Blood (Bblood@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Brad R. Blood, PhD
Senior Project Manager

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.

Lindsay A. Messett, CWB®
Senior Biologist
(SCP; 182810004-20009-001)

Attachments: Exhibits 1–3
A – Representative Photographs
B – Survey Datasheets

cc: WildlifeResearchPermits@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW001302\Documentation\CBB\Santiago CBB Report-091825.docx

REFERENCES

California Department of Fish and Wildlife (CDFW). 2023 (June 6, 2023). *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species*. Sacramento, CA: CDFW.

Cameron, S.A., Lozier, J.D., Strange, J.P, Koch, J.B., Cordes, N., Solter, L.F. and Griswold, T.L. 2011. Patterns of widespread decline in North American bumble bees. *Proceedings of the National Academy of Science (USA)* 108(2): 662–667.

ECOSUR. 2014. *Mexican Bumble Bee Database based on ECOSUR (El Colegio de la Frontera Sur) and other Mexican collections*.

Fürst, M.A., McMahon, D.P., Osborne, J.L., Paxton, R.J. and Brown, M.J.F. 2014. Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature* 506: 364–366.

Goulson, D. 2010. *Bumblebees: behaviour, ecology, and conservation*. Oxford University Press, Oxford.

Hatfield, R, Colla, S.R., Jepsen, S., Richardson, L., Thorp, R. and Foltz Jordan, S. 2014. Draft IUCN Assessments for North American *Bombus* spp. for the North American IUCN Bumble Bee Specialist Group. The Xerces Society for Invertebrate Conservation, www.xerces.org, Portland, OR.

Hatfield, R., Jepsen, S., Mader, E., Black, S.H. and Shepherd, M. 2012. *Conserving Bumble Bees. Guidelines for Creating and Managing Habitat for America's Declining Pollinators*. The Xerces Society for Invertebrate Conservation., Portland, OR.

Labougle, J. M. 1990. Bombus of Mexico and Central America (Hymenoptera, Apidae). *University of Kansas Science Bullelin* 54 (3): 35–73.

NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life. Arlington, Virginia. Available at: http://explorer.natureserve.org. (Accessed: July 18, 2014).

Psomas. 2024. Results of a Presence/Absence Survey for Crotch's Bumble Bee for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Williams, P.H., Thorp, R.W., Richardson, L.L. and Colla, S.R. 2014. *The Bumble bees of North America: An Identification guide*. Princeton University Press, Princeton.

Williams, P.H. and Osborne, J.L. 2009. Bumble bee vulnerability and conservation world-wide. *Apidologie* 40: 367–387.

Williams, P.H., Colla, S.R. and Xie, Z. 2009. Bumblebee vulnerability: common correlates of winners and losers across three continents. *Conservation Biology* 23: 931–940.

Zungri, D. 2005. Notes on three species of Bombus (Hymenoptera: Apidae) in the Central Valley of California: new records of distribution and abundance. *Pan-Pacific Entomologist* 81(3–4): 179–180.

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB.aprx\ex_RL_LV

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

0 2,000 4,000 Feet

PSOMAS

(Rev: 9-03-2025 KAN) R:\Projects\IRW_IRWD\3IRW001302\Graphics\CBB\ex_RL_LV.pdf

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

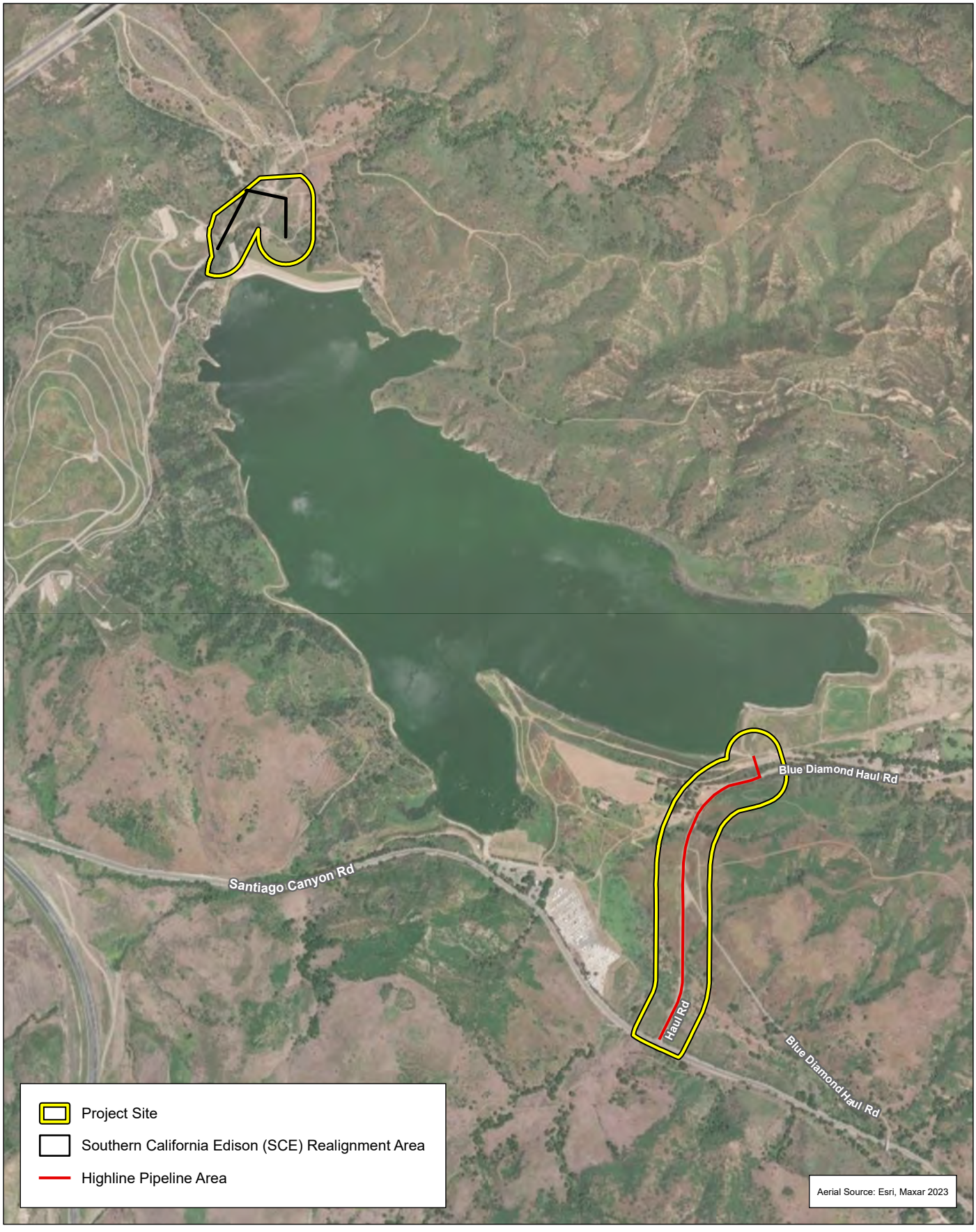
N
W E
S

0 1,000 2,000
Feet

PSOMAS

(Rev: 9-03-2025 KAN) R:\Projects\IRW_IRWD\3IRW001302\Graphics\CBB\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB_aprvtex_USGS



Crotch's Bumble Bee Survey Area

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

0 750 1,500
Feet

PSOMAS

(Rev: 9-03-2025 KAN) R:\Projects\IRW_IRWD\3IRW001302\Graphics\CBB\ex_CBB_Survey.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB_aprxtex_CBB_Survey

ATTACHMENT A

REPRESENTATIVE PHOTOGRAPHS

May 28, 2025. Overview of nectar resources (leafy California buckwheat and black sage) in the SCE Realignment portion of the survey area.

July 18, 2025. Honeybees observed on laurel sumac in the SCE Realignment portion of the survey area during the focused surveys.

D:\Projects\3IRW\SantiagoCreek\Graphics\CBB_2025\ex_SP1.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(09/04/2025 SAK) R:\Projects\IRW_IRWD\3IRW010204\Graphics\CBB\ex_SP.pdf

June 27, 2025. Overview of nectar resources (leafy California buckwheat) in the Highline Pipeline portion of the survey area.

May 28, 2025. Overview of nectar resources (deerweed) in the Highline Pipeline portion of the survey area.

D:\Projects\3IRW\SantiagoCreek\Graphics\CBB_2025\ex_SP2.ai

ATTACHMENT B

SURVEY DATASHEETS

Bumble Bee Survey Field Data Sheet	Unique Survey ID:
Page 1 of 2	Federal Recovery Permit Number: MOU - S-182810004-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam Outlet Tower and Spillway Improvements Project	n/a

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
28	05	2025	65/73	0-1/2-3	100/85

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m^2)	Total Site Area (m^2) (including area not surveyed)
Foraging/ nesting	n/a	n/a	n/a	5.53 Hours	9:15 am	2:47 pm	42.4 acres	76.4 acres

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.776380	-117.718680	33.789514	33.769113	-117.728283	-117.706870

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10- 14 spp 15+ spp	Mowing and weed abatement along the access roads and the slope of the dam.	Mowing and weed abatement

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
n/a	n/a

Bumble Bee Survey Field Data Sheet **Page** 2 **of** 2	**Unique Survey ID:** **Date:** 5/9/2025	**Transect ID** (if applicable) n/a
Were *Bombus* present? Y or N N	Are Honey Bees (*Apis*) present? Y or N Y	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1*

Species	**No. of Females**	**No. of Males**	**No. of Queens**	**Flowers or species** of plant being used	**Actual (A) or Estimated (E) counts?**	**% ID Conf***	**Distance (m)** Distance sampling only
Flowering Plants							Native
Salvia melifera							Y
Herschfeldia incana							N
Nicotiana glauca							N
Eriogonum fasciculatum var. foliolosum							Y
Malosma laurina							Y
Pseudognaphalium californicum							Y
Madia exigua							Y
Eriophyllum confertiflorum var. confertiflorum							Y
Acmispon glaber							Y
Brassica nigra							N
Salvia apiana							Y
Eriodictyon crassifolium							Y

*Self evaluationof your confidence inyour identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%,<5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					***B. crotchii* Capture Point** (Decimal degrees)		***Distance Sampling only***
Species	**No. of Females**	**No. of Males**	**No. of Queens**	**Flowers or species of plant being used**	**LAT**	**LONG**	**Distance (m)**
B. crotchii	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID:
Page 1 of 2	Federal Recovery Permit Number: MOU - S-182810004-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam Outlet Tower and Spillway Improvements Project	n/a

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
27	06	2025	71/74	0-1/3-4	10/10

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m^2)	Total Site Area (m^2) (including area not surveyed)
Foraging/ nesting	n/a	n/a	n/a	4.42 Hours	9:10 am	1:35 pm	42.4 acres	76.4 acres

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.776380	-117.718680	33.789514	33.769113	-117.728283	-117.706870

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10- 14 spp 15+ spp	Mowing and weed abatement along the access roads and the slope of the dam.	Mowing and weed abatement

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
n/a	n/a

Bumble Bee Survey Field Data Sheet **Page** 2 **of** 2	**Unique Survey ID:** **Date:** 5/9/2025	**Transect ID** (if applicable) n/a
Were *Bombus* present? Y or N N	Are Honey Bees (*Apis*) present? Y or N Y	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1*

Species	**No. of Females**	**No. of Males**	**No. of Queens**	**Flowers or species** of plant being used	**Actual (A) or Estimated (E) counts?**	**% ID Conf***	**Distance (m)** Distance sampling only
Flowering Plants							Native
Acmispon glaber							Y
Herschfeldia incana							N
Nicotiana glauca							N
Eriogonum fasciculatum var. foliolosum							Y
Malosma laurina							Y
Brassica nigra							N

*Self evaluationof your confidence inyour identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%,<5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					***B. crotchii* Capture Point** (Decimal degrees)		***Distance Sampling only***
Species	**No. of Females**	**No. of Males**	**No. of Queens**	**Flowers or species of plant being used**	**LAT**	**LONG**	**Distance (m)**
B. crotchii	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID:
Page 1 of 2	Federal Recovery Permit Number: MOU - S-182810004-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam Outlet Tower and Spillway Improvements Project	n/a

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
18	07	2025	69/76	0-1/2-3	60/25

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m^2)	Total Site Area (m^2) (including area not surveyed)
Foraging/ nesting	n/a	n/a	n/a	4.67 Hours	9:00 am	1:40 pm	42.4 acres	76.4 acres

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.776380	-117.718680	33.789514	33.769113	-117.728283	-117.706870

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10- 14 spp 15+ spp	Mowing and weed abatement along the access roads and the slope of the dam.	Mowing and weed abatement

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
n/a	n/a

Bumble Bee Survey Field Data Sheet **Page** 2 **of** 2	**Unique Survey ID:** **Date:** 5/9/2025	**Transect ID** (if applicable) n/a
Were *Bombus* present? Y or N N	Are Honey Bees (*Apis*) present? Y or N Y	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1*

Species	**No. of Females**	**No. of Males**	**No. of Queens**	**Flowers or species** of plant being used	**Actual (A) or Estimated (E) counts?**	**% ID Conf***	**Distance (m)** Distance sampling only
Flowering Plants							Native
Acmispon glaber							Y
Herschfeldia incana							N
Nicotiana glauca							N
Eriogonum fasciculatum var. foliolosum							Y
Malosma laurina							Y
Lepidospartum squamatum							Y

*Self evaluationof your confidence inyour identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%,<5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					***B. crotchii* Capture Point** (Decimal degrees)		***Distance Sampling only***
Species	**No. of Females**	**No. of Males**	**No. of Queens**	**Flowers or species of plant being used**	**LAT**	**LONG**	**Distance (m)**
B. crotchii	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Draft Environmental Impact Report

Santiago Creek Dam Improvement Project

SCH No. 2023050097

Prepared for

Irvine Ranch Water District
Fiona Sanchez, Director of Water Resources
15600 Sand Canyon Avenue
Irvine, California 92618

Prepared by

Psomas
Jennifer Marks, Principal-in-Charge
5 Hutton Centre, Suite 300
Santa Ana, California 92707

April 28, 2025

Irvine Ranch Water District

NOTICE OF AVAILABILITY
Draft Environmental Impact Report

DATE: April 28, 2025

TO: Responsible and Trustee Agencies, Interested Organizations, and Interested Parties

LEAD AGENCY: Irvine Ranch Water

PROJECT TITLE/SUBJECT: Santiago Creek Dam Improvement Project — Draft Environmental Impact Report (EIR) (State Clearinghouse No. 2023050097)

REVIEW PERIOD: April 28, 2025 – June 11, 2025 (45 days)

This Notice of Availability (NOA) has been prepared to notify responsible and trustee Agencies (Agencies) as well as interested organizations and parties that Irvine Ranch Water District (IRWD), as the Lead Agency pursuant to the California Environmental Quality Act (CEQA), has prepared a Draft Environmental Impact Report (Draft EIR) for the proposed Santiago Creek Dam Improvement Project (Project) that is available for review and comment. The Draft EIR was prepared to comply with CEQA and the CEQA Guidelines and to provide agencies and the public with information on the potential significant environmental impacts of the proposed project, recommended mitigation measures to reduce or avoid those environmental effects, and the analysis of alternatives to the proposed project.

PROJECT LOCATION: The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. Santiago Creek Dam impounds Irvine Lake. The Project is located south of State Route 261 and east of State Route 241 and Santiago Canyon Road. Existing structures include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, a portion of the Irvine Lake Pipeline, and a dam access road. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of State Route 241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

PROJECT DESCRIPTION: Santiago Creek Dam was originally constructed in 1933 to store water in Irvine Lake for the benefit of the surrounding communities. The Project proposes to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities and to modify the embankment to permit operation of the facilities for a long-term water resource benefit. The Project includes construction of a new inlet/outlet works, including an inclined inlet/outlet structure, intake riser pipelines and platforms, bifurcation valve vault, emergency outlet pipeline, and emergency outlet valve vault. The existing spillway would be replaced with a new side-channel spillway, and a portion of the Irvine Lake pipeline would be upsized and relocated to below ground beneath the proposed spillway structure. The Project includes improvements to the dam crest, removing the dam face, installing a filter drain system within new embankment shell material, widening the dam crest, raising the elevation of the dam crest by up to one foot, and installing protective railings. Ancillary site improvements are also proposed for the Project, including a new inlet/outlet access roadway, spillway bridge, dam control building, and emergency access walkway and stairs. The Project also includes raising the

spillway by six feet to approximately 797.9 feet, which is two feet higher than the existing maximum water storage elevation with the flashboards installed. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow for storage of an additional approximately 1,600 acre-feet of water. Construction work is anticipated to occur over a four-year period of time, assuming downtime associated with weather restrictions, beginning in approximately fall 2027 (exact dates subject to change).

ENVIRONMENTAL IMPACTS: The Draft EIR evaluates the potential impacts of the Project and, for identified potentially significant impacts, the Draft EIR recommends mitigation measures that would reduce the impacts of the Project to a less-than-significant level for the following environmental topics: biological resources, cultural and tribal cultural resources, paleontological resources, hazards and hazardous materials. Impacts related to air quality would remain significant and unavoidable even with implementation of all feasible mitigation measures. The Project site is not on any of the lists of Hazardous Waste and Substances sites enumerated under California Government Code Section 65962.5.

DOCUMENT AVAILABILITY: The NOA and Draft EIR may be viewed and downloaded from the following IRWD website address http://www.irwd.com/irvinelakeproject. Printed copies of the Draft EIR are available for public review at Irvine Ranch Water District, 15600 Sand Canyon Avenue, Irvine, California 92618, and at the following locations during regular business hours:

- Heritage Park Library,14361 Yale Avenue, Irvine, CA 92604
- Library of the Canyons, 7531 East Santiago Canyon Road, Silverado, CA 92676

PUBLIC MEETING: IRWD will hold one public meeting to receive public comments on the environmental analysis in the Draft EIR. The public meeting will include a brief presentation providing an overview of the proposed project and findings of the Draft EIR. The meeting will be held at Irvine Ranch Water District, 15600 Sand Canyon Avenue, Irvine, California 92618 at 6:00 P.M. on May 21, 2025.

PUBLIC REVIEW AND COMMENTS: IRWD is soliciting comments from the public regarding the content of the environmental information contained in the Draft EIR. Written comments on the Draft EIR must be received by the IRWD at the mailing and/or email addresses provided below no later than 4:00 PM on June 11, 2025.

Irvine Ranch Water District
Water Resources & Policy Department
P.O. Box 57000
Irvine, California 92619-7000
Attn: Fiona Sanchez, Director of Water Resources
sanchezf@irwd.com

TABLE OF CONTENTS

Section **Page**

Section 1.0 Executive Summary 1-1

1.1 Introduction 1-1

1.2 Project Location 1-1

1.3 Project Description Summary 1-2

1.4 Project Objectives 1-4

1.5 Project Alternatives 1-4

1.5.1 Alternative 1 – No Project Alternative 1-5
1.5.2 Alternative 2 – Purchasing Water Alternative 1-5
1.5.3 Environmentally Superior Alternative 1-5

1.6 Environmental Impact Report Focus and Effects Found Not to be Significant 1-6

1.7 Areas of Controversy/Issues to be Resolved 1-6

1.8 CEQA Baseline 1-7

1.9 Summary of Significant Effects and Mitigation Program 1-7

Section 2.0 Introduction, Project History, and Setting 2-1

2.1 Purpose of this Environmental Impact Report 2-1

2.2 Type of Environmental Impact Report and Standards of Adequacy under the California Environmental Quality Act 2-1

2.3 Federal Cross-Cutter Requirements 2-2

2.4 Environmental Review Process 2-2

2.4.1 Review of an EIR 2-2
2.4.2 Issues to Be Addressed in the EIR 2-3
2.4.3 EIR Review and Approval Process 2-10

2.5 Project History 2-10

2.6 Planning Context 2-10

2.6.1 On-Site General Plan and Zoning Designations 2-10
2.6.2 Surrounding General Plan and Zoning Designations 2-11

2.7 Environmental Setting 2-11

2.8 Organization of the Draft EIR 2-12

2.9 References 2-14

Section 3.0 Project Description 3-1

3.1 Purpose of the Project Description 3-1

3.2 Project Location 3-1

3.3 Project Background 3-2

3.4 Project Purpose and Need 3-3

3.5 Project Objectives....3-4
3.6 Project Description....3-5
3.7 Site Demolition....3-10
3.8 Utility Relocation....3-10
3.9 Dewatering and Stream Diversion....3-10
3.10 Additional Inundation During Operations....3-11
3.11 Additional Geotechnical Investigations....3-11
3.12 Construction Detail....3-12
3.13 Operation and Maintenance....3-14
3.14 Intended Uses of the EIR....3-15
3.15 Project Permit and Approvals....3-16
3.16 References....3-17

Section 4.0 Impact Analysis Introduction....4-1

4.0.1 Cumulative Impact Assumptions....4-2

4.1 Aesthetics....4.1-1

4.1.1 Regulatory Setting....4.1-1
4.1.2 Methodology....4.1-2
4.1.3 Existing Conditions....4.1-3
4.1.4 Thresholds of Significance....4.1-4
4.1.5 Impact Analysis....4.1-4
4.1.6 Cumulative Impacts....4.1-6
4.1.7 Mitigation Program....4.1-7
4.1.8 Level of Significance After Mitigation....4.1-7
4.1.9 References....4.1-8

4.2 Air Quality....4.2-1

4.2.1 Background....4.2-1
4.2.2 Regulatory Setting....4.2-6
4.2.3 Methodology....4.2-10
4.2.4 Existing Conditions....4.2-12
4.2.5 Thresholds of Significance....4.2-13
4.2.6 Impact Analysis....4.2-14
4.2.7 Cumulative Impacts....4.2-23
4.2.8 Mitigation Program....4.2-23
4.2.9 Level of Significance After Mitigation....4.2-24
4.2.10 References....4.2-25

4.3 Biological Resources....4.3-1

4.3.1 Regulatory Setting....4.3-1
4.3.2 Methodology....4.3-8
4.3.3 Existing Conditions....4.3-17
4.3.4 Thresholds of Significance....4.3-56
4.3.5 Impact Analysis....4.3-56
4.3.6 Cumulative impacts....4.3-81
4.3.7 Mitigation Program....4.3-81

4.3.8 Level of Significance After Mitigation 4.3-88
4.3.9 References 4.3-89

4.4 Cultural Resources 4.4-1

4.4.1 Regulatory Setting 4.4-1
4.4.2 Methodology 4.4-8
4.4.3 Existing Conditions 4.4-10
4.4.4 Thresholds of Significance 4.4-21
4.4.5 Impact Analysis 4.4-21
4.4.6 Cumulative Impacts 4.4-23
4.4.7 Mitigation Program 4.4-24
4.4.8 Level of Significance after Mitigation 4.4-25
4.4.9 References 4.4-26

4.5 Energy 4.5-1

4.5.1 Background 4.5-1
4.5.2 Regulatory Setting 4.5-1
4.5.3 Methodology 4.5-4
4.5.4 Thresholds of Significance 4.5-5
4.5.5 Impact Analysis 4.5-5
4.5.6 Cumulative Impacts 4.5-7
4.5.7 Mitigation Program 4.5-7
4.5.8 Level of Significance After Mitigation 4.5-7
4.5.9 References 4.5-8

4.6 Geology and Soils 4.6-1

4.6.1 Regulatory Setting 4.6-1
4.6.2 Methodology 4.6-4
4.6.3 Existing Conditions 4.6-5
4.6.4 Thresholds of Significance 4.6-9
4.6.5 Impact Analysis 4.6-9
4.6.6 Cumulative Impacts 4.6-14
4.6.7 Mitigation Program 4.6-15
4.6.8 Level of Significance After Mitigation 4.6-16
4.6.9 References 4.6-17

4.7 Greenhouse Gas Emissions 4.7-1

4.7.1 Background 4.7-1
4.7.2 Regulatory Setting 4.7-3
4.7.3 Methodology 4.7-7
4.7.4 Existing Conditions 4.7-7
4.7.5 Thresholds of Significance 4.7-7
4.7.6 Impact Analysis 4.7-7
4.7.7 Cumulative Impacts 4.7-10
4.7.8 Mitigation Program 4.7-11
4.7.9 Level of Significance After Mitigation 4.7-11
4.7.10 References 4.7-12

4.8 Hazards and Hazardous Materials 4.8-1

4.8.1 Regulatory Setting 4.8-1
4.8.2 Methodology 4.8-4
4.8.3 Existing Conditions 4.8-4
4.8.4 Thresholds of Significance 4.8-5

4.8.5 Impact Analysis....4.8-5
4.8.6 Cumulative Impacts....4.8-7
4.8.7 Mitigation Program....4.8-8
4.8.8 Level of Significance after Mitigation....4.8-8
4.8.9 References....4.8-9

4.9 Hydrology and Water Quality....4.9-1

4.9.1 Regulatory Setting....4.9-1
4.9.2 Methodology....4.9-9
4.9.3 Existing Conditions....4.9-9
4.9.4 Thresholds of Significance....4.9-10
4.9.5 Impact Analysis....4.9-11
4.9.6 Cumulative Impacts....4.9-16
4.9.7 Mitigation Program....4.9-17
4.9.8 Level of Significance After Mitigation....4.9-17
4.9.9 References....4.9-18

4.10 Land Use and Planning....4.10-1

4.10.1 Regulatory Setting....4.10-1
4.10.2 Methodology....4.10-5
4.10.3 Existing Conditions....4.10-5
4.10.4 Thresholds of Significance....4.10-6
4.10.5 Impact Analysis....4.10-7
4.10.6 Cumulative Impacts....4.10-18
4.10.7 Mitigation Program....4.10-19
4.10.8 Level of Significance After Mitigation....4.10-19
4.10.9 References....4.10-20

4.11 Noise....4.11-1

4.11.1 Background....4.11-1
4.11.2 Vibration....4.11-3
4.11.3 Regulatory Setting....4.11-4
4.11.4 Methodology....4.11-9
4.11.5 Existing Conditions....4.11-9
4.11.6 Thresholds of Significance....4.11-9
4.11.7 Impact Analysis....4.11-10
4.11.8 Cumulative Impacts....4.11-16
4.11.9 Mitigation Program....4.11-17
4.11.10 Level of Significance after Mitigation....4.11-17
4.11.11 References....4.11-18

4.12 Public Services....4.12-1

4.12.1 Regulatory Setting....4.12-1
4.12.2 Methodology....4.12-4
4.12.3 Existing Conditions....4.12-5
4.12.4 Thresholds of Significance....4.12-7
4.12.5 Impact Analysis....4.12-8
4.12.6 Cumulative Impacts....4.12-10
4.12.7 Mitigation Program....4.12-11
4.12.8 Level of Significance After Mitigation....4.12-11
4.12.9 References....4.12-12

4.13 Recreation 4.13-1

4.13.1 Regulatory Setting 4.13-1
4.13.2 Methodology 4.13-2
4.13.3 Existing Conditions 4.13-2
4.13.4 Thresholds of Significance 4.13-8
4.13.5 Impact Analysis 4.13-8
4.13.6 Cumulative impacts 4.13-10
4.13.7 Mitigation Program 4.13-10
4.13.8 Level of Significance After Mitigation 4.13-10
4.13.9 References 4.13-11

4.14 Transportation 4.14-1

4.14.1 Regulatory Setting 4.14-1
4.14.2 Methodology 4.14-4
4.14.3 Existing Conditions 4.14-4
4.14.4 Thresholds of Significance 4.14-5
4.14.5 Impact Analysis 4.14-6
4.14.6 Cumulative Impacts 4.14-8
4.14.7 Mitigation Program 4.14-8
4.14.8 Level of Significance After Mitigation 4.14-8
4.14.9 References 4.14-9

4.15 Tribal Cultural Resources 4.15-1

4.15.1 Regulatory Setting 4.15-1
4.15.2 Methodology 4.15-6
4.15.3 Existing Conditions 4.15-8
4.15.4 Thresholds of Significance 4.15-10
4.15.5 Impact Analysis 4.15-11
4.15.6 Cumulative Impacts 4.15-13
4.15.7 Mitigation Program 4.15-14
4.15.8 Level of Significance After Mitigation 4.15-16
4.15.9 References 4.15-17

4.16 Utilities and Service Systems 4.16-1

4.16.1 Regulatory Setting 4.16-1
4.16.2 Methodology 4.16-6
4.16.3 Existing Conditions 4.16-7
4.16.4 Thresholds of Significance 4.16-8
4.16.5 Impact Analysis 4.16-9
4.16.6 Cumulative impacts 4.16-13
4.16.7 Mitigation Program 4.16-14
4.16.8 Level of Significance After Mitigation 4.16-14
4.16.9 References 4.16-15

4.17 Wildfire 4.17-1

4.17.1 Regulatory Setting 4.17-1
4.17.2 Methodology 4.17-6
4.17.3 Existing Conditions 4.17-6
4.17.4 Thresholds of Significance 4.17-9
4.17.5 Impact Analysis 4.17-9
4.17.6 Cumulative Impacts 4.17-14
4.17.7 Mitigation Program 4.17-15

4.17.8 Level of Significance After Mitigation 4.17-15
4.17.9 References 4.17-16

Section 5.0 Alternatives 5-1

5.1 Introduction 5-1

5.2 Criteria for Selecting Alternatives 5-1

5.2.1 Ability to Achieve Project Objectives 5-2
5.2.2 Feasibility 5-2
5.2.3 Elimination/Reduction of Significant Impacts 5-3
5.2.4 Alternative Considered but Not Carried Forward 5-5
5.2.5 Alternative Site 5-6

5.3 Alternatives for Analysis 5-6

5.3.1 Alternative 1 – No Project Alternative 5-7
5.3.2 Alternative 2 – Purchasing Water Alternative 5-11

5.4 Environmentally Superior Alternative 5-16

Section 6.0 Long-Term Implications of the Project 6-1

6.1 Significant Environmental Effects That Cannot be Mitigated 6-1

6.2 Significant Irreversible Environmental Changes That Would be Caused by the Project 6-1

6.3 Growth-Inducing Impacts of the Proposed Action 6-1

6.4 References 6-4

Section 7.0 Persons and Organizations Consulted 7-1

7.1 Agency Coordination 7-1

7.1.1 California Department of Fish and Wildlife, South Coast Region 5 7-1
7.1.2 Santa Ana Regional Water Quality Control Board 7-1
7.1.3 U.S. Fish and Wildlife Service 7-1
7.1.4 U.S. Army Corps of Engineers 7-1

7.2 Organizations Consulted 7-1

7.2.1 OC Waste and Recycling 7-1
7.2.2 Orange County Fire Authority 7-1
7.2.3 Orange County Sheriff's Department 7-1
7.2.4 Southern California Edison 7-1
7.2.5 AECOM 7-1

Section 8.0 List of Preparers 8-1

8.1 Irvine Ranch Water District 8-1

8.2 Consultants 8-1

8.2.1 Psomas 8-1
8.2.2 South Environmental 8-1

TABLES

Table **Page**

1-1 Summary of Potential Impacts, Mitigation Measures and Level of Significance 1-9
2-1 Summary Matrix of Notice of Preparation Comments 2-4
3-1 Construction Phasing 3-13
3-2 IRWD/Lake Operational Modes 3-14
3-3 Discretionary Permits or Approvals Potentially Required 3-16
4-1 Approved and Pending Projects Within 1-Mile Radius of the Project Site 4-5
4.2-1 California and Federal Ambient Air Quality Standards 4.2-7
4.2-2 Attainment Status of Criteria Pollutants in the South Coast Air Basin 4.2-8
4.2-3 Air Quality Levels Measured at the Saddleback Valley Monitoring Station 4.2-12
4.2-4 South Coast Air Quality Management District Air Quality Significance Thresholds 4.2-14
4.2-5 Unmitigated Project Maximum Daily Regional Construction Emissions 4.2-16
4.2-6 Mitigated Project Maximum Daily Regional Construction Emissions 4.2-17
4.2-7 SCAQMD Disturbance Area by Equipment Type 4.2-20
4.2-8 Unmitigated Construction-Phase Localized Significance Threshold Emissions 4.2-20
4.2-9 Mitigated Construction-Phase Localized Significance Threshold Emissions 4.2-21
4.3-1 Vegetation Types and Other Areas in the BSA 4.3-18
4.3-2 Summary of Jurisdictional Resources in the Survey Area 4.3-27
4.3-3 Special Status Plant Species Reported from the Project Region 4.3-29
4.3-4 Special Status Wildlife Species Reported from the Project Vicinity 4.3-42
4.3-5 Vegetation Acreage Impacts of the Project 4.3-57
4.3-6 Summary of Project Impacts on Jurisdictional Resources 4.3-77
4.4-1 Cultural Chronology for Southern California 4.4-10
4.4-2 Cultural Resource Studies Within The Project Site 4.4-13
4.4-3 Prior Cultural Resources Within the 1/2-Mile Radius of the Project Site 4.4-15
4.4-4 NAHC Tribal Representatives Contact List 4.4-17
4.5-1 Energy Use During Construction 4.5-6
4.7-1 Estimated GreenHouse Gas Emissions from Construction 4.7-8
4.7-2 Estimated Total Project Annual Greenhouse Gas Emissions 4.7-9
4.10-1 Project Policy Consistency With Applicable County of Orange General Plan Elements 4.10-8
4.11-1 Noise Levels For Common Events 4.11-2
4.11-2 Construction Noise Criteria 4.11-4
4.11-3 Orange County Compatibility Matrix for Land Use and Community Noise Equivalent Levels 4.11-5
4.11-4 Orange County Exterior Noise Standards 4.11-7
4.11-5 Orange County Interior Noise Standards 4.11-7
4.11-6 Estimated Construction Noise Levels at Receptors 4.11-12
4.11-7 Vibration Damage Threshold Criteria 4.11-15
4.11-8 Vibration Annoyance Thresholds 4.11-15
4.12-1 Fire Stations Serving the Project Site 4.12-6
4.13-1 OC Parks Facilities 4.13-5
4.13-2 Other Park Facilities within the Project Vicinity 4.13-7
4.15-1 NAHC Tribal Representatives Contact List 4.15-7
5-1 Compatibility Comparison of Alternatives With Project Objectives 5-7
5-2 Comparison of Project Alternatives Impacts to Proposed Project Impacts 5-17

EXHIBITS

Exhibit **Follows Page**

1-1 Regional Location 1-1
1-2 Aerial Photograph 1-1
3-1 General Arrangement Plan 3-4
3-2a–b Santiago Dam Construction Features 3-5
3-3 Inlet/Outlet Works General Arrangement Plan 3-5
3-4 Conceptual Inlet/Outlet Structure Plan and Profile 3-5
3-5 Conceptual Valve Vault Plan and Sections 3-6
3-6 Conceptual Emergency Outlet Valve Vault Plan and Sections 3-6
3-7 Conceptual Spillway General Arrangement 3-6
3-8 Conceptual Primary Contractor Staging Area Plan 3-7
3-9 Conceptual Irvine Lake Pipeline Plan and Profile 3-7
3-10 Conceptual Emergency Outlet Pipe Plan and Profile 3-8
3-11 Conceptual Embankment Improvements 3-8
3-12 Conceptual Inlet/Outlet Structure Access Road Plan and Profile 3-8
3-13 Conceptual Spillway Vehicle Bridge Plan 3-8
3-14 Conceptual Dam Control Building Profile and Sections 3-9
3-15 Conceptual Demolition General Plan 3-10
3-16 Conceptual SCE Site Plan 3-10
3-17 Additional Inundation Areas 3-11
3-18 Proposed Stockpiling and Impact Areas 3-12
4-1 Nearby Projects 4-4
4.1-1a Site Photograph Locations 4.1-3
4.1-1b Site Photographs 4.1-3
4.1-1c Site Photographs 4.1-3
4.1-1d Site Photographs 4.1-3
4.3-1 U.S. Geological Survey 7.5-minute Digital Quadrangle 4.3-8
4.3-2 Biological Resources 4.3-19
4.3-3 Orange County Central/Coastal NCCP/HCP 4.3-26
4.3-4 Jurisdictional Resources – USACE Waters of the United States 4.3-27
4.3-5 Jurisdictional Resources – RWQCB Waters of the State 4.3-27
4.3-6 Jurisdictional Resources – CDFW Jurisdictional Waters 4.3-27
4.3-7 Special Status Species Locations 4.3-28
4.3-8 Project Impacts Vegetation Types 4.3-56
4.3-9 Project Impacts Special Status Species 4.3-56
4.3-10 Project Impacts USACE Waters of the United States 4.3-75
4.3-11 Project Impacts RWQCB Waters of the State 4.3-75
4.3-12 Project Impacts CDFW Jurisdictional Waters 4.3-76
4.6-1 Fault Map for Santiago Creek Dam 4.6-8
4.6-2 Zones of Required Investigation for Landslides and Liquefaction 4.6-11
4.8-1 Explosive Safety Quantity-Distance Arcs 4.8-6

APPENDICES

Appendix

A Notice of Preparation and Comment Letters
B Air Quality and Greenhouse Gas Emissions Technical Memorandum
C Biological Technical Report
D Historic Property Identification Report and Paleontological Resources Study
E Energy Calculations
F The EDR Radius Map Report
G Noise and Vibration Technical Memorandum

This page intentionally left blank

SECTION 1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The environmental impact report (EIR) process, as set forth in the California Environmental Quality Act (CEQA), requires the lead agency to prepare an objective document that fully discloses its analysis of potential environmental impacts and feasible alternatives in order to: (1) inform agency decision makers and the general public of the direct and indirect potentially significant environmental effects of a proposed action; (2) identify feasible or potentially feasible mitigation measures to reduce or eliminate potential significant adverse impacts; and (3) identify and evaluate a reasonable range of alternatives to the proposed project. In accordance with Section 15168 of the CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3, Sections 15000, *et seq*.), this EIR addresses the potential environmental impacts associated with the proposed Project--the Santiago Creek Dam Improvement Project (the "Project").

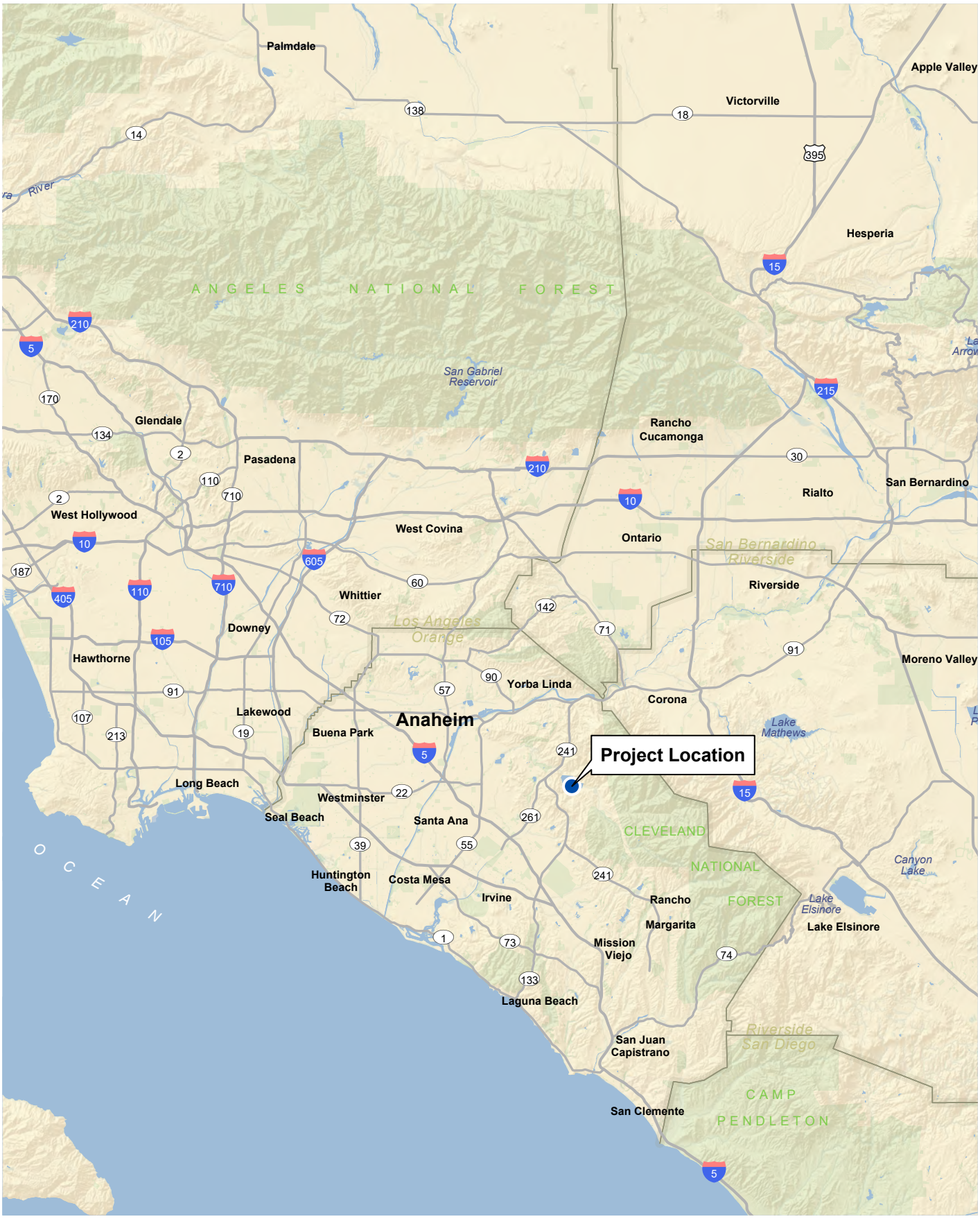
This EIR includes a detailed description of the proposed Project and the potential physical environmental impacts associated with the implementation of the Project. The Lead Agency, the Irvine Ranch Water District (IRWD), determined that this EIR should analyze all environmental topics, with the exception of agriculture and forest resources, mineral resources, and population and housing, and issued a Notice of Preparation (NOP) on May 4, 2023. The NOP and the comments received during the public review of the NOP are included in Appendix A to this EIR.

The environmental topics analyzed in detail in Section 4.0, Impact Analysis, of this EIR describe: (1) the physical conditions that existed at the approximate time this EIR's NOP was filed with the California State Clearinghouse (May 4, 2023); (2) the type and magnitude of potential environmental impacts resulting from Project planning, construction, and operation; and (3) if warranted, recommendations for feasible mitigation measures that would reduce or avoid significant adverse environmental impacts potentially caused by the proposed Project. A summary of the proposed Project's significant environmental impacts and the mitigation measures imposed by IRWD on the Project to lessen or avoid those impacts are included in this Executive Summary as Table 1-1. IRWD applies mitigation measures which it determines (1) are feasible and practical for the Project to implement; (2) are feasible and practical for IRWD to monitor and enforce; (3) are legal for IRWD to impose; (4) have an essential nexus to the Project's impacts; and (5) would result in a benefit to the physical environment. CEQA does not require the Lead Agency to analyze an exhaustive list of every imaginable mitigation measure, or measures that are duplicative of mandatory regulatory requirements.

1.2 PROJECT LOCATION

Santiago Creek Dam is located at the northwest end of Irvine Lake in unincorporated Orange County, California. The Project is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the embankment dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, Irvine Lake pipeline (ILP), and dam access road. The regional and local vicinity of the Project site is depicted on Exhibit 1-1, Regional Location, and Exhibit 1-2[1], Aerial Photograph, respectively.

[1] Only a portion of the pipeline immediately downstream of Irvine Lake is considered the ILP; the majority of the pipeline was previously converted to a recycled water pipeline.



D:\Projects\3IRW\SantiagoCreek\PROVSCD\SCD_Project.aprx\ex_RL

Regional Location

Exhibit 1-1

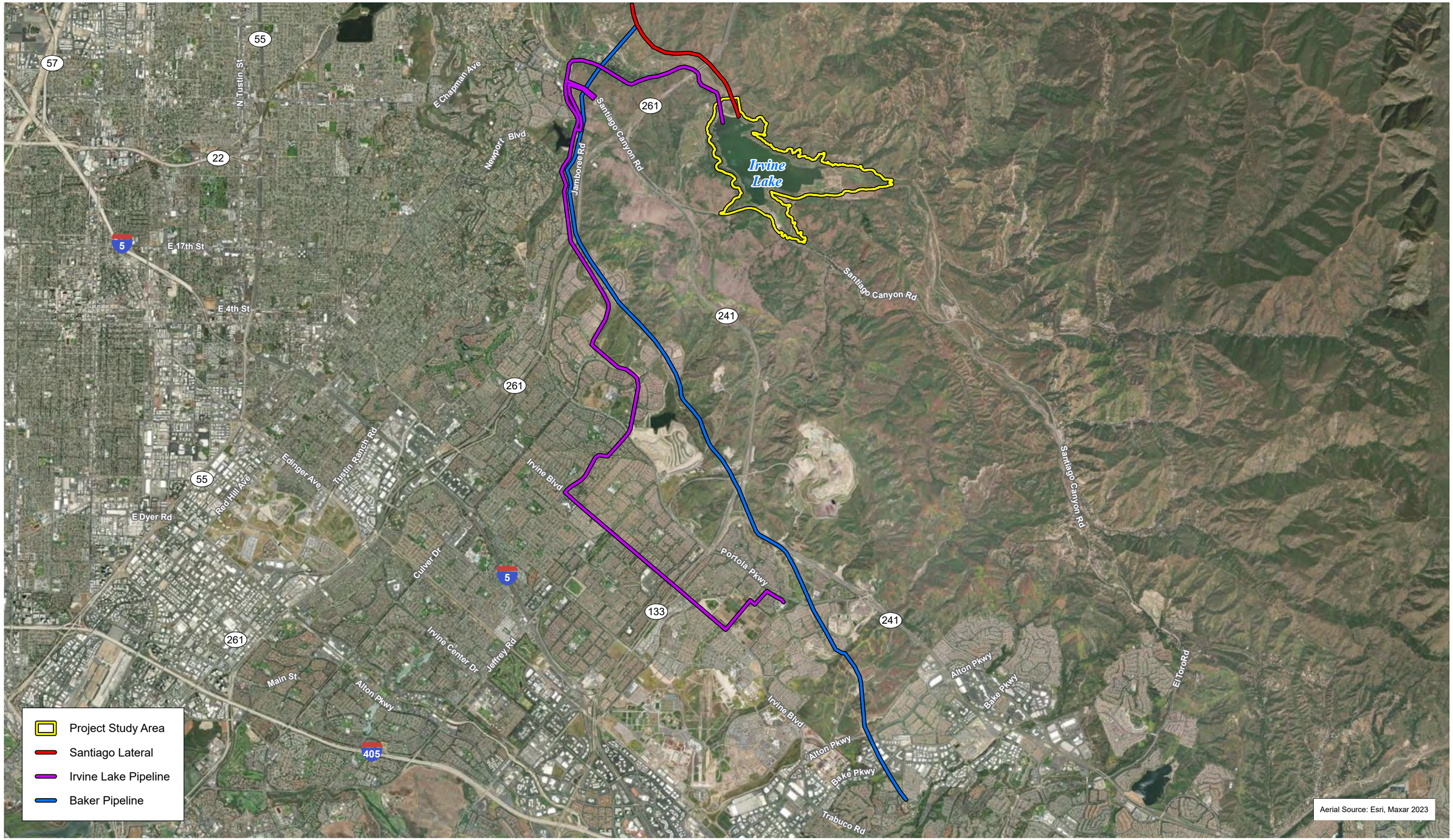
Santiago Creek Dam Improvement Project

N W E S

0 5 10 Miles

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_RL.pdf



D:\Projects\3IRWS\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Aerial_11x17L

Aerial Photograph

Exhibit 1-2

Santiago Creek Dam Improvement Project

N W E S

0 0.6 1.2 Miles

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Aerial.pdf

1.3 PROJECT DESCRIPTION SUMMARY

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in Section 3.0, Project Description.

- The existing outlet tower would be demolished; with the portion of the tower located below the sediment to be filled with concrete and capped with a concrete plug or completely removed. A new inclined outlet structure consisting of a series of inclined concrete footings with metal platforms would be constructed on the left abutment of the dam. Each riser from the structure would include an intake fish screen.
- The proposed inclined inlet/outlet structure would be configured to incorporate the new outlet structure, including new valves and fittings. Water from the lake would enter the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow either to the Irvine Lake Pipeline (ILP) or the emergency outlet pipeline. Water that enters the ILP would reach the IRWD distribution system. Water that enters the emergency outlet pipeline would be released to the creek near the end of the new spillway.
- The existing ILP travels over Santiago Creek and is supported on piers. Historically, this pipeline has washed out during high flow events through the spillway and Santiago Creek. As part of the Project, approximately 1,000 linear feet of the ILP near the dam would be upsized from 36 inches to approximately 54 inches to match the inlet/outlet pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line and improve the system's hydraulics.
- In addition to the modifications to the existing outlet works, the existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment of the dam.
- A new approximately 12-foot-wide gravel-paved roadway would be constructed to provide access from the dam crest, across the spillway channel, and to the top of the new inlet/outlet structure. A new 160-foot-long steel bridge structure would be constructed to provide vehicle access from the dam crest, across the spillway channel, and to the top of the inlet/outlet structure. The bridge would be approximately 12 feet wide and span the upper portion of the spillway structure. The bridge would be supported on piles located on the left and right side of the spillway structure. The new access road would terminate in a cul-de-sac-type turn-around at the top of the inlet/outlet structure. A shotcrete tie-back wall would be required to cut the proposed roadway into the existing slope without affecting the existing OCWR Santiago Canyon Landfill facilities above.
- A new dam control building located on the dam crest near the spillway structure would be constructed to house the pneumatic system that would operate the valves on the inclined inlet/outlet structure, the lake aeration systems, and the electrical and control equipment. The dam control building would be approximately 60 feet wide by 20 feet deep with a height of approximately 18 feet. The building would have a gable-style roof and would be fire hardened and constructed of non-combustible materials. The height of the interior of the building would allow at least 12 feet of unobstructed clearance.
- The upper portion of the dam would be removed to a depth at least 15 feet below the dam crest. On the downstream side of the embankment, the Project includes removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material which is composed of pervious material.
- The existing dam crest would be widened from 10 feet to between approximately 35 and 45 feet, the dam crest elevation would be raised up approximately one foot, and

improvements would be constructed to ensure vehicular traffic remains on the dam crest road. The paved dam crest would include protective railing on both sides of the road and replacement of piezometers to monitor the performance of the embankment dam. These embankment improvements would require excavations along the toe of the dam to key in the earthwork improvements to the face of the dam.

- The dam crest would also be raised up approximately one foot. This would raise the effective dam crest from an elevation of 811.9 feet to approximately 812.9 feet to meet Department of Safety of Dams (DSOD) freeboard requirements during a Probable Maximum Flood event.
- A new emergency access walkway (at least five feet wide) and stair system would be constructed along the left wall of the new spillway channel to provide access to the inlet/outlet structure and dam crest from the adjacent Santiago Canyon Landfill during a spillway event. The walkway would connect to the proposed inlet/outlet structure access road.
- The existing Southern California Edison (SCE) overhead power lines and power poles would be relocated to the downstream toe of the dam within the Project vicinity. SCE would relocate the existing overhead electrical lines. There would be an approximately 15-foot-wide right-of-way (ROW) easement for long-term maintenance.
- The Project would raise the spillway six feet to 797.9 feet, which is two feet higher than the existing maximum water storage elevation of 795.5 feet. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 acre-feet of additional water.
- Before beginning construction of the dam improvements, the lake would be dewatered, and an access road would be graded along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.
- IRWD would maximize withdrawals from Irvine Lake in the time leading up to construction initiation to minimize the amount required to be dewatered. The dewatering process would combine several methods including dewatering using the valves and outlet tower to allow water to flow downstream, implementing a temporary pumping system, and use of a subgrade dewatering system (e.g., dewatering wells). The temporary pumping system would include diesel driven pumps and temporary above ground piping that would convey the water from the lake to a discharge point along Santiago Creek near the existing Arizona crossing. Dewatering would be used throughout the year as needed to manage the water level during and after storm events and to maintain a dry work environment. IRWD would coordinate downstream releases with impacted agencies and entities.
- Once the lake is dewatered and before the first dry season, the contractor would construct a temporary diversion berm and access ramp. The temporary diversion would provide a physical barrier to protect the work area from seasonal storms and would provide an elevated access road to allow construction equipment to access the downstream side of the dam.
- During construction, concrete crushing would occur in one of the staging areas. Concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may also occur at various stages of the Project as concrete is removed from the existing spillway or dam. When feasible, demolished and removed materials would be recycled or reused.
- IRWD may be required to obtain additional geotechnical investigations to support the Project's final design. These investigations would occur during the design phase and may include exploratory test pits, soil borings, packer testing, and/or non-intrusive geologic

investigations and observations. The additional geotechnical investigations would remain within the proposed limits of disturbance defined by the Project, are included in the analysis contained in this EIR, and would be mitigated as part of the overall Project.

1.4 PROJECT OBJECTIVES

Section 15124(b) of the CEQA Guidelines requires "[a] statement of objectives sought by the proposed project. A clearly written statement of objectives helps the lead agency develop a reasonable range of alternatives to evaluate in the EIR and would aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project." Not only is a project analyzed in light of its objectives, compatibility with project objectives is one of the criteria used in selecting and evaluating a reasonable range of project alternatives. Clear project objectives simplify the selection process by providing a standard against which to measure project alternatives.

Santiago Creek Dam was completed in 1933 and certified by the State of California, Department of Water Resources (DWR), DSOD. In 2012 and in collaboration with DSOD, IRWD initiated seismic evaluations of the existing outlet tower that resulted in a determination that the free-standing structure was seismically unstable. In 2017, IRWD initiated, at DSOD's request, a multi-phase spillway condition assessment. The assessment found that the aging spillway is nearing the end of its useful life and the design, while acceptable at the time of construction, does not meet current standards. In 2021, IRWD completed risk analysis on all of its dams as part of its transition to a Risk Informed Decision Making (RIDM) dam safety program and identified an opportunity to enhance the safety of the Santiago Creek Dam embankment by adding a filter drain system.

The primary objective of the proposed Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities as well as the modification of the embankment to permit operation of the facilities to provide a long-term water resource benefit. In implementing the proposed Project, IRWD would also obtain the following benefits:

1. Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety, and design requirements established by the DSOD, which is the governing State agency associated with this Project;
2. Satisfy IRWD's operational requirements in the present and the future;
3. Extend the useful life of the facilities;
4. Improve regional water supply reliability; and
5. Minimize impacts to local environmental resources and surrounding property owners.

1.5 PROJECT ALTERNATIVES

Section 15126.6(a) of the CEQA Guidelines requires that "an EIR describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives". Two alternatives have been evaluated. These alternatives are summarized below and discussed and depicted graphically in Section 5.0, Alternatives to the Proposed Project, of this EIR.

The alternatives were developed to avoid or minimize impacts associated with the proposed Project. The summaries of each alternative identify the potentially significant impacts associated with that alternative. Table 5-1, Compatibility Comparison of Alternatives With Project Objectives,

analyzes the compatibility of the alternatives with the proposed Project, and Table 5-2, Comparison of Project Alternatives Impacts to Proposed Project Impacts, provides a summary of alternative impacts as compared to the proposed Project.

1.5.1 ALTERNATIVE 1 – NO PROJECT ALTERNATIVE

This alternative assumes the site would continue to remain in its current state and would not meet current standards. The alternative would also reduce the useful life of the facilities, and reduce water supply reliability. The existing uses on the site would continue with restricted operations. The existing site improvements would remain unchanged, and no structures would be demolished. The No Project Alternative would avoid the following mitigable impacts: Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, and Tribal Cultural Resources. Additionally, there would be reduced impacts for the following environmental topics: Aesthetics, Energy, Greenhouse Gas Emissions, Hydrology and Water Quality, Land Use and Planning, Public Services, Noise Recreation, Transportation, and Utilities and Service Systems. The No Project Alternative would not meet any of the five Project Objectives.

1.5.2 ALTERNATIVE 2 – PURCHASING WATER ALTERNATIVE

This alternative assumes that IRWD would need to purchase, on average, 5,070-acre feet (AF) of imported supplies each year to meet demands currently met with the Irvine Lake native water supplies. This Alternative would generally have the same impacts as the No Project Alternative. The Purchasing Water Alternative would meet only one of the five Project Objectives.

1.5.3 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The No Project Alternative (Alternative 1) would have the least impact to the environment because it would not involve any construction or demolition activities, nor would it result in any environmental impacts. This alternative would avoid potentially significant impacts, albeit mitigable, of the proposed Project associated with Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, and Tribal Cultural Resources. This alternative would not meet any of the Project objectives.

The remaining alternative was, as required by CEQA, compared to the proposed Project when determining the environmentally superior alternative. When evaluating the proposed Project compared to Alternative 2, it may result in reduced impacts in some areas; however, it would result in increased impacts in other areas and would not satisfy the five Project objectives.

Based solely on the potential environmental impacts, Alternative 1, No Project Alternative, would have the greatest reduction in environmental impacts and would be deemed the environmentally superior alternative. However, this alternative would not meet any of the Project objectives. Therefore, as part of the alternative selection process, the Board of Directors will need to balance the environmental impacts of the alternatives and their ability to meet Project objectives. Also, according to Section 15126.6(e)(2) of the CEQA Guidelines, “If the environmentally superior alternative is the ‘no project’ alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.” Based upon the detailed analysis contained in Section 5.0, Alternatives, of the Draft EIR, the proposed Project would be the next environmentally superior alternative. For further comparison of the alternatives and identification of the environmentally superior alternative, see Section 5.4, Environmentally Superior Alternative.

1.6 ENVIRONMENTAL IMPACT REPORT FOCUS AND EFFECTS FOUND NOT TO BE SIGNIFICANT

In accordance with Section 15063 of the CEQA Guidelines, IRWD prepared a NOP for the proposed Project and distributed it to responsible and interested agencies and to key interest groups. The NOP was distributed to agencies and individuals for a 30-day review period beginning on May 4, 2023 and ending on June 5, 2023. In addition, notices regarding the availability of the NOP were distributed to all property owners and occupants of businesses within 500 feet of the Project site. The NOP was also posted on IRWD's website.

A Scoping Meeting was held on May 16, 2023, at 5 PM at IRWD's Board Room, 15600 Sand Canyon Avenue, in Irvine. IRWD staff were available to answer any questions about the proposed Project. A handout that provided an overview of the proposed Project, the scope of the EIR, and Project schedule was distributed. Comment cards were available for attendees to submit at the meeting or to mail to IRWD staff. There were no attendees, and thus no one signed the sign-in sheet.

A summary of the issues raised in the NOP comment letters is provided in Section 2.4, Environmental Review Process, of this EIR. The NOP and the comments received during the public review of the NOP are included in Appendix A to this EIR. A total of eight comment letters/emails were received during the 30-day NOP review period.

IRWD has determined that the EIR should address the following environmental topics as stand-alone sections.

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

Section 2.4, Environmental Review Process, provides an overview of the EIR review process and a summary of the environmental topics and threshold questions within topical areas that will not receive detailed evaluation in the EIR.

1.7 AREAS OF CONTROVERSY/ISSUES TO BE RESOLVED

Section 15123(b)(3) of the CEQA Guidelines requires that an EIR identify issues to be resolved, including the choice among alternatives and whether or how to mitigate the Project's significant effects on the environment. With respect to the proposed Project, as part of the NOP process, a number of concerns, which have been addressed and/or resolved, were expressed. Following is a summary of concerns raised in response to the NOP, and the Section of the EIR that addresses the concern:

- Biological Direct, Indirect, and Cumulative Impacts: Impacts to special status vegetation (coastal sage scrub, riparian, woodland), jurisdictional resources (U.S. Army Corps of

Engineers [USACE], Regional Water Quality Control Board [RWQCB], California Department of Fish and Wildlife [CDFW]), special status plant and wildlife species (mud nama, Crotch's bumble bee, western spadefoot, least Bell's vireo, and coastal California gnatcatcher); compliance with the County of Orange Central and Coastal Subregion Natural Community Conservation Plan/Habitat Conservation Plan; regulatory permitting; Biological Opinion (U.S. Fish and Wildlife Service [USFWS]) and Incidental Take Permit (CDFW); mitigation and avoidance of Project-related Biological Impacts (Section 4.3, Biological Resources)

- Consistency with the Southern California Association of Governments (SCAG) Plans and Projections (Section 4.10, Land Use and Planning)
- Tribal Cultural Resources (Section 4.15, Tribal Cultural Resources)
- Emergency and Construction Access, Traffic Operations, and Vehicle Miles Traveled (Section 4.14, Transportation)
- Cumulative Impacts (Sections 4.1 through 4.17)
- Hydrology and Hydraulics Impacts (Section 4.9, Hydrology and Water Quality)
- Impacts to Public Service Providers (Section 4.12, Public Services)
- Impacts to Parks and Recreation Facilities (Section 4.13, Recreation)
- Landfill Impacts (Section 4.16, Utilities and Service Systems)
- Wildfire Impacts (Section 4.17, Wildfire)

1.8 CEQA BASELINE

Section 15125 of the CEQA Guidelines requires that the analysis in the EIR compare the potential impacts against the existing conditions. Therefore, the analysis has been conducted with the baseline of current operations at the Santiago Creek Dam.

1.9 SUMMARY OF SIGNIFICANT EFFECTS AND MITIGATION PROGRAM

Table 1-1 presents a summary of the potential environmental effects of the Project; measures to mitigate impacts to the extent feasible; and the expected status of effects following implementation of the mitigation measures. A more detailed evaluation of these issues is presented in Sections 4.1 through 4.17. The level of significance provided in the 'Project Impact' columns is the level of significance prior to mitigation. The column identified as 'Level of Significance After Mitigation' contains the determination whether the mitigation measures would reduce the impact to a level of less than significant.

This page intentionally left blank

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Section 4.1 – Aesthetics			
Threshold 4.1-1 Substantially degrade the existing visual character or quality of public views of the site and its surroundings (Public views are those that are those that are experienced from publicly accessible vantage points). If the project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality.	The proposed Project would not substantially degrade the existing visual character or quality of public views of the site and its surroundings. Additionally, the Project would not conflict with applicable zoning and other regulations governing scenic quality. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.1-2 Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	The proposed Project would not create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Impacts would be less than significant with implementation of PDF AES-1 and PDF AES-2, and no mitigation is required.	**PDF AES-1** The Project will design and operate lighting for construction, security, or equipment maintenance to conform to the requirements of the Occupational Safety and Health Administration, Code of Federal Regulations (CFR)-29, Standard 1926.56 and any Orange County light pollution regulations. Additionally, the Project will orient lighting to minimize effects to the community and adjacent sensitive habitat areas. **PDF AES-2** To the extent feasible, the Project will direct night lighting away from sensitive native habitats and provide low-sodium or similar lighting equipped with shields to focus light downward.	Less Than Significant.
Section 4.2 – Air Quality			
Threshold 4.2-1 Conflict with or obstruct implementation of the applicable air quality plan.	Based on the analysis presented in Section 4.2, Air Quality, pollutant emissions from the proposed Project would exceed the South Coast Air Quality Management District (SCAQMD) thresholds during construction and would result in a significant impact even with the implementation of mitigation measures and SCAQMD regulatory requirements. Additionally, the Project's construction activities would conflict with the 2022 Air Quality Management Plan's (AQMP's) goal of reducing criteria pollutant emissions. Subsequently, the Project would result in a temporary significant and unavoidable impact related to consistency with the AQMP, pursuant to Threshold 4.2-1.	**MM AQ-1** IRWD will require its construction contractor(s) to implement the following measures to minimize nitrogen oxide (NO_x) and volatile organic compound (VOC) emissions during construction: • All off-road diesel-powered construction equipment greater than 50 horsepower will meet U.S. Environmental Protection Agency Tier 4 Final emission standards to the extent that the equipment is available. In addition, all construction equipment will be outfitted with Best Available Control Technology devices certified by the California Air Resources Board. If Tier 4 Final equipment is not available to the best of the construction contractor's understanding, the construction contractor(s) will provide IRWD with documentation showing the reasons for non-availability. • Require the use of 2010 and newer diesel haul trucks (e.g., material delivery trucks and soil import/export). If the construction contractor(s) determines that 2010 model year or newer diesel trucks cannot be obtained, trucks that meet USEPA 2007 model year NO_x emissions requirements will be required. If 2007 model year or newer diesel trucks are not available, the construction contractor(s) will provide IRWD with reasonable documentation showing the reasons for non-availability. • Construction equipment will be properly serviced and maintained to the manufacturer's applicable standards.	Significant and Unavoidable Impact.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Threshold 4.2-2 Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard.	Pursuant to Threshold 4.2-2, short-term construction emissions of nonattainment pollutants and their precursors would be cumulatively considerable and would result in a significant and unavoidable impact to regional air quality with implementation of MM AQ-1. Project operations would result in a less than significant impact to regional air quality.	MM AQ-1 as stated above.	Significant and Unavoidable Impact.
Threshold 4.2-3 Expose sensitive receptors to substantial pollutant concentrations.	The proposed Project would not increase congestion or result in a significant impact related to carbon monoxide hotspots. The construction period would be relatively short when compared to a 30- or 70-year exposure period. Additionally, combined with the highly dispersive properties of diesel particulate matter and additional reductions in particulate emissions from newer construction equipment, as required by U.S. Environmental Protection Agency and California Air Resources Board regulations, Project construction would not expose sensitive receptors to substantial emissions of toxic air contaminants. Also, the proposed Project would not have the potential to expose sensitive receptors to substantial toxic air contaminants from stationary or mobile sources. Overall, pursuant to Threshold 4.2-3, impacts would be less than significant, and no mitigation is required.	MM AQ-1 as stated above.	Less Than Significant.
Threshold 4.2-4 Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	Project-related odors are construction-related, low magnitude, and short-term in nature; no long-term operational odors would result. As such, the proposed Project would have less than significant impact in regard to other emissions, pursuant to Threshold 4.2-4.	**PDF AQ-1** Upon the initial dewatering of the reservoir at the start of construction, all exposed organic matter shall be removed from the reservoir by construction crews. Organic matter removal, including removal of plant and animal species, shall occur in accordance with all applicable laws, regulations, and permit conditions.	Less Than Significant.
Section 4.3 – Biological Resources			
Threshold 4.3-1 Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.	The Project has potential to impact special status plant and wildlife species. Significant or potentially significant impacts were identified for mud nama, Crotch's bumble bee, coastal California gnatcatcher, least Bell's vireo, bald eagle, and roosting bats. Additionally, wildlife using habitat adjacent to the Project could be indirectly impacted by construction noise, night lighting during construction, dust, and invasive plant species. Assuming implementation of PDF-BIO-1 through PDF-BIO-9 and with implementation of MM BIO-1 through MM BIO-7, these impacts would be reduced to less than significant and the potential impacts on special status species would be less than significant, pursuant to Threshold 4.3-1.	**PDF-BIO-1** Worker Environmental Awareness Program (WEAP) Training. Prior to the initiation of construction activities, IRWD will retain a qualified Biologist (i.e., Biological Monitor) to provide a WEAP training for construction personnel to review the mitigation measures and permit requirements applicable to the construction phase. The Biological Monitor will require trained personnel to sign the WEAP Log to document that they have been trained and understand the mitigation measures and permit conditions. The Biological Monitor will repeat the WEAP training as-needed for new construction personnel. **PDF-BIO-2** Project Limits. Prior to construction, the Project limits will be clearly staked by IRWD or IRWD's Contractor and verified by the Biological Monitor. **PDF-BIO-3** Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Construction Minimization Measures. As required by the NCCP/HCP, IRWD will follow standard construction-related minimization measures. These include removal of coastal sage scrub outside the California gnatcatcher breeding season (i.e., February 15 to July 15); pre-construction surveys for coastal California gnatcatchers; identification of coastal sage scrub habitat areas for protection as Environmentally Sensitive Areas (ESAs); and biological monitoring during all clearing of coastal sage scrub. **PDF-BIO-4** Tree Protection. To protect western sycamore and coast live oak trees adjacent to Project impact areas, protective fencing will be	Less Than Significant (mud nama, Crotch's bumble bee, coastal California gnatcatcher, least Bell's vireo, bald eagle, and roosting bats).

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		placed around all western sycamore and coast live oak trees located within 50 feet of the impact areas. The tree protection area will be 1.5 times the dripline of the tree. No stockpiling of materials will occur within the tree protection areas. Limbs of western sycamore and coast live oak trees can be pruned to allow construction equipment access. If large branches need to be removed or if more than 10 percent of the total canopy would be affected, pruning will be supervised by a Certified Arborist retained by IRWD. **PDF-BIO-5** Nesting Bird Protection. To the extent practicable, vegetation clearing will be conducted during the non-breeding season (i.e., September 16 to January 31). If vegetation clearing will be initiated during the breeding season for nesting birds/raptors (i.e., February 1–September 15), the construction activity will be conducted in compliance with the conditions set forth in the Migratory Bird Treaty Act. IRWD will retain a qualified Biologist to conduct a pre-construction survey for nesting birds and/or raptors within three days prior to clearing of any vegetation or work near existing structures. The nesting bird survey area will include a buffer of 100 feet around the work area for nesting birds and a buffer of 500 feet around the work area for nesting raptors. If an active nest is found, the Biologist will determine the appropriate protective buffer depending on the sensitivity of the species and the nature of the construction activity. The protective buffer will be 25–100 feet for nesting birds; 300–500 feet for special status bird species or nesting raptors; and 0.5 mile for golden eagle or prairie falcon. No work will be conducted in the protective buffer until a qualified Biologist determines that the nest is no longer active. The Biologist will map any nests found during survey efforts and their protective buffers and will provide the map to IRWD and the Contractor. **PDF-BIO-6** Speed Limit During Construction. The speed limit on construction access roads will be no more than 20 miles per hour. Signage will be posted throughout the construction areas and at multiple locations along the access road between the dam and the staging area at the upstream end of the lake. “Wildlife crossing” signage will also be posted along the access road between the dam and the staging area at the upstream end of the lake. Signage will be verified by the Biological Monitor. **PDF-BIO-7** Night Lighting. Night lighting will be directed away from adjacent habitat areas to the extent practicable. Shielding of night lighting during construction will be incorporated to ensure that ambient lighting is directed away from sensitive habitat areas. Appropriate shielding of night lighting will be verified by the Biological Monitor. **PDF-BIO-8** Prevent Spread of Invasive Species. Weed seeds entering the construction area via vehicles will be minimized by requiring construction vehicles to be washed prior to delivery to the Project site. Track-clean or other methods of vehicle cleaning will be used by the construction contractor to prevent weed seeds from entering/exiting the Project site on vehicles. Wattles used for erosion control will be biodegradable and certified as weed-free. Seed mixes and/or hydroseed applied to temporarily disturbed areas will consist of native species local to the Project vicinity. IRWD will retain a qualified Biologist to review and approve the	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		seed mix. Use of measures to prevent the spread of invasive species will be verified by the Biological Monitor. **PDF-BIO-9** Treatment of Invasive Species. During active construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a monthly basis. If a target species is observed within 100 feet of the active construction area, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed. For a period of two years following completion of construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a quarterly basis. If a target species is observed within 100 feet of the previously disturbed areas, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed. **MM BIO-1A** **Special Status Plants/Pre-construction Surveys:** During the peak blooming season prior to the initiation of construction (within the same year or the spring/summer prior), IRWD will retain a qualified Botanist to conduct a focused survey for mud nama. Although not required, the pre-construction survey will also include intermediate mariposa lily, many-stemmed dudleya, and Coulter's matilija poppy to minimize impacts on these species. The pre-construction survey will focus on these species in the general locations where they were previously observed within the impact area and will including a 100-foot survey buffer. The Botanist will record special status plant locations within the impact area and within 100 feet of the impact area using GPS and will clearly mark locations with pin flags or lathe and flagging. The Botanist will meet in the field with IRWD to discuss whether avoidance of these locations would be feasible (e.g., whether they could be protected within the temporary impact areas). No compensatory mitigation will be required if the locations of intermediate mariposa lily,[2] many-stemmed dudleya, and Coulter's matilija poppy cannot be avoided. However, IRWD will notify the Natural Communities Coalition (NCC) and allow the NCC to collect seed and/or salvage special status plants that will be impacted by the Project. Seed collection/salvage will be coordinated so that it does not delay the construction schedule. Compensatory mitigation will be required if more than 10 percent of the mud nama locations mapped in 2022 will be impacted, as described below under MM BIO-1B. Following the pre-construction survey and field meeting with IRWD, the Botanist will prepare a Pre-construction Special Status Plant Survey Report to document the results of the pre-construction surveys and will document the special status plant locations that will be avoided during construction. The Botanist	

[2] The NCCP/HCP covers impacts on this species up to 20 individuals; if more than 20 individuals would be impacted, additional consultation with the resource agencies would be required. However, this is not anticipated to be necessary because only six individuals have been observed in the BSA during focused surveys and only one individual is located in the impact area.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		will calculate the percent of the mud nama population that will be impacted by comparing the amount of mud nama within the construction impact area to the mud nama locations mapped in 2022. The report will also document that the final engineering plans, coupled with construction avoidance areas, will impact less than 50 percent of the mud nama population mapped in 2022. After the field meeting with IRWD, the Botanists will work with IRWD/Contractor to clearly mark the locations that will be avoided during construction with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing until the initiation of construction. During construction, the Biological Monitor will ensure that these areas are protected during construction as described below under MM BIO-1C. **MM BIO-1B** **Mud Nama/Compensatory Mitigation:** As described under MM BIO-1A, if compensatory mitigation is required for mud nama (i.e., more than 10 percent of the mud nama locations mapped in 2022 will be impacted by the Project), IRWD will retain a qualified Restoration Biologist to prepare a detailed Mud Nama Mitigation Plan. The Plan will describe collection of seed, salvage of individuals, salvage of soils (i.e., seed bank), and establishment of a new on-site location that will replace the area of mud nama impacted at a minimum 1:1 ratio (i.e., 1 acre impacted to 1 acre replaced). The on-site mitigation areas will provide similar microhabitat, including similar soils and elevation to provide similar inundation frequency to current conditions. The Mud Nama Mitigation Plan shall include the following topics: (1) responsibilities and qualifications of the personnel to implement and supervise the plan; (2) mitigation site selection criteria; (3) site preparation and planting implementation, including pilot studies (if needed); (4) implementation schedule; (5) maintenance plan/guidelines; (6) monitoring plan; (7) performance criteria and contingency planning; and (8) long-term preservation. IRWD will implement the Plan. IRWD will retain a qualified Restoration Biologist/Seed Collector to collect seed, salvage individuals, and salvage soils (i.e., seed bank) from the mud nama during the spring/summer prior to impacts upon this plant. IRWD will ensure that the seed/salvaged individuals/soil will be stored by a qualified Seed Collector in appropriate conditions to maintain the viability of the seed to be used in implementation of the Mud Nama Mitigation Plan. **MM BIO-1C** **Special Status Plants/Biological Monitoring:** Before the start of construction, IRWD will retain a qualified Biological Monitor to confirm that the special status plant locations to be avoided are clearly marked with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing. The Biological Monitor will post signs to indicate each location as an “Environmentally Sensitive Area” and that no work activities may occur within the fencing. The Biological Monitor will conduct a WEAP training regarding the importance of Environmentally Sensitive Areas. Once Project activities begin, the Biological Monitor will check the fencing/signage weekly to ensure that it stays in place throughout construction activities and will notify IRWD and the construction	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		contractor immediately if the fencing/signage needs to be repaired. **MM BIO-2** **Crotch's Bumble Bee:** If the California Department of Fish and Wildlife (CDFW) determines that listing of the Crotch's bumble bee is not warranted as threatened or endangered under the California Endangered Species Act prior to or during implementation of the Project, this measure will not be required. Until CDFW makes a determination, or if CDFW determines that listing of the Crotch's bumble bee as threatened or endangered under the California Endangered Species Act is warranted, the following measures will be required. **MM BIO-2A** **Incidental Take Permit:** IRWD will obtain an Incidental Take Permit (2081) prior to removal of suitable habitat for Crotch's bumble bee. IRWD will consult with CDFW to determine the appropriate mitigation to compensate for loss of floral resources associated with the species at a minimum 1:1 ratio of suitable habitat impacted (i.e., 1 acre impacted to 1 acre compensated). Potential compensatory mitigation options include on-site revegetation of temporarily disturbed areas using a seed mix of species preferred by Crotch's bumble bee at a minimum 1:1 ratio of temporarily impacted areas; payment of an in-lieu mitigation fee to an approved mitigation bank at a minimum 1:1 ratio of permanently impacted areas; long-term preservation of on-site or off-site habitat at a minimum 1:1 ratio of permanently impacted areas; or another strategy as approved by CDFW. Mitigation provided for under MM BIO-3 (Coastal Sage Scrub) may be used towards mitigation for Crotch's bumble bee. **MM BIO-2B** **Pre-construction Survey:** Prior to vegetation clearing or other ground-disturbance during each year of Project construction, IRWD will retain a qualified Biologist to conduct pre-construction focused surveys for active nests of Crotch's bumble bee following the most current CDFW guidelines[3] within 100 feet of Project impact areas with suitable habitat for Crotch's bumble bee. According to current guidelines (CDFW 2023), the Biologist will conduct three visual surveys during the species' active period (i.e., April to August). The timing between each visual survey may be reduced to accommodate the construction schedule, as long as the first and last survey are conducted at least one week apart during the active period. If no active nests of Crotch's bumble bee are observed, vegetation clearing, grading, and ground-disturbance may proceed. If a ground nest is observed, it will be protected in place until it is no longer active as determined by the qualified Biologist retained by IRWD. IRWD will implement applicable protective measures from the Incidental Take Permit for the species (see MM BIO-2A). Potential protective measures may include protective buffers coupled with biological monitoring to avoid take of an active ground nest. The protective buffer will be determined by the	

[3] The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		Biologist conducting the pre-construction survey, or as designated in conditions in the Incidental Take Permit. IRWD shall assure that a Letter Report is prepared to document the results of the pre-construction survey and will provide the letter to CDFW within 30 days of the completion of the survey. **MM BIO-2C** **Biological Monitoring**: Biological monitoring for Crotch's bumble bee will follow the most current CDFW guidelines at the time of construction. Per current guidelines (CDFW 2023), IRWD will retain a Biological Monitor to be present onsite during vegetation-clearing and/or ground disturbing activities that take place during the Crotch's bumble bee queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring will be required for vegetation-clearing or ground-disturbance that occurs from November to January. If a ground nest of Crotch's bumble bee is observed during the monitoring, it will be protected in place until it is no longer active as determined by the qualified Biologist retained by IRWD. IRWD will also implement applicable protective measures from the Incidental Take Permit for the species (see MM BIO-2A). If establishment of a protective buffer and/or avoidance of the nest is not feasible, IRWD and its qualified Biologist will consult with CDFW regarding potential encroachment into the protective buffer that may result in take of Crotch's bumble bee pursuant to MM BIO-2A. **MM BIO-3** **Coastal Sage Scrub and Coastal California Gnatcatcher:** Potential direct and indirect impacts on coastal sage scrub and coastal California gnatcatcher are fully mitigated through IRWD's participation and contribution in the NCCP/HCP Mitigation Program. This participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other Covered Species and Covered Habitats. IRWD will mitigate for impacts on coastal sage scrub and coastal California gnatcatcher through a combination of the following, as approved by U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW): (1) use of IRWD's NCCP/HCP take allocation at a 1:1 ratio for impacted coastal sage scrub; (2) restoration of coastal sage scrub habitat at a minimum 1:1 ratio in areas temporarily disturbed by construction including weeding and three years of restoration monitoring; and/or (3) restoration of coastal sage scrub habitat at an on-site or off-site location at a minimum 1:1 ratio, as described in a Habitat Mitigation and Monitoring Plan (HMMP) in order to preserve IRWD's remaining NCCP/HCP take allocation (if desired by IRWD). If a coastal sage scrub habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will prepare a Coastal Sage Scrub HMMP and submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Coastal Sage Scrub HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Ecologist to prepare the Coastal Sage Scrub HMMP and will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Coastal Sage Scrub HMMP and ensuring that the mitigation program achieves the approved performance criteria. **MM BIO-4** **Riparian Vegetation and Jurisdictional Permitting:** Before the start of construction, IRWD will obtain all necessary permits for impacts to U.S Army Corps of Engineers (USACE), California Department of Fish and Wildlife (CDFW), and/or Regional Water Quality Control Board (RWQCB) jurisdictional areas and will determine the compensatory mitigation needed for the loss of jurisdictional waters and wetlands. Potential compensatory mitigation options will include one or a combination of the following, as determined through consultation with the above-listed resource agencies: (1) establishment of riparian habitat (on site or off site) at a minimum 1:1 ratio for impacted jurisdictional areas; (2) payment to a resource agency approved mitigation bank or regional riparian enhancement program (e.g., invasive species removal) at a minimum 1:1 ratio for impacted jurisdictional areas; and/or (3) preservation of off-site riparian habitat on IRWD lands at a minimum 1:1 ratio for impacted jurisdictional areas. If in-lieu mitigation fees are required, IRWD will pay the in-lieu mitigation fee before the start of construction to a mitigation bank/enhancement program for the replacement of impacted jurisdictional resources. If a riparian habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will retain a qualified Restoration Ecologist to prepare a Riparian Habitat Mitigation and Monitoring Plan (HMMP) and will submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Riparian HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWS will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Riparian HMMP and ensuring that the mitigation program achieves the approved performance criteria. **MM BIO-5** **Least Bell's Vireo:** IRWD will consult with USFWS and CDFW under Section 7 of the Federal Endangered Species Act and Section 2080.1 of the California Fish and Game Code to approve the mitigation approach and whether NCCP/HCP Conditional Coverage would be extended to least Bell's vireo based on the measures below. A. IRWD will obtain concurrence from USFWS and CDFW that the riparian mitigation described in MM BIO4 will provide	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		appropriate compensatory mitigation for the loss of riparian habitat. B. To the extent feasible, removal of riparian habitat will be conducted during the non-breeding season (i.e., September 16 to March 14) in order to minimize direct impacts on nests of least Bell's vireo. IRWD will retain a qualified Biologist to monitor vegetation clearing of riparian habitat. C. Before starting construction each spring, IRWD will retain a qualified Biologist to survey all habitat within 500 feet of the construction limits for the presence of least Bell's vireo. The Biologist will map any active nests/territories as Environmentally Sensitive Areas on an aerial photograph. IRWD will also ensure that the Biologist prepares a Letter Report and that it is submitted to USFWS and CDFW to document the results of the pre-construction survey within 30 days of completion of the survey. D. IRWD will retain a qualified Biologist to conduct weekly focused surveys during construction to update the location of active least Bell's vireo territories. The Biologist will map new territories as Environmentally Sensitive Areas and will remove inactive Environmentally Sensitive Areas from the map. Once construction is in progress, IRWD will provide Weekly Reports to USFWS and CDFW. E. IRWD will retain a qualified Biologist to establish a 500-foot protective buffer around each least Bell's vireo territory identified during pre-construction or weekly surveys. The Biologist will verify that occupied riparian habitat is protected with lathe and rope, orange snow fencing, or other suitable fencing to provide an adequate buffer from construction work. The Biologist will post signs to indicate that the area is an "Environmentally Sensitive Area" and that no work activities may occur within the fencing. The Biologist will conduct training to educate workers on the importance of Environmentally Sensitive Areas. F. If construction activities need to occur within 500 feet of an active least Bell's vireo territory, IRWD will consult with USFWS and CDFW to determine an appropriate noise reduction strategy. Appropriate noise reduction measures may include, but are not limited to, specifications for equipment type, siting of equipment, and temporary noise barriers. IRWD will retain a qualified Biologist to monitor the installation of any noise reduction measures. G. IRWD will retain a qualified Biologist to conduct daily monitoring when construction activities are conducted within 500 feet of an active least Bell's vireo territory or until the Biologist determines that the individuals are not being impacted by the noise (i.e., the noise measures are established and birds are acclimated to the activities). **MM BIO-6** **Bald Eagle:** IRWD will consult with USFWS and CDFW with regard to the bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW. USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or early April to confirm the nesting stage (i.e., presence of eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing until the young fledge or May 15, whichever comes last. The Biologist will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year. **MM BIO-7** **Pre-Construction Bat Surveys:** IRWD will retain a qualified Biologist to conduct a pre-construction roosting bat survey (including both day and evening efforts) before construction begins. The day survey will involve inspection of the structures within the impact area to look for signs of bat roosting. The evening survey will involve monitoring each potential roost site for evening emergence, conducting exit counts, and acoustic monitoring (from a half an hour before sunset to no greater than three hours after sunset) near potential roosts within the impact area. If the Biologist determines that bats are actively roosting onsite, IRWD will retain a qualified Biologist to prepare a Project-specific Bat Roost Minimization Plan (BRMP) and will implement the plan. The BRMP will include relevant avoidance and minimization measures based on the survey results. If tree roosting bat species are found to be both foraging and potentially roosting onsite, IRWD will conduct tree removal only during the non-maternity season (September 1 through March 31). When potentially-occupied roost trees are removed, IRWD will implement a phased tree removal method (i.e., leaving the felled tree on the ground for 24-48 hours after the felling to allow any tree-roosting bats to leave). IRWD will avoid all Project-structures proposed for demolition that support an active day-roost until either the roost is no longer active, as determined by a qualified Biologist, or the occupants can be humanely evicted as described in the BRMP. IRWD will retain a qualified Biologist to conduct bat eviction during the fall months outside of the bat maternity season (i.e., September 1 through November 30).	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Threshold 4.3-2 Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.	The Project would impact coastal sage scrub, riparian, and woodland habitats. The additional inundation during implementation of the Project would also affect a limited amount of these habitats. With implementation of MM BIO-3, MM BIO-4, and MM BIO-8 these impacts would be less than significant. Therefore, the potential impact on riparian habitats and sensitive natural communities would be less than significant, pursuant to Threshold 4.3-2.	**MMs BIO-3** and **BIO-4** as stated above**.** **MM BIO-8** **Tree Survey/Replacement:** Before the start of construction, IRWD will retain a qualified Biologist or Certified Arborist to conduct a tree survey to identify the location and health of western sycamore trees within 100 feet of the Project impact area. To the extent practicable, temporary impact areas will be revised to avoid and minimize effects on western sycamore trees. Standard tree protection measures to fence western sycamores will be recommended for trees within or near the work area (PDF BIO-4). Any western sycamores that are greater than four inches diameter at breast height (dbh) removed by construction will be replaced at no less than a 1:1 ratio. Trees with a dbh of 4 inches to 8 inches will replaced at a 1:1 ratio with a minimum container size of 15 gallons. Trees with a dbh of greater than 8 inches to 16 inches will be replaced at a 1:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 16 inches to 24 inches will be replaced at a 3:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 24 inches to 36 inches will be replaced at a 5:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 36 inches will be replaced at a 10:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). The replacement trees will be replaced either on-site or off-site in a location with appropriate microclimate conditions. The replacement trees will be incorporated into the Coastal Sage Scrub HMMP (described above).	Less Than Significant.
Threshold 4.3-3 Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	The Project would impact areas within the jurisdiction of the USACE, RWQCB, and CDFW. The Project also may significantly impact water quality during construction. With the implementation of MM BIO-4, these impacts would be less than significant. Therefore, the potential impact on state- and federally- protected wetlands and other jurisdictional resources would be less than significant, pursuant to Threshold 4.3-3.	**MM BIO-4** as stated above.	Less Than Significant.
Threshold 4.3-4 Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	Santiago Creek Dam represents an existing barrier to wildlife movement; therefore the Project would not impact wildlife movement along a regional wildlife corridor. However, the Project is located within a NCCP/HCP Reserve and wildlife movement in adjacent areas could be affected by noise, night lighting, and human activity during construction. With the implementation of PDF-BIO-1, PDF-BIO-6, and PDF-BIO-7 impacts would be less than significant under Threshold 4.3-4.	No mitigation is required.	Less Than Significant.
Threshold 4.3-5 Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	The Project has the potential to affect nesting birds/raptors, which are protected by the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code. With the implementation of standard pre-construction surveys and nesting bird protections (PDF-BIO-5), the impact would be less than significant, and no conflict with applicable requirements would occur pursuant to Threshold 4.3-5.	No mitigation is required.	Less Than Significant.
Threshold 4.3-6 Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.	The Project is consistent with the NCCP/HCP. With implementation of MM BIO-3 and MM BIO-5, the impact would be reduced to less than significant., No conflict with the NCCP/HCP would occur under Threshold 4.3-6.	**MM BIO-3** and **MM BIO-5** as stated above.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Section 4.4 – Cultural Resources			
Threshold 4.4-1 Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5.	The Santiago Creek Dam (P-30-176757) was determined eligible for the California Register of Historical Resources (CRHR) and listed in the CRHR. Although specific aspects of the dam would be modified, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. Thus, the Project would not cause a substantial adverse change in the significance of an historical resource, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.4-2 Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.	The Project has potential to cause a substantial adverse change in the significance of an archaeological resource. However, potential effects would be mitigated to a less than significant level with the implementation of MM CR-1, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and MM CR-2, which identifies treatment of unanticipated discoveries.	**MM CR-1** IRWD will retain a certified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Standards for professional archaeology, to observe ground-disturbing activities (including but not limited to geotechnical excavations, vegetation removal, grubbing, grading, and excavation) within previously undisturbed soils below fill soils and to salvage and catalogue archaeological resources as necessary. Monitoring will not be required for secondary movement of soils, such as backfilling. The archaeologist will be present at the pre-construction meeting, will establish procedures for archaeological resource surveillance within previously undisturbed soils in coordination with IRWD throughout construction of the proposed Project, and will establish, in cooperation with IRWD, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the artifacts as appropriate. The archaeological monitor will have the authority to temporarily halt or divert work away from any discoveries of archaeological resources in order to evaluate the resources pursuant to **MM CR-2**. The archaeologist may determine, in consultation with IRWD, to reduce monitoring to spot-checking or eliminate monitoring depending on site conditions observed, such as the presence of fill material, soil stratigraphy, encountering bedrock, or other factors. The archaeological monitor will keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the certified archaeologist will prepare a monitoring report that details the results of monitoring. The report will be submitted to IRWD and any Native American groups who request a copy. The certified archaeologist will submit a copy of the final report to the California Historic Resources Information System South Central Coastal Information Center. **MM CR-2** If archaeological resources are inadvertently unearthed during excavation activities (within disturbed or undisturbed soils), the contractor will immediately cease all earth-disturbing activities within a 50-foot radius of the area of discovery, and the certified archaeologist and IRWD will be notified immediately. If the certified archaeologist determine the archaeological resources are potentially significant pursuant to CEQA Guidelines Section 15064.5 or California PRC Section 21083.2(g), the archaeologist, in consultation with IRWD and representatives from the tribal governments consulting under AB 52, will determine appropriate treatment, which may include avoidance of the area of the find, data recovery, documentation, testing, reburial, archival review,	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		and/or transfer to the appropriate museum or educational institution, or other appropriate actions. After the find has been appropriately avoided or mitigated, work in the area may resume.	
Threshold 4.4-3 Disturb any human remains, including those interred outside of formal cemeteries.	Pursuant to Threshold 4.4-3, Project activities are not expected to disturb human remains. However, if human remains are encountered during grading activities, RR CR-1 requires that any activity in the area of a potential find be halted, and the Orange County Coroner be notified. Implementation of RR CR-1 would reduce this impact to a less than significant level.	**RR CR-1** If human remains are found during ground-disturbing activities, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains will occur, in accordance with Section 7050.5 of the California Health and Safety Code. The County Coroner will be notified of the discovery immediately. If the County Coroner determines that the remains are or believed to be Native American, s/he will notify the NAHC within 24 hours of the discovery. In accordance with Section 5097.98 of the California Public Resources Code, the NAHC must immediately notify those persons it believes to be the most likely descended from the deceased Native American (i.e., the most likely descendant). The descendants will complete their inspection within 48 hours of being granted access to the site by IRWD. IRWD will discuss and confer with the most likely descendants regarding all reasonable options regarding the descendants' preferences for treatment of the human remains prior to disturbing the site by further construction activity.	Less Than Significant.
Section 4.5 – Energy			
Threshold 4.5-1 Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	Based on the analysis presented in Section 4.5, Energy, the Project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation. The Project's impact would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.5-2 Conflict with or obstruct a State or local plan for renewable energy or energy efficiency.	Implementation of the Project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Section 4.6 – Geology and Soils			
Threshold 4.6-1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Strong seismic ground shaking	The Project site is in a seismically active area that would likely experience strong ground shaking during the life of any project developed thereon. However, compliance with existing regulations (2022 California Building Code) would reduce potentially significant impacts associated with strong seismic ground shaking to a less than significant level.	No mitigation is required.	Less Than Significant.
ii) Seismic-related ground failure, including liquefaction	Implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving seismic-related ground failure. There would be a less than significant impacts related to seismic-related ground failure, including liquefaction and lateral spreading, with implementation of engineering design requirements applicable to the Project and no mitigation would be required.	No mitigation is required.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
iii) Landslides	Implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving landslides. There would be a less than significant impact related to landslides, including liquefaction and lateral spreading, with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.	No mitigation is required.	Less Than Significant.
Threshold 4.6-2 Result in substantial soil erosion or the loss of topsoil.	Grading activities would increase the potential for soil erosion and loss of topsoil. With the incorporation of construction BMPs as described in Section 4.9, Hydrology and Water Quality, of this EIR and compliance with applicable laws and regulations (e.g., NPDES Construction General Permit), Project impacts on soil erosion and loss of topsoil would be less than significant. Long-term operation of the Project would also result in less than significant impacts. No mitigation measures are required.	No mitigation is required.	Less Than Significant.
Threshold 4.6-3 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.	There would be less than significant impacts related to the presence of unstable geologic units with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.	No mitigation is required.	Less Than Significant.
Threshold 4.6-4 Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.	The on-site soils were determined to have very low or non-existent expansion potential. There would be less than significant impacts related to expansive soils with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.	No mitigation is required.	Less Than Significant.
Threshold 4.6-5 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	The Project has a potential to disturb unique paleontological resources during construction. However, potential effects may be mitigated to a less than significant level with the implementation of MM GEO-1, which requires retention of a qualified Paleontologist to observe ground-disturbing activities, including geotechnical investigations, within undisturbed soils and MM GEO-2, which identifies treatment of unanticipated discoveries.	**MM GEO-1** Before beginning initial ground-disturbing activities (including but not limited to geotechnical excavations, vegetation removal, grubbing, grading, and excavation), IRWD will retain a paleontologist that meets the 2010 Society of Vertebrate Paleontology standards for paleontology. The paleontologist will observe ground-disturbing activities within previously disturbed or undisturbed soils with high paleontological sensitivity in geological formations, such as the Williams Formation or Pleistocene age alluvium, at the Project site. In the event of discovery, paleontological findings will be salvaged and catalogued by the paleontologist. Monitoring will not be required for secondary movement of soils, such as backfilling. The paleontologist will regularly meet with the contractor to ensure adequate involvement with ground-disturbing activities and will establish procedures for paleontological resource surveillance within previously undisturbed soils in coordination with IRWD throughout construction of the proposed Project. The qualified paleontologist will also establish, in coordination with IRWD, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the fossils/unique geological units as appropriate. The paleontological monitor will have the authority to temporarily halt or divert work away from exposed fossils in order to recover the fossil specimens pursuant to MM GEO-2. The paleontologist may determine, in consultation with IRWD, to reduce monitoring to spot-checking or eliminate monitoring depending on site conditions observed, such as the presence of geologic units with low paleontological sensitivity or other factors. The	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		paleontological monitor will prepare daily logs detailing the types of activities and soils observed and any discoveries. Upon the completion of initial ground-disturbing activities, the paleontologist will prepare a final monitoring and mitigation report to document the results of the monitoring effort. **MM GEO-2** If paleontological resources are inadvertently unearthed during excavation activities, the contractor will immediately cease all earth-disturbing activities within a 50-foot radius of the area of discovery and will contact the paleontologist and IRWD immediately. If the paleontologist determines the paleontological resources are potentially significant under CEQA, the paleontologist, in consultation with IRWD, will determine appropriate actions for treatment. Any significant fossils collected during project-related excavations will be salvaged and prepared to the point of identification following the standards of the Society of Vertebrate Paleontology (2010). Any salvaged fossils will be offered for donation to an accredited repository with a scientific interest in the materials. If no accredited repository accepts the donation, then the fossils may be donated to a local museum, historical society, school, or other institution for educational purposes. After the resource has been appropriately avoided or mitigated, work in the area may resume.	
Section 4.7 – Greenhouse Gas Emissions			
Threshold 4.7-1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	Pursuant to Threshold 4.7-1, the Project would not generate GHG emissions, either directly or indirectly, resulting in a significant impact on the environment. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.7-2 Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	Pursuant to Threshold 4.7-2, the Project would be consistent with and would not conflict with regulations and policies adopted for the purpose of reducing GHG emissions. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Section 4.8 – Hazards and Hazardous Materials			
Threshold 4.8-1 Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	A portion of the Project site is located on the former Irvine Park-Army Camp and is currently designated on the Cortese List. With the implementation of MM HAZ-1, which requires IRWD to follow and implement the 3Rs of Explosives Safety – Recognize, Retreat, and Report, impacts would be less than significant.	**MM HAZ-1** IRWD will require that all construction contractor(s) and their personnel receive, review, and adhere to the guidance published in *3Rs Safety Guide, Former Irvine Park-Army Camp, California, Orange County*. IRWD will require its construction contractor to provide training to all construction personnel on the implementation and application of the Safety Guide, which includes 1) Recognize that munitions are dangerous; 2) Retreat – do not approach, touch, move or disturb it, but carefully leave the area; and 3) Report immediately what you saw and where you saw it to local law enforcement.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Threshold 4.8-2 Expose people or structure, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	The Project site is located within a Very High Fire Hazard Severity Zone (FHSZ) in a State Responsibility Area. The areas surrounding the Project site are also located within a Very High FHSZ, with the exception of a portion of Irvine Lake, which is located within a High FHSZ within an State Responsibility Area. With regulatory compliance measures incorporated, the proposed Project would not exacerbate wildfire risk and impacts would be less than significant. No mitigation is required.	No mitigation is required.	Less Than Significant.
Section 4.9 – Hydrology and Water Quality			
Threshold 4.9-1 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	The proposed Project would not violate any water quality standards and waste discharge requirements, nor would it otherwise substantially degrade water quality, pursuant to Threshold 4.9-1. Water quality-related impacts would be less than significant. No mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.9-2 Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	The Project would not deplete groundwater supplies or interfere substantially with groundwater recharge. No impacts would occur, pursuant to Threshold 4.9-2. No mitigation is required.	No mitigation is required.	No Impact.
Threshold 4.9-3 Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of **surface** runoff in a manner in which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. iv) impede or redirect flood flows.	The proposed Project would not alter the existing drainage pattern of the site or area, would not result in substantial erosion or siltation on or off-site, substantially increase the rate or amount of surface runoff in a manner in which would result in flooding on- or off-site, create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff, or impede or redirect flood flows. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.9-4 In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.	The proposed Project would not introduce any uses that would expose people or structures to the release of pollutants during seiches and flooding due to breaches of the dam. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.9-5 Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	The proposed Project would not conflict with or obstruct implementation of the applicable water quality control plan or sustainable groundwater management plan. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Section 4.10 – Land Use and Planning			
Threshold 4.10-1 Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	The Project would not conflict with any local applicable land use plan, policy, or regulation. Impacts would be less than significant.	No mitigation is required.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Section 4.11 – Noise			
Threshold 4.11-1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	Noise generated during Project construction would not exceed the daytime or nighttime noise thresholds established by the Federal Transit Administration (FTA). For the residential sensitive receptors located approximately two miles to the west, noise levels generated during Project construction would be attenuated by the substantial distances between the Project site and the aforementioned uses. Furthermore, Irvine Lake is surrounded by ridgelines which would also attenuate noise levels. As shown in Table 4.11-5, noise exposure levels are anticipated to range from 31 to 46 A-weighted decibels (dBA) equivalent noise level (L_{eq}) at Irvine Regional Park and are not anticipated to result in a substantial level of noise exposure. Additionally, Project construction would not exceed the 80 dBA L_{eq} daytime and 70 dba L_{eq} nighttime noise criteria and consequently would not expose Oak Canyon Park and Lakeview Park Camping Area to excessive levels of noise. No camping is allowed at Irvine Lake (OC Parks 2023) so there would be no nighttime noise exposure. No Project-related traffic noise impacts are anticipated. Impacts related to stationary sources of noise would be less than significant, and no mitigation is necessary pursuant to Threshold 4.11-1.	No mitigation is required.	Less Than Significant.
Threshold 4.11-2 Generation of excessive groundborne vibration or groundborne noise levels.	Vibration annoyance and building damage from typical construction activities have the potential to be excessive at nearfield distances of 100 feet or less. Because of the very substantial distances between the Project site and the nearest buildings, vibration-induced annoyance and building damage would not occur. The operations phase of the Project would not involve machinery or activities that generate perceptible levels of vibration. There would be a less than significant impact, and no mitigation is required pursuant to Threshold 4.11-2.	No mitigation is required.	Less Than Significant.
Threshold 4.11-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.	The Project would not result in exposure of people residing or working in the Project area to excessive aircraft noise levels. Pursuant to Threshold 4.11-3, there would be no impact related to excessive aircraft noise exposure.	No mitigation is required.	Less Than Significant.
Section 4.12 – Public Services			
Threshold 4.12-1 Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: (i) Fire protection	The Project's temporary construction activities and periodic maintenance activities would only cause an incremental increase in demand on County fire services. No new or physically-altered fire facilities that would result in substantial adverse physical impacts would be required as a result of the Project. Therefore, the impact is less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
(ii) Police protection	The Project would not result in an increased demand for police protection services or result in a significant impact to police response. The Project would replace an existing use that is generating demand for police protection services. The Project would not result in the need for construction of new or physically-altered police facilities to maintain adequate levels of service. Therefore, the impact is considered less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Section 4.13 – Recreation			
Threshold 4.13-1 Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	The proposed Project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. Less than significant impacts would occur.	No mitigation is required.	Less Than Significant.
Threshold 4.13-2 Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	The proposed Project would not include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment. No impact would occur.	No mitigation is required.	No Impact.
Section 4.14 – Transportation			
Threshold 4.14-1 Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.	Project construction and operation would not result in a significant impact. Based on the evaluation included in Section 4.14, Transportation, with compliance with the Traffic Control Plan and County requirements, Project construction impacts would be less than significant. Additionally, it is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of the proposed Project. Therefore, the potential operation impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.14-2 Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).	The Project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b), pursuant to Threshold 4.14-2. No impact would occur, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.14-3 Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	No impact would occur related to hazards due to a design feature or incompatible uses, pursuant to Threshold 4.14-3. No mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.14-4 Result in inadequate emergency access.	No impact to local or regional emergency access routes would occur, pursuant to Threshold 4.14-4. No mitigation is required.	No mitigation is required.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Section 4.15 – Tribal Cultural Resources			
Threshold 4.15-1 Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1 (k), or	Potential impacts to archeological resources would be mitigated to a less than significant level with the implementation of MM CR-1, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and MM CR-2, which identifies treatment of unanticipated discoveries. Additionally, the Project would comply with the State requirements pertaining to the protection of human remains by implementing RR CR1. The Santiago Creek Dam Complex (P-30-176757) was determined eligible for the CRHR and listed in the CRHR. However, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. Thus, pursuant to Threshold 4.15-1, the Project would not have an impact on a tribal cultural resource that is listed or eligible for listing on the CRHR or a local register.	**MM CR-1** IRWD will retain a certified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Standards for professional archaeology, to observe ground-disturbing activities (including but not limited to geotechnical excavations, vegetational removal, grubbing, grading, and excavation) within previously undisturbed soils below the fill soils and to salvage and catalogue archaeological resources as necessary. Monitoring will not be necessary for secondary movement of soils, such as backfilling. The archaeologist will be present at the pre-construction meeting, will establish procedures for archaeological resource surveillance within previously undisturbed soils in coordination with IRWD throughout construction of the proposed Project, and will establish, in cooperation with IRWD, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the artifacts as appropriate. The archaeological monitor will have the authority to temporarily halt or divert work away from any discoveries of archaeological resources in order to evaluate the resources pursuant to MM CR-2. The archaeologist may determine, in consultation with IRWD, to reduce monitoring to spot-checking or eliminate monitoring depending on site conditions observed, such as the presence of fill material, soil stratigraphy, encountering bedrock, or other factors. The archaeological monitor will keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the certified archaeologist will prepare a monitoring report that details the results of monitoring. The report will be submitted to IRWD and any Native American groups who request a copy. The certified archaeologist will submit a copy of the final report to the California Historic Resources Information System (CHRIS) South Central Coastal Information Center (SCCIC). **MM CR-2** If archaeological resources are inadvertently unearthed during excavation activities (within disturbed or undisturbed soils), the contractor will immediately cease all earth-disturbing activities within a 50-foot radius of the area of discovery, and the certified archaeologist and IRWD will be notified immediately. If the certified archaeologist determine the archaeological resources are potentially significant pursuant to CEQA Guidelines Section 15064.5 or California Public Resources Code (PRC) Section 21083.2(g), the archaeologist, in consultation with IRWD and representatives from the tribal governments consulting under AB 52, will determine appropriate treatment, which may include avoidance of the area of the find, data recovery, documentation, testing, reburial, archival review, and/or transfer to the appropriate museum or educational institution, or other appropriate actions. After the find has been appropriately avoided or mitigated, work in the area may resume. **RR CR-1** If human remains are found during ground-disturbing activities, no further excavation or disturbance of the site or	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		any nearby area reasonably suspected to overlie adjacent remains will occur, in accordance with Section 7050.5 of the California Health and Safety Code. The County Coroner will be notified of the discovery immediately. If the County Coroner determines that the remains are or believed to be Native American, s/he will notify the NAHC within 24 hours of the discovery. In accordance with Section 5097.98 of the California Public Resources Code, the NAHC must immediately notify those persons it believes to be the most likely descended from the deceased Native American (i.e., the most likely descendant). The descendants will complete their inspection within 48 hours of being granted access to the site by IRWD. IRWD will discuss and confer with the most likely descendants regarding all reasonable options regarding the descendants' preferences for treatment of the human remains prior to disturbing the site by further construction activity.	
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	Potential impacts to tribal cultural resources would be mitigated to a less than significant level with the implementation of MM TCR-1, MM TCR-2, and TCR-3, which detail procedures related to tribal monitoring and protocols for unanticipated discoveries.	**MM TCR-1** **Juaneño Band of Mission Indians, Acjachemen Nation – Belardes Tribal Monitoring.** At least one month prior to beginning earthwork activities (i.e. grading, excavation and trenching) related to the existing water line tie-in activities of the proposed project, located at the intersection of Santiago Canyon Road and Haul Road, IRWD will notify the representatives of the Juaneño Band of Mission Indians, Acjachemen Nation - Belardes ("Acjachemen Nation - Belardes") identifying the date of starting earthwork activities. The notification will invite the representative to be present at the project site, and IRWD will further coordinate with the Acjachemen Nation – Belardes for construction monitoring. Acjachemen Nation – Belardes will be provided reasonable access to the project site, at its own expense and in a manner that will not conflict construction activities or cause construction delays to the contractor, to observe these earthwork activities. If Native American artifacts and ancestral human remains related to Acjachemen Nation – Belardes are uncovered during earthwork activities, MM TCR-3 Protocols for Unanticipated Discoveries will be implemented. The Acjachemen Nation – Belardes will document and provide logs to IRWD detailing the time/date of the visit, the outcome of the site visit and detail proposed activities it intends to conduct at the next site visit. The logs will also specifically describe the relevant ground-disturbing activities, the type of construction activities performed, locations of ground-disturbing activities, soil types, cultural-related materials, and any other facts, conditions, materials, or discoveries of significance to the Acjachemen Nation - Belardes. The monitor logs will identify and describe any discovered tribal cultural resources, including but not limited to, Native American cultural and historical artifacts, remains, places of significance, etc., as well as any discovered Native American (ancestral) human remains and burial goods.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		MM TCR-2 **Gabrieleno Band of Mission Indians - Kizh Nation Tribal Monitoring.** During the AB 52 consultation process, the Gabrieleno Band of Mission Indians - Kizh Nation (Kizh Nation) informed IRWD's staff that the Gabrieleno tribe has a strong tribal cultural presence in the region from the past, including the project site area. Therefore, there could be Kizh Nation tribal cultural resources present at the project site area and Kizh Nation has requested Native American monitoring of ground disturbing activities. The project site area spans over a vast area and the proposed project would have multiple construction phases with varied activities and schedules. At least one month prior to beginning earthwork activities, IRWD will notify in writing the Native American representatives from the Kizh Nation (tribal representative) of the date of the start of earthwork activities. The tribal representative, at their own expense, and in a manner that does not interfere with earthwork activities, will be allowed to observe subsurface ground disturbing construction activities. Monitoring may include either direct observation of the earthwork activities or the examination of excavated soils prior to disposal for evidence of cultural resources. If Native American artifacts and ancestral human remains are uncovered during earthwork activities, then MM TCR-3 Protocols for Unanticipated Discoveries will be implemented. The Kizh Nation tribal representative will complete daily monitoring logs and provide logs to IRWD detailing the time/date of the visit and the outcome of the site visit and detail proposed activities for their next site visit. The logs will also specifically describe the relevant ground-disturbing activities, the type of construction activities performed, locations of ground-disturbing activities, soil types, cultural-related materials, and any other facts, conditions, materials, or discoveries of significance to the Kizh Nation. The monitor logs will identify and describe any discovered tribal cultural resources, including but not limited to, Native American cultural and historical artifacts, remains, places of significance, etc., as well as any discovered Native American (ancestral) human remains and burial goods. **MM TCR-3** ***Protocols for Unanticipated Discoveries.*** If a cultural resource is found, all construction activities in the immediate vicinity of the discovery (i.e., not less than the surrounding 50 feet) will cease and will not resume until the discovered cultural resource(s) is assessed by IRWD's consulting Qualified Archaeologist. If the Qualified Archaeologist determines that the resources may be significant under CEQA, then the Qualified Archaeologist, in consultation with IRWD, will develop an appropriate treatment plan for the resource(s). IRWD will also consult with the Native American tribes or other appropriate Native American representatives in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. Under CEQA, preservation in place is the preferred manner of mitigating	

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		impacts to archaeological sites. However, if avoidance is infeasible, other appropriate measures will be instituted, which could include, among other options, detailed documentation, or data recovery excavation. Work may proceed on other parts of the project area while mitigation for cultural resources is being carried out.	
Section 4.16 – Utilities and Service Systems			
Threshold 4.16-1 Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which cause significant environmental effects.	The Project would not require or result in the relocation or construction of new or expanded wastewater treatment, storm drainage, natural gas, or telecommunications facilities. The Project would not result in additional demand for water supply. Construction of the Project would require relocation of the existing overhead power lines and power poles in the Project vicinity. This relocation would be completed by SCE prior to construction. The new poles would be placed outside of the construction limits for the Project and are not included as part of this Project. As such, impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.16-2 Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.	The Project would not result in a significant additional demand for water. Less-than-significant water-related impacts would occur, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.16-3 Result in a determination by the wastewater treatment provider that serves or may service the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	The Project would result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments. No impacts would occur, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.16-4 Generate solid waste in excess of State or local standards or in excess of the capacity of Local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	The Project would not generate solid waste in excess of State or local standards or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals. Impacts would be less than significant, and no mitigation is required.	No mitigation is required.	Less Than Significant.
Threshold 4.16-5 Comply with federal, State, and Local Management and reduction statues and regulations related to solid wastes including the CIWMP (County Integrated Waste Management Plan).	The Project would comply with federal, State, and Local Management and reduction statues and regulations related to solid waste. No impact would occur, and no mitigation is required.	No mitigation is required.	No Impact.
Section 4.17 – Wildfire			
Threshold 4.17-1 Substantially impair an adopted emergency response plan or emergency evacuation plan.	The proposed Project would not substantially impair an adopted emergency response plan or emergency evacuation plan, as it would not prevent access to the local or regional circulation system and would improve an emergency access walkway in the case of a reservoir spill event with RR WILDF-1 and PDFs WILDF-1 through WILDF-3 incorporated. Therefore, the potential impacts associated with emergency access would be less than significant.	**RR WILDF-1** The Project will comply with the general provisions of the California Fire Code relating to fire safety, emergency access, and emergency egress routes. **PDF WILDF-1** The Project will comply with the general provisions of the Orange County Fire Authority fire prevention requirements, including prohibiting operation of any stationary equipment, welding equipment, cutting torches, tarpots, or grinding devices from which a spark, fire or flame may originate on or near any forest-covered land, brush covered land, or grass covered land, without: 1. Having an IRWD approved Hot Work Permit; 2. Prior to starting construction activities, soaking around the work area for a distance of 30 feet to reduce fire	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
		spread into wildlands, which shall remain soaked for the duration of the work; 3. Maintaining, at a minimum, one serviceable round point shovel with an overall length of not less than forty-six (46) inches and one backpack pump water-type fire extinguisher fully equipped and ready for use at the immediate area during the operation; 4. Stopping work when winds are 8 MPH during periods when relative humidity is less than 25%, or a Red Flag condition has been declared or public announcement is made, or when an official sign was caused to be posted by the Orange County Fire Authority or IRWD; or 5. Keeping a cell phone nearby and calling 911 immediately in case of a fire. **PDF WILDF-2** The Project will comply with the general provisions of the Orange County Fire Authority, including prohibiting operation of either mechanized or non-mechanized equipment during Red Flag Warnings as declared by the Orange County Fire Authority or other jurisdictional agency or IRWD determines hazardous conditions exist and informs the Project Contractor of such. **PDF WILDF-3** The Project will comply with the general provisions of the Orange County Fire Authority, including training all construction personnel in the requirements of the Fire Prevention and Response Plan prior to construction. The Plan will outline the responsibilities for prevention, pre-suppression and suppression activities associated with fire hazards for the Project. Additionally, fire safety information shall be disseminated to construction personnel during regular safety meetings and fire management techniques shall be applied during construction.	
Threshold 4.17-2 Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	The proposed Project would be surrounded by open space areas, however, it would not exacerbate wildfire risks within the area, as it would incorporate RR WILDF-2, and comply with all applicable regulations including PRC Sections 4427, 4428, 4431, and 4442 and California Division of Occupational Safety and Health Administration. Therefore, the potential impacts associated with slope, prevailing winds, and other factors would be less than significant.	**RR WILDF-2** The Project will comply with PRC Sections 4427, 4428, 4431, and 4442, related to the handling of combustible fuels and equipment that can exacerbate fire risks, in addition to fire protection and prevention requirements specified by the California Code of Requirements and California Division of Occupational Safety and Health Administration. This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use.	Less Than Significant.
Threshold 4.17-3 Require installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.	The proposed Project would not exacerbate wildfire risks within the area as a result of the installation or maintenance of associated infrastructure, as it would comply with all applicable regulations such as California Code of Regulations Title 24, the California Building Code, and the County of Orange Safety Element. Therefore, the potential impacts associated with installation or maintenance of associated infrastructure would be less than significant.	No mitigation is required.	Less Than Significant.

TABLE 1-1
SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND LEVEL OF SIGNIFICANCE

Threshold of Significance	Project Impacts	Mitigation Measures (MM) / Project Design Features (PDF) / Regulatory Requirements (RR)	Level of Significance After Mitigation
Threshold 4.17-4 Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage change.	The proposed Project would not expose people or structure to risks subsequent to wildfire, such as flooding or landslides, as it would comply with all applicable regulations during construction and operations. Therefore, the potential impacts associated with wildfire risks such as flooding, and landslides would be less than significant.	No mitigation is required.	Less Than Significant.

SECTION 2.0 INTRODUCTION, PROJECT HISTORY, AND SETTING

2.1 PURPOSE OF THIS ENVIRONMENTAL IMPACT REPORT

Section 21002.1 of the California Environmental Quality Act (CEQA) (*California Public Resources Code* [PRC] Section 21000, et seq.) states that the purpose of an environmental impact report (EIR) is to identify the significant effects of a project on the environment, to identify alternatives to the project, and to indicate the manner in which those significant impacts can be mitigated or avoided. A detailed description of the proposed Santiago Creek Dam Improvement Project ("the Project") is provided in Section 3.0, Project Description, of this EIR.

For purposes of complying with CEQA, Irvine Ranch Water District (IRWD) is the Lead Agency for the Project. IRWD is also the approving body for the Project's discretionary actions.

In accordance with Section 15121(a) of the CEQA Guidelines (Title 14, *California Code of Regulations* [CCR] Section 15000, et seq.), this EIR is an informational document that will inform public agency decision makers and the general public of (1) the significant environmental effects of the proposed project, (2) possible ways to minimize the significant effects, and (3) reasonable alternatives to the proposed project. Decisionmakers are required to consider the information in the EIR in determining whether to approve, deny, or modify the proposed project.

2.2 TYPE OF ENVIRONMENTAL IMPACT REPORT AND STANDARDS OF ADEQUACY UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

This EIR has been prepared in accordance with CEQA and the CEQA Guidelines. CEQA Guidelines Section 15151 defines the standards of adequacy for an EIR as follows:

> An EIR should be prepared with a sufficient degree of analysis to provide decisionmakers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.

This Draft EIR is intended to serve as a project EIR under CEQA. Section 15161 of the CEQA Guidelines states, "the most common type of EIR examines the environmental impacts of a specific development project. This type of EIR should focus primarily on the changes in the environment that would result from the development project." This EIR shall examine all phases of the project including planning, construction, and operation.

Under CEQA, "The purpose of the Environmental Impact Report is to identify the significant effects of a project on the environment, to identify alternatives to the proposed project, and to indicate the manner in which significant environmental effects can be mitigated or avoided" (PRC Section 21002.1[a]). An EIR is the most comprehensive form of environmental documentation identified in CEQA and the CEQA Guidelines, and provides the information needed to assess the environmental consequences of a proposed project, to the extent feasible. EIRs are intended to provide an objective, factually supported, full-disclosure analysis of the environmental consequences associated with a proposed project that has the potential to result in significant, adverse environmental impacts.

An EIR is also one of the various decision-making tools used by a Lead Agency to consider the merits and disadvantages of a project that is subject to its discretionary authority. Prior to approving a proposed project, the Lead Agency must consider the information contained in the EIR, determine whether the EIR was properly prepared in accordance with CEQA and the CEQA Guidelines, determine that the EIR reflects the independent judgment of the Lead Agency, adopt findings concerning the project's significant environmental impacts and alternatives, and adopt a Statement of Overriding Considerations if the project would result in significant impacts that cannot be avoided.

IRWD staff has reviewed all submitted drafts and technical studies for consistency with IRWD's regulations and policies and has commissioned the preparation of this EIR to reflect its own independent judgment, including reliance on applicable IRWD technical personnel and review of all technical subconsultant reports.

2.3 FEDERAL CROSS-CUTTER REQUIREMENTS

As part of Project funding, IRWD may seek funding assistance through the Clean Water State Revolving Fund (CWSRF). Administered through the State Water Resources Control Board, the CWSRF Program offers financing for a variety of water quality projects. In order to qualify for CWSRF funding, a project must comply with CEQA and applicable federal environmental laws. Because the CWSRF Program is partially funded by the United States Environmental Protection Agency (USEPA), supporting documentation must meet specific federal cross-cutting requirements in the form of an Environmental Package. For purposes of this Project, this EIR will serve as an appendix and reference document to the Environmental Package to address relevant environmental requirements.

2.4 ENVIRONMENTAL REVIEW PROCESS

2.4.1 REVIEW OF AN EIR

IRWD, as the Lead Agency (and Project proponent), has the principal authority for approving the proposed Project, along with other public agencies with direct interest in the Project that may be responsible agencies and trustee agencies such as the California Department of Fish and Wildlife, Division of Safety of Dams, State Water Resources Control Board, State Historic Preservation Office, United States Fish and Wildlife Service, and the County of Orange, and other agencies, as appropriate. These agencies may use this EIR in their decision-making or permitting processes and will consider the information in this EIR in combination with other information that may be presented during the CEQA process. In addition, this EIR provides the analysis in support of the Mitigation Program that will be implemented as part of the Project if approved.

In accordance with CEQA, public agencies are required to make appropriate findings for each potentially significant environmental impact identified in the EIR if they decide to approve a project. If the EIR identifies significant environmental impacts that cannot be mitigated to a less than significant level through the adoption of mitigation measures or project alternatives, the Lead Agency (and responsible agencies using this CEQA document for their respective permits or approvals) must decide whether the benefits of the proposed project outweigh any identified significant environmental effects that cannot be mitigated to below a threshold of significance. If the decision-making agency decides that the project benefits outweigh the unavoidable impacts then the decision-making agency (i.e., Lead Agency or responsible agency) is required to adopt a Statement of Overriding Considerations, which states the reasons that support its actions pursuant to Section 15093 of the CEQA Guidelines. The proposed Project would result in significant and unavoidable air quality impacts, for which a Statement of Overriding Consideration would need to be adopted.

The Lead Agency's actions involved in implementation of the proposed Project are described in Section 3.0, Project Description. Other agencies that may have discretionary approval over the Project, or components thereof, including responsible and trustee agencies, are also identified in the Project Description.

2.4.2 ISSUES TO BE ADDRESSED IN THE EIR

IRWD made a determination that the Project may have a significant effect on the environment; as such, an EIR is required for the Project.

In compliance with Section 15082 of the CEQA Guidelines, IRWD oversaw preparation of the Notice of Preparation (NOP) of the Draft EIR for the Project, which was distributed on May 4, 2023 to the State Clearinghouse and other public agencies for a 30-day review and comment period, ending on June 5, 2023. Additionally, a Scoping Meeting was held on May 16, 2023, to facilitate public review and comment on the Project. IRWD staff members were available to answer any questions about the proposed Project. Notices were sent to the adjacent property owners and adjacent cities. The comments received on the NOP by IRWD, and the handout made available at the Scoping Meeting are included in Appendix A of this EIR.

A total of eight comment letters/emails (including the confirmation letter from the State Clearinghouse), were received during the 30-day NOP review period. Table 2-1 provides a summary matrix of the issues raised in the NOP comments.

TABLE 2-1
SUMMARY MATRIX OF NOTICE OF PREPARATION COMMENTS

Date	Commenters	Comment Category: Project Description	Aesthetics/Lighting	Air Quality	Biological Resources	Cultural Resources	Energy	Geology /Soils	Greenhouse Gas Emissions	Hazards/Hazardous Mat.	Hydrology/Water Quality/Sea Level Rise	Land Use/Planning	Noise	Population and Housing	Public Services	Recreation	Trans./Traffic/Parking	Tribal Cultural Resources	Utilities/Service Systems	Wildfire	Cumulative Impacts	Miscellaneous
State Agencies																						
May 4, 2023	Native American Heritage Commission																	X				
June 5, 2023	California Department of Fish and Wildlife, South Coast Region		X		X						X	X	X								X	
Local Agencies																						
May 24, 2023	City of Irvine																					X
June 2, 2023	Orange County Fire Authority																					X
June 5, 2023	Southern California Association of Governments											X		X			X					
June 5, 2023	OC Public Works	X		X	X					X	X		X		X	X	X		X	X	X	
Organizations																						
June 2, 2023	Juaneño Band of Mission Indians, Acjachemen Nation-Belardes																	X				
June 5, 2023	Transportation Corridor Agencies																					X

* The letter from the Governor's Office of Planning and Research, State Clearinghouse and Planning Unit verified receipt of the NOP and provided a listing of the agencies that the document was forwarded to.

Source: Comment letters can be found in Appendix A.

At the onset of the CEQA process, IRWD determined that an EIR is required for the Project and an Initial Study was prepared to focus the required analysis included in the EIR. Through the Initial Study, it was determined that no impact would occur related to the following topics and/or threshold questions were adequately addressed. No further analysis on these topics is included in this EIR.

Aesthetics

- ***Have a substantial adverse effect on a scenic vista?***

  As described previously, Santiago Creek Dam is located at the north end of Irvine Lake, in unincorporated Orange County. The County of Orange General Plan (Chapter VI. Resources Element) states that "one of the roles of open space within the County is to provide areas for outdoor recreation (e.g., parks, beaches, trails) and areas with aesthetics, historic or cultural values" (County of Orange 2012). Although Irvine Lake provides these open space resources, the Project site is not specifically designated as a scenic vista or an aesthetic resource by the County of Orange. Due to the nature of the proposed Project, which includes abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam in addition to structural improvements to the dam spillway, and because no scenic vistas are identified in the Project vicinity, no impacts would occur, and no mitigation is required.

- ***Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?***

  According to Caltrans' California Scenic Highway Mapping System, there are no officially designated or eligible State scenic highways within or in proximity to the Project site (Caltrans 2024). The Project is located south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The County of Orange Scenic Highways Plan designates Santiago Canyon Road as a Viewscape Corridor which is not considered a State scenic highway. Views of the Project site would be obstructed by intervening topography and vegetation and motorists traveling along Santiago Canyon Road would be largely unaffected by the Project. Any impacts would be related to construction and would be temporary in nature and would not represent substantial damage to scenic resources within a State scenic highway. Therefore, no impact would occur.

Agriculture and Forestry Resources

- ***Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?***

  and

- ***Conflict with existing zoning for agricultural use, or a Williamson Act contract?***

  According to the Farmland Mapping and Monitoring Program, the Project site and surrounding area are currently mapped as "Other Land" and "Urban and Built-Up Land," which is not considered to contain significant farmland resources (DLRP 2024). Further, the Project site has historically been subject to disturbance associated with the construction and maintenance of the Santiago Dam and Reservoir.

The proposed Project includes abandonment of the existing Santiago Creek Dam outlet tower, construction of a new inclined outlet structure located on the left abutment of the existing dam, structural improvements to the dam spillway, and improvements to the dam embankment. No expansion of facilities is contemplated beyond the existing Santiago Creek Dam footprint and the immediately surrounding and disturbed areas. Therefore, no agricultural-related impacts would result from Project implementation, and no mitigation is required.

- ***Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220[g]), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104[g])?***

  and

- ***Result in the loss of forest land or conversion of forest land to non-forest use?***

  According to Section 12220(g) of the *California Public Resources Code*, "forest land is land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits". The Project site does not meet the definition of forest land; therefore, no impacts would occur, and no mitigation is required.

- ***Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?***

  As discussed previously, the proposed Project site is not designated as farmland of significance and is not being used for agricultural production. Further, there are no forest lands in the vicinity of the Project site; therefore, the Project would not convert forest land to non-forest use. No impacts would occur, and no mitigation is required.

Geology and Soils

Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

- ***Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.***

  There are no mapped active faults or Alquist-Priolo Earthquake Fault Zones traversing the Project site (AECOM and GEI Consultants 2022). There would be no impact related to risks from surface rupture of a known fault, and no mitigation is required.

- ***Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?***

  The proposed Project would not involve the use of septic tanks or alternative wastewater disposal systems. No impacts would occur, and no mitigation is required.

Hazards and Hazardous Materials

- ***Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?***

  Project construction activities would require the transport and use of standard construction equipment and materials, some of which may include a hazardous component such as transport and storage of fuels. These activities would be conducted in compliance with existing federal, State, and local regulations.

  Daily Project operations would not involve the use or transport of hazardous materials. The Project site is located near several major transportation facilities and arterials, including East Santiago Canyon Road/East Chapman Avenue, Jamboree Road, SR-241, and SR-261. These roadways may be used to transport hazardous materials; however, the proposed Project would neither increase the frequency of transport, nor would it introduce hazards that would increase the likelihood for accidental release of hazardous materials into the environment. Additionally, the rehabilitation and replacement of the Santiago Creek Dam outlet works and spillway facilities as well as embankment improvements would not require any new or additional chemical storage or transport beyond existing operational activities. As such, a less than significant impact related to the transport, use, or disposal of hazardous materials or the release of hazardous materials into the environment would occur.

- ***Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?***

  Construction of the Project would involve the use of common hazardous materials such as gasoline, oil, paints, thinners, solvents, acids, curing compounds, grease, and other chemicals that could pose risks to construction workers or lead to soil and groundwater contamination, if not properly stored, used, or disposed. Standard construction practices would be observed such that any materials released are appropriately contained and remediated as required by local, State, and federal law. These materials are common to typical construction activities, and compliance with existing hazardous material regulations on the storage, use, and disposal of hazardous materials at construction sites would prevent hazards to the public or environment through reasonably foreseeable upset or accident conditions.

  The proposed Project includes abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam, embankment improvements to the dam crest, and structural improvements to the dam spillway; this Project would not substantially change the nature of the existing facilities. As such, a less than significant impact related to the release of hazardous materials into the environment would occur.

- ***Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?***

  The nearest schools to the proposed Project site include Santiago Canyon Community College, located approximately 2 miles northwest of the Project site and Chapman Hills Elementary School, located approximately 2.5 miles west of Project site. Temporary construction activities may require the use of materials listed as hazardous; however, these materials would be routine construction materials and would not be required in large

quantities. Therefore, the potential impacts associated with the transport and use of hazardous materials during construction would be less than significant, and no mitigation is required.

- ***For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the Project area?***

  The Project site is not located within an adopted Airport Land Use Plan or in the vicinity of a private airstrip, heliport, or helistop. The nearest airport is John Wayne Airport, located approximately 10.8 miles southwest of the Project site. The Project would be located outside the John Wayne Airport influence area and would not expose additional people to safety hazards related to airport operations. Implementation of the proposed Project would not impact the airport facilities or their operation; no mitigation would be required.

- ***Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?***

  Construction of the proposed Project is not anticipated to physically interfere with an adopted emergency response plan or evacuation plan because all construction activities and staging areas would be within the boundaries of the existing Santiago Creek Dam. Implementation of the proposed Project would not alter traffic conditions or modify the local or regional circulation system. Additionally, should an emergency occur at the proposed Project site, the internal street systems would provide access to the outlying arterial roadway system. Therefore, no impacts related to the adopted emergency response or evacuation plans would occur, and no mitigation is required.

Land Use and Planning

- ***Physically divide an established community?***

  As discussed in Section 3.2, Project Location, Santiago Creek Dam is located at the north end of Irvine Lake. The closest residential uses are located approximately 1.8 miles from the Project site. Implementation of the proposed Project would not divide an established community. No impact would occur, and no mitigation is required.

Mineral Resources

- ***Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?***

  According to the California Department of Conservation, Division of Mines and Geology, the Project site is located within Mineral Resource Zones (MRZ)-1, MRZ-2, and MRZ-3 (CGS 1995). The State Geologist classifies these MRZs based on the following factors: (1) MRZ-1 are areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exhibits for their presence; (2) MRZ 2 are areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence; and (3) MRZ-3 are areas containing mineral deposits the significance of which cannot be evaluated from available data. As stated previously, the proposed Project involves abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam in addition to embankment improvements to the dam crest and structural improvements to the dam

spillway. The Santiago Creek Dam is an existing structure, and proposed improvements would be limited to the existing development footprint. Therefore, impacts to mineral resources would be less than significant, and no mitigation is required.

- ***Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?***

  As discussed above, the Project site is located within MRZ-1, MRZ-2, and MRZ-3 (CGS 1995). The proposed Project involves abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam in addition to embankment improvements to the dam crest and structural improvements to the dam spillway. The Santiago Creek Dam is an existing structure, and proposed improvements would be limited to the existing development footprint. Therefore, impacts to mineral resources would be less than significant, and no mitigation is required.

Noise

- ***For a project located within an airport land use plan or, where such plan has not been adopted, within two miles of a private or public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?***

  The Project is not located within an Airport Land Use Plan area or in the vicinity of a private airstrip or heliport, and it would not expose people to excessive noise levels associated with airport operations or aircraft travel. The closest airport to the Project site is John Wayne Airport, located more than 10 miles southwest of the Project site. No impacts would result, and no mitigation is required.

Population and Housing

- ***Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?***

  The proposed Project would involve abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam in addition to embankment improvements to the dam crest and structural improvements to the dam spillway. Implementation of the Project would not increase employment and population in the area; therefore, the Project would not result in either direct or indirect population growth. No impacts would occur, and no mitigation is required.

- ***Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?***

  The proposed Project would involve abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam, structural improvements to the dam spillway, and improvements to the dam embankment. The Project would not displace existing housing or population, resulting in construction of replacement housing elsewhere. Therefore, no impacts would occur, and no mitigation is required.

2.4.3 EIR REVIEW AND APPROVAL PROCESS

This Draft EIR was prepared under the direction and supervision of IRWD and will be circulated for a 45-day public review and comment period, as mandated by the CEQA Guidelines (14 CCR 15105). At any time during the public review period, written comments concerning the adequacy of the document can be submitted by interested public agencies and members of the public to:

Irvine Ranch Water District
Water Resources & Policy Department
Attention: Fiona Sanchez
15600 Sand Canyon Avenue
Irvine, California 92618
Email: sanchezf@irwd.com

After the public review comment period, written responses to all written comments received during the public review period pertaining to environmental issues will be prepared as part of the Final EIR. As required by CEQA, responses to comments submitted by responsible public agencies will be distributed to those agencies for review at least ten days prior to consideration of the Final EIR by the IRWD Board of Directors. A public hearing before the IRWD Board of Directors will be held to consider the Project and the adequacy of the Final EIR, at which time public testimony will be received.

The IRWD Board of Directors is the decision-making body for the Project. The Board of Directors will consider whether to certify the Final EIR and to adopt findings relative to the Project's environmental effects. It will then consider whether to approve or deny the Project.

2.5 PROJECT HISTORY

As indicated above, an NOP of the Draft EIR for the Project was distributed on May 4, 2023, to the State Clearinghouse and other public agencies for the required 30-day review and comment period. Subsequently, a Scoping Meeting was held on May 16, 2023, to facilitate agency public review and comment on the Project.

2.6 PLANNING CONTEXT

2.6.1 ON-SITE GENERAL PLAN AND ZONING DESIGNATIONS

The proposed Project site has a General Plan designation of Open Space (OS) and a zoning designation of General Agricultural (A1), both of which are consistent with the existing uses on the Project site (County of Orange 2024, 2015). The OS General Plan designation provides for limited land uses that do not require a commitment of significant urban infrastructure. The Project site is also within an Open Space Reserve (OSR) overlay. The OSR designation is intended to reflect the Resources and Recreation Elements of the General Plan. It identifies major parks, beaches, forests, harbors, and other territory that is to remain open space. It may also include recreational trails and similar facilities for alternative transportation. Since the proposed Project does not include changes to the existing land use or zoning designations and would not change the character or existing uses of the Project site, the proposed Project is considered to be consistent with both the Land Use Element of the County's General Plan and the County's Zoning Ordinance.

2.6.2 SURROUNDING GENERAL PLAN AND ZONING DESIGNATIONS

County of Orange General Plan designations in the vicinity of the Project site include Open Space and Open Space Reserve to the north and west; Public Facilities to the northwest; Open Space Reserve and Landfill Site (LS) to the south; Open Space Reserve and Rural Residential (0.25–0.5 dwelling unit [DU]/acre [ac]) to the east; and Rural Residential (0.25–0.5 DU/ac) and Suburban Residential (0.5–18 DU/ac) to the southeast of the Project site.

2.7 ENVIRONMENTAL SETTING

The Project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle. It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. Irvine Lake (also called the Santiago Creek Reservoir) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

The Santiago Creek Dam is a compacted earthfill embankment completed in 1933 that is under the jurisdiction of the State of California, Department of Water Resources, Division of Safety of Dams. Santiago Creek Dam impounds Irvine Lake, a critical water supply reservoir for IRWD. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level within the lake varies throughout the lake; however, it is estimated that the accumulated sediment occupies approximately 2,150 acre-feet of the lake to date.

The outlet works for the dam consists of a tower, an outlet conduit, and a downstream control house. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where a bifurcation splits the flow into a main pipe and diverter pipe. The main pipe supplies water to IRWD.

The existing spillway is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years). The downstream end of the spillway was extensively modified in 1969 and 1970 after sustaining significant damage during a February 1969 flood event. The damaged spillway channel and spillway chute were removed (up to spillway Station [Sta.] 2+85.44) and a new flip bucket was constructed at the end of the existing spillway chute. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to and west of Irvine Lake. Residential development is located west of and across SR-241 from Irvine Lake.

Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek is a blueline stream which enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project site. Elevations in the Project site range from approximately 657 to 996 feet above mean sea level.

The Project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement (IA). The following vegetation types occur in the survey area: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

2.8 ORGANIZATION OF THE DRAFT EIR

This EIR is organized into eight sections, each containing its own references section. A list of the EIR sections and a brief description of their contents is provided below to assist the reader in locating information.

- **Section 1.0, Executive Summary:** This section provides summaries of the Project Description, alternatives to the proposed Project, environmental impacts, and mitigation measures.
- **Section 2.0, Introduction, Project History, and Setting:** This section briefly discusses the purpose of the EIR, describes the environmental review process, describes the environmental setting of the Project, and gives an overview of the EIR's organization.
- **Section 3.0, Project Description:** This section provides a detailed description of the Project characteristics and a statement of the Project Objectives.
- **Section 4.0, Existing Conditions, Impact Analysis, Cumulative Impacts, and Mitigation Program:** This section contains subsections 4.1, Aesthetics, through 4.17, Wildfire. Each subsection includes discussions on the following topics: regulatory setting (if applicable), methodology, existing conditions, thresholds of significance, impact analysis, cumulative impacts, mitigation program (if any), level of significance after mitigation, and references.
- **Section 5.0, Alternatives:** This section considers four alternatives to the proposed Project, including the No Project Alternative. The alternatives were developed to mitigate or avoid the significant effects the Project may have on the environment. In addition, this section identifies the environmentally superior alternative.
- **Section 6.0, Long-Term Implications:** This section contains a summary discussion of issues such as the balance of long-term versus short-term impacts; potential growth-inducing impacts; a discussion of energy (electricity and natural gas) in accordance with Appendix F of the CEQA Guidelines; and any significant irreversible environmental changes that would be caused by the Project.

[1] The Santiago Canyon Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

- **Section 7.0, Persons and Organizations Consulted:** This section lists the persons and organizations that were contacted to obtain data on the preparation of this EIR.
- **Section 8.0, Preparers:** This section lists the persons that directly contributed to preparation of this EIR.

2.9 REFERENCES

AECOM and GEI Consultants (AECOM and GEI). 2022 (July 15). *Santiago Creek Dam Outlet Tower and Spillway Improvements Project, PR 01813, Preliminary Design Report Volumes I and II*. Orange, CA: AECOM. Rancho Cordova, CA: GEI.

California Department of Conservation, Division of Mines and Geology (CGS). 1995. Generalized Mineral, Land Classification of Orange County, California: Aggregate Resources Only. Sacramento, CA: CGS. https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=mlc.

California Department of Conservation, Division of Land Resource Protection (DLRP). 2024 (August, published). Farmland Mapping and Monitoring Program (FMMP). *Orange County Important Farmland 2020*. Sacramento, CA: DLRP. https://www.conservation.ca.gov/dlrp/fmmp/Pages/Orange.aspx.

California Department of Transportation (Caltrans). 2024 (November 12, date accessed). California Scenic Highway Mapping System. https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways.

Orange, County of. 2024 (June, updated). General Plan, Chapter III. Land Use Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2024-07/Adopted%20Land%20Use%20Element%20Amendment%20-%20June%202024.pdf.

———. 2015 (August 23). General Plan Land Use Element Map. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/58442.pdf.

———. 2012. General Plan, Chapter IV. Resources Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/40235.pdf.

SECTION 3.0 PROJECT DESCRIPTION

3.1 PURPOSE OF THE PROJECT DESCRIPTION

The purpose of the project description is to describe the proposed Project in a way that allows for meaningful review by the public, reviewing agencies, and decision makers. Section 15124 of the CEQA Guidelines requires that the project description for an EIR contain: (1) the precise location and boundaries of a proposed project; (2) a statement of objectives sought by the proposed project including the underlying purpose of the project; (3) a general description of the project's technical, economic, and environmental characteristics; and (4) a statement briefly describing the intended uses of the EIR, including a list of the agencies that are expected to use the EIR in their decision making; a list of the permits and other approvals required to implement the project; and a list of related environmental review and consultation requirements required by federal, State, or local laws, regulations, or policies. An adequate project description need not be exhaustive but should supply the detail necessary for evaluation of the Project.

An EIR is the most comprehensive form of environmental documentation identified in CEQA and the CEQA Guidelines. The following project description provides the information needed to assess the environmental effects associated with the development, construction, and operation of the proposed Project.

3.2 PROJECT LOCATION

Santiago Creek Dam is located at the northwest end of Irvine Lake in unincorporated Orange County, California. The Project is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the embankment dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, a portion of the Irvine Lake pipeline (ILP), and dam access road. The regional and local vicinity of the Project site is depicted on Exhibit 1-1 Regional Location, and Exhibit 1-2 Aerial Photograph, respectively.

The Project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle map. It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. Irvine Lake (named the Santiago Creek Reservoir by the USGS) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project site in the northwest, downstream of the dam, while Fremont Canyon Creek enters downstream of the Project site. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level.

Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Orange County Waste and Recycling (OCWR) Santiago Canyon Landfill Facility is located

adjacent to the west of Irvine Lake. Residential development is located west of SR-241, with the closest residence located approximately 1.8 miles away.

The Project is within the Santa Ana Watershed (Hydrologic Unit Code 18070203). The drainage area for the Project encompasses approximately 63.4 square miles.

The following vegetation types occur in the survey area: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore. Other landcover includes cliff, open water, fluctuating shoreline, vegetated fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

3.3 PROJECT BACKGROUND

Irvine Ranch Water District (IRWD) owns and operates Irvine Lake and the Santiago Creek Dam that serves as a critical water supply reservoir for IRWD's service area. The Santiago Creek Dam impounds water for Irvine Lake from the Santiago Creek, local storm water runoff, and raw water from the Metropolitan Water District of Southern California (MWD) and serves as a domestic and non-potable water supply for various cities in Orange County.

Irvine Lake is a reservoir of untreated water located east of Irvine Regional Park. The Lake's capacity is currently approximately 24,000 acre-feet (AF) but it can hold an additional 2,700 AF when flash boards are installed on the spillway, temporarily raising the maximum water elevation an additional 4 feet to 795.9 feet. IRWD uses water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation uses, and 2) as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. IRWD also provides lake water to Serrano Water District (SWD) through the Howiler Treatment Plant, which is owned and operated by IRWD to serve SWD's customers in the City of Villa Park and portions of the City of Orange. Per the terms of the Water Service Reliability Agreement executed between IRWD and SWD on December 12, 2024, IRWD can backstop and/or augment use of groundwater to enhance SWD's water supply reliability using water sourced from Irvine Lake. In the future, IRWD will construct an interconnection between SWD's and IRWD's potable system, which will allow IRWD to serve water from the Howiler Treatment Plant to IRWD customers. The construction and operation of the interconnection will be subject to separate environmental review.

Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000. Santiago Creek Dam is located in Orange County, California and impounds water for Irvine Lake from the Santiago Creek, a tributary to the Santa Ana River. Santiago Creek Dam is approximately 136 feet high and 1,425 feet long. It is roughly 760 feet wide at the base and contains approximately 800,000 cubic yards of materials. IRWD has appropriative rights to the flows of Santiago Creek including a right to diversion by storage in Irvine Lake for municipal, domestic, and agricultural uses. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level varies throughout the lake; however, it is estimated that the accumulated sediment currently occupies approximately 2,150 AF of the lake.

The sources of water for the Lake are flows from Santiago Creek, local runoff captured during rainfall events and untreated (imported) water purchased from MWD. The imported water is conveyed to the Lake through MWD's Santiago Lateral Pipeline (SLP). When water is drawn from the Lake from the existing outlet tower, water is conveyed via the Irvine Lake Pipeline (ILP) to downstream customers. Exhibit 1-2 shows the location of the Project site in relation to the SLP and the ILP.

The outlet works for the dam consists of a tower, an outlet conduit, and downstream control house. The outlet works are the normal means of releasing water impounded by a dam. The tower sits above an outlet pipe or tunnel and is used to transport water out of the reservoir. The outlet conduit conveys water from the reservoir through, under, or around a dam in a controlled manner. The downstream control house contains (or houses) electrical and other equipment. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where the pipeline splits in a bifurcation valve vault to permit water to flow into a 36-inch main pipe and 30-inch diverter pipe. The main pipe supplies water to IRWD and the Howiler Water Treatment Plant. The diverter pipe can release water from the lake into the streambed immediately downstream of the control house in the event of an emergency or for dam safety purposes.

The existing dam spillway[1] is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, broad crested weir control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years).

Irvine Lake is held at varying levels depending on the time of year. In the wet winter months, water can be stored up to the 791.9-foot elevational contour[2]. The height of the existing spillway with flashboards installed is at the 795.9-foot elevation contour; this is the current maximum capacity of the reservoir and is only permitted in the summer months. Historically, the inflow into the reservoir during storm events is high enough to cause the water to flow over the spillway crest, located at the 791.9-foot elevation, approximately once every four to five years (1937 to 2019). From October 2002 to September 2020, the reservoir has been filled to the spillway crest four times and water has been high enough to flow over the spillway twice. The water levels in the lake during this period (2002 to 2020) fluctuated between the approximately 736-foot elevation contour to the 795-foot elevation contour. Between 2002 and 2020, the longest consecutive period of time that water was stored in the upper two feet of the reservoir (i.e., 793.9 to 795.9 feet) was approximately 35 days.

3.4 PROJECT PURPOSE AND NEED

In 2012 and in collaboration with DSOD, IRWD initiated seismic evaluations of the existing outlet tower that resulted in a determination that the free-standing structure was seismically unstable (URS 2015). In 2017, IRWD initiated, at the request of DSOD, a multi-phase spillway condition assessment. The assessment found that the spillway is nearing the end of its useful life and its design, while acceptable at the time of construction, does not meet current design standards. IRWD has also conducted an assessment of seismic performance of the dam embankment and has determined that modifications to the embankment are necessary.

1 A spillway is a structure on a dam that allows water to flow around the dam to safely release excess water from a reservoir.

2 NAVD88 Datum is used throughout this document.

In view of the findings of the seismic evaluation of the existing outlet tower and dam embankment as well as the comprehensive assessment of the existing spillway, IRWD has elected to develop designs for an inclined outlet structure that would be placed near the left abutment of the existing dam, to modify the embankment, and to replace the existing spillway with a side-channel spillway on the left abutment as shown on Exhibit 3-1, General Arrangement Plan. The spillway crest would be raised by six feet, which is two feet higher than the top of the flashboards when installed, to regain operational storage capacity that was lost over the years due to sedimentation. The existing outlet tower would be demolished, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir. The embankment would be modified to include a filter and drain system and a new downstream shell.

3.5 PROJECT OBJECTIVES

Section 15124(b) of the CEQA Guidelines requires an EIR to contain "[a] statement of objectives sought by the proposed project. A clearly written statement of objectives helps the lead agency develop a reasonable range of alternatives to evaluate in the EIR and would aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project." Not only is a project analyzed in light of its objectives, compatibility with project objectives is one of the criteria used in selecting and evaluating a reasonable range of project alternatives. Clearly-described project objectives simplify the selection process by providing a standard against which to measure project alternatives.

The primary objective of the proposed Project is to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities and to modify the embankment to permit operation of the facilities for a long-term water resource benefit. In implementing the proposed Project, IRWD would also obtain the following benefits:

- Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety, and design requirements established by the California DWR, DSOD, which is the governing State agency associated with this Project;
- Satisfy IRWD's operational requirements in the present and the future;
- Extend the useful life of the facilities;
- Improve regional water supply reliability; and
- Minimize impacts to local environmental resources and surrounding property owners.

As discussed in Section 5.0, Alternatives, the No Project Alternative (Alternative 1) would have the least impact to the environment because it would not involve any construction or demolition activities, nor would it result in any environmental impacts. This alternative would avoid potentially significant impacts, albeit mitigable, of the proposed Project associated with Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, and Tribal Cultural Resources. However, without the Project, no improvements to the dam and related facilities would occur, thus reducing the useful life of the facilities and reducing future regional water supply reliability. In addition, this alternative would not meet any of the Project objectives. When evaluating the proposed Project compared to Alternative 2, that alternative may result in reduced impacts in some areas; however, it would result in increased impacts in other areas and would not satisfy the five Project objectives identified above.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_General_Arrangement_Plan

General Arrangement Plan

Exhibit 3-1

Santiago Creek Dam Improvement Project

N
W E
S

0 750 1,500
Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-1.pdf

3.6 PROJECT DESCRIPTION

General elements of each portion of the Project are shown on Exhibits 3-2a and 3-2b, Santiago Dam Construction Features, and discussed in detail below. The Project Description represents a conservative analysis to accommodate the range of uncertainty regarding the final design. Therefore, the quantities and measurements used throughout this section and the Draft EIR are estimates based on the best available information.

Inlet/Outlet Works

The proposed inlet/outlet works for the Santiago Creek Dam would consist of several interconnected facilities composed of the inclined inlet/outlet structure, emergency outlet pipe, ILP, bifurcation valve vault, emergency outlet valve vault, and dam control building. A general arrangement plan for the entire inlet/outlet works is shown on Exhibit 3-3, Inlet/Outlet Works General Arrangement Plan.

Inlet/Outlet Structure

The existing outlet tower would be demolished, with the portion of the tower located below the sediment filled with concrete and capped with a concrete plug or completely removed. A new inclined outlet structure would consist of a series of inclined concrete footings with metal platforms to be constructed on the left abutment of the dam and an approximately 54-inch steel pipe inclined along the slope that would act as the conveyance pipe for water into and out of the reservoir. The entirety of the concrete footings and concrete-encased steel pipe would be situated in firm bedrock and anchored to the slope by drilled foundation anchors to resist sliding and overturning of the structure.

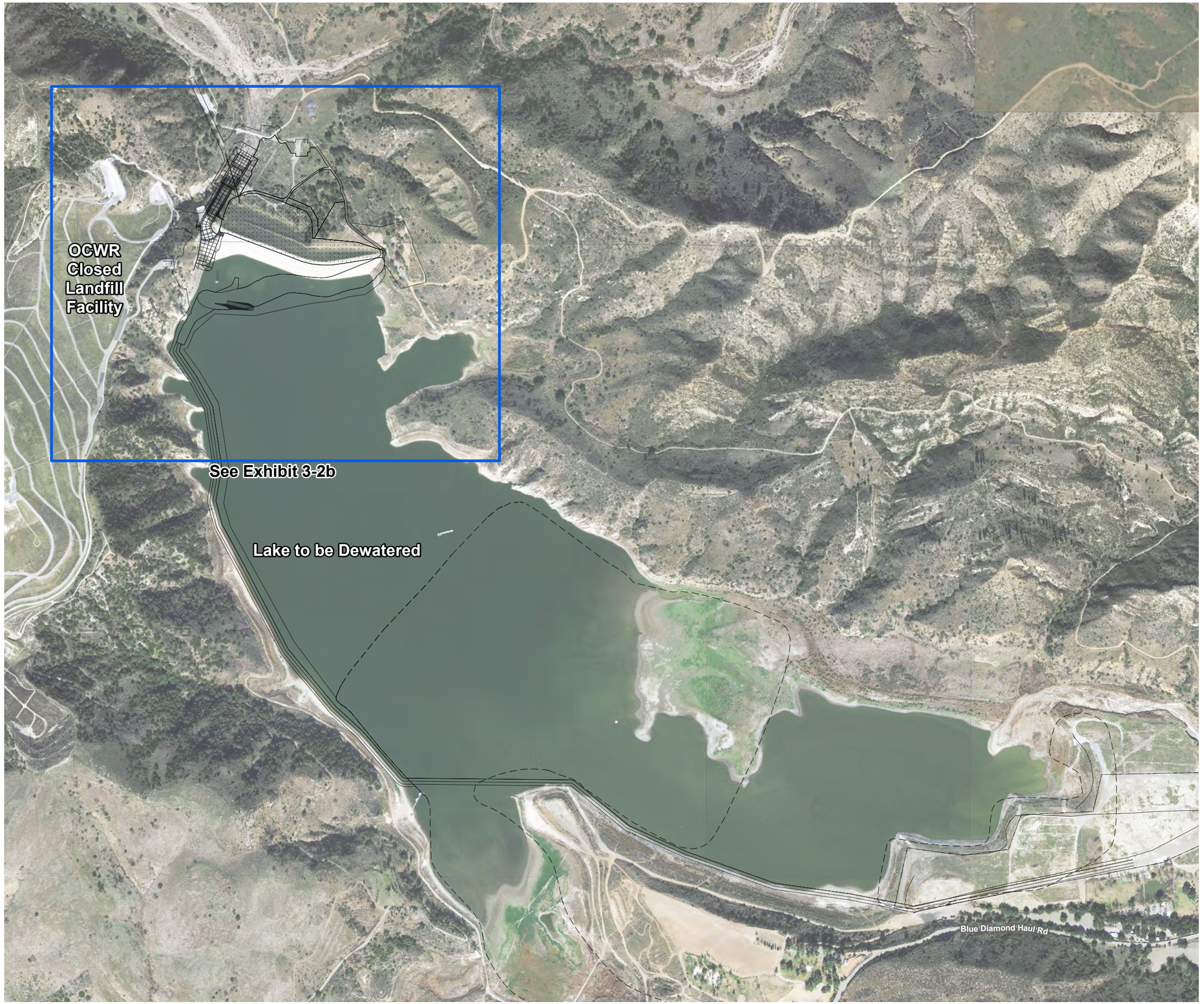
Each platform location would contain an approximately 30-inch steel riser pipe extending vertically from the inclined 54-inch steel pipe that would act as an intake for reservoir water into the 54-inch pipe. Each riser from the structure would include an intake fish screen. A plan and profile arrangement of the proposed inclined inlet/outlet structure is shown on Exhibit 3-4, Conceptual Inlet/Outlet Structure Plan and Profile.

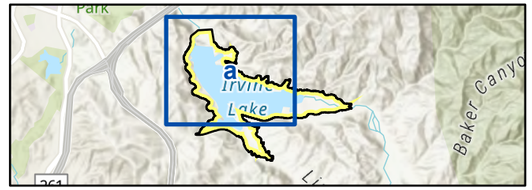
The proposed inclined inlet/outlet structure would be configured to incorporate the new outlet structure, including new valves and fittings. Water from the lake would enter the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow to the ILP or the emergency outlet pipeline. Water that enters the ILP would reach IRWD's distribution system. Water that enters the emergency outlet pipeline would be released to the creek near the end of the new spillway.

Intake Risers and Platforms

The proposed inclined inlet/outlet structure would consist of seven approximately 30-inch riser pipes spaced in approximately 10-foot vertical increments down the cut slope from approximately the 780-foot elevation contour to the 720-foot elevation contour. This spacing provides IRWD with operational flexibility by allowing water to be drawn from the reservoir at different depths depending on the water quality in the reservoir and other operational considerations.

Each riser pipe would be outfitted with an approximately 36-inch-diameter intake fish screen with an approximately 30-inch-diameter outlet that would act to inhibit debris, silt, and aquatic life from entering the 36-inch steel pipe. At each riser location, a metal platform consisting of stainless-steel posts, beams, grating, and guardrail would provide maintenance access when the reservoir





*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.

N
W E
S

0 400 800
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Santiago Dam Construction Features

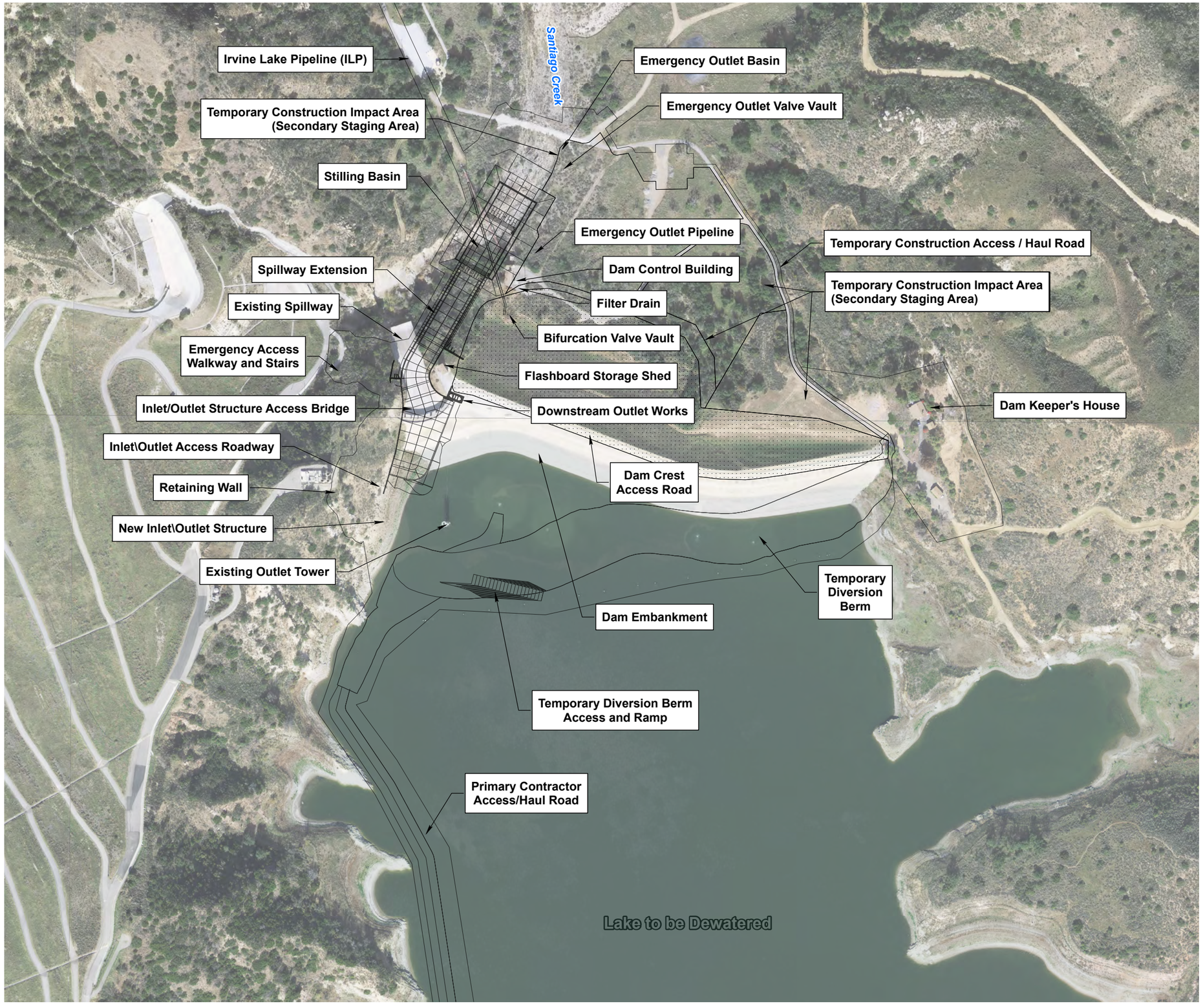
Exhibit 3-2a

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Dam_Features_A.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Construction_Dam_Area_A



*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.

N
W E
S

0 150 300
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Santiago Dam Construction Features

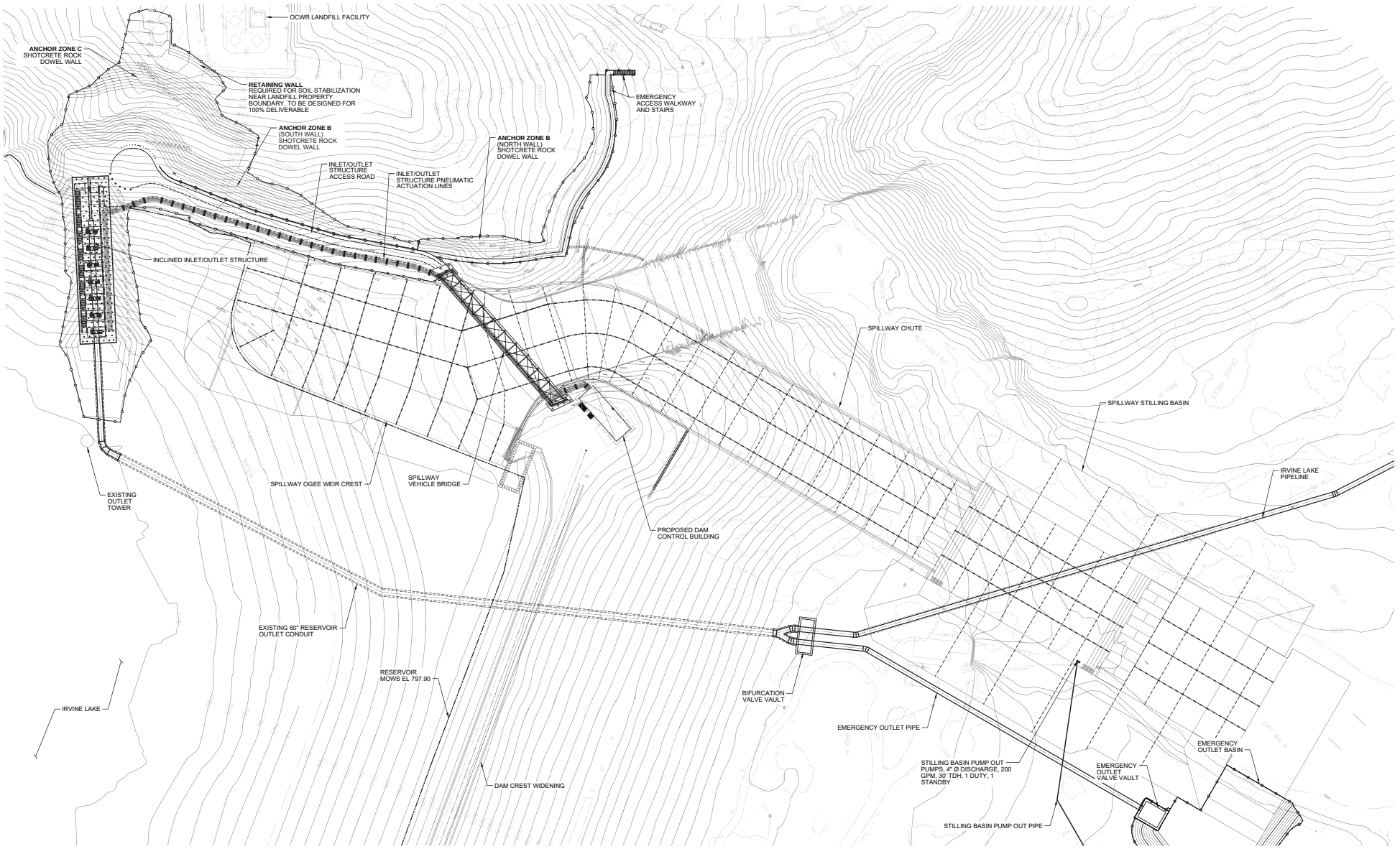
Exhibit 3-2b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Dam_Features_B.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Construction_Dam_Area_B



Source: AECOM and Irvine Ranch Water District, 2023

Inlet/Outlet Works General Arrangement Plan

Exhibit 3-3

Santiago Creek Dam Improvement Project

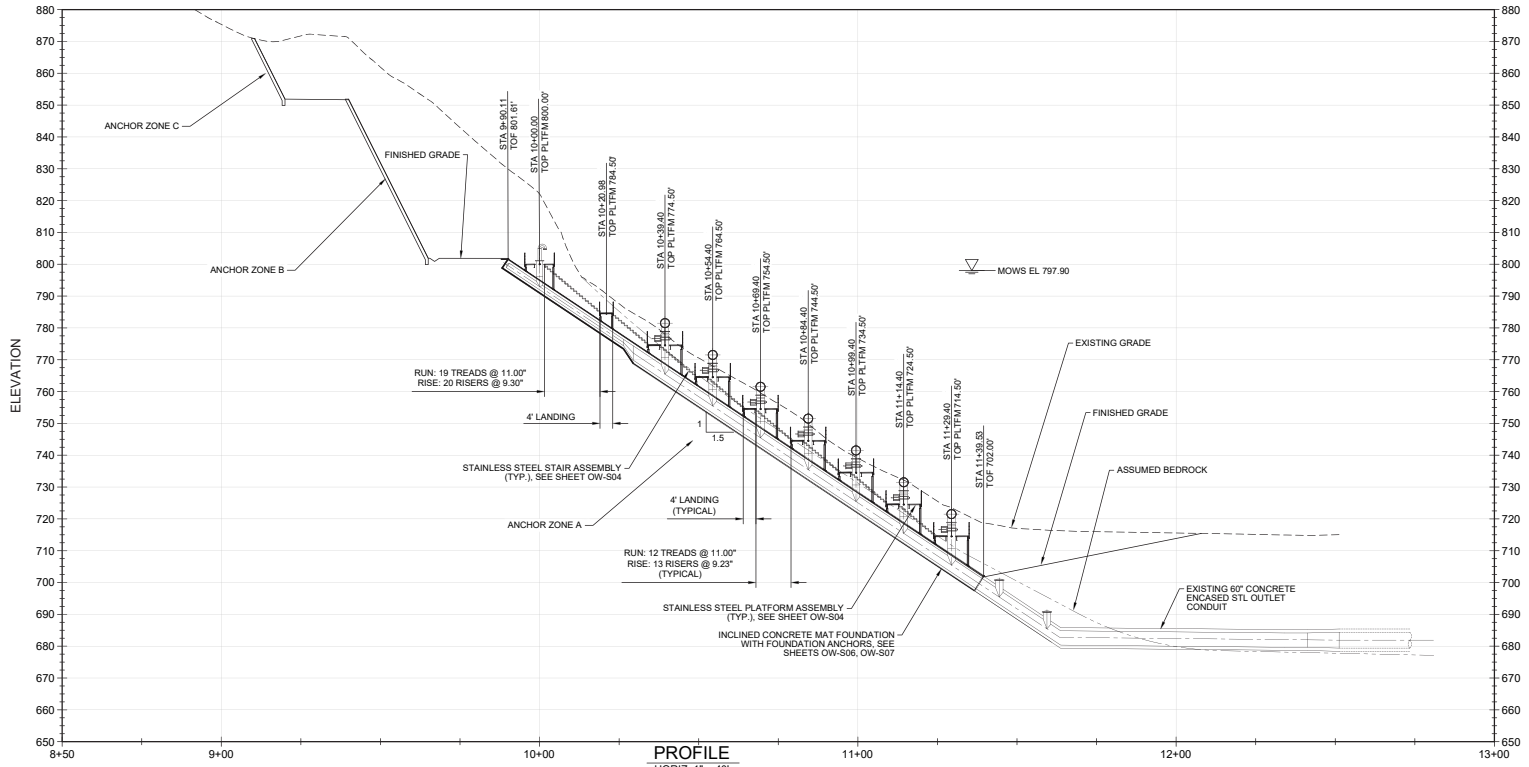
W S N m

Map not to scale

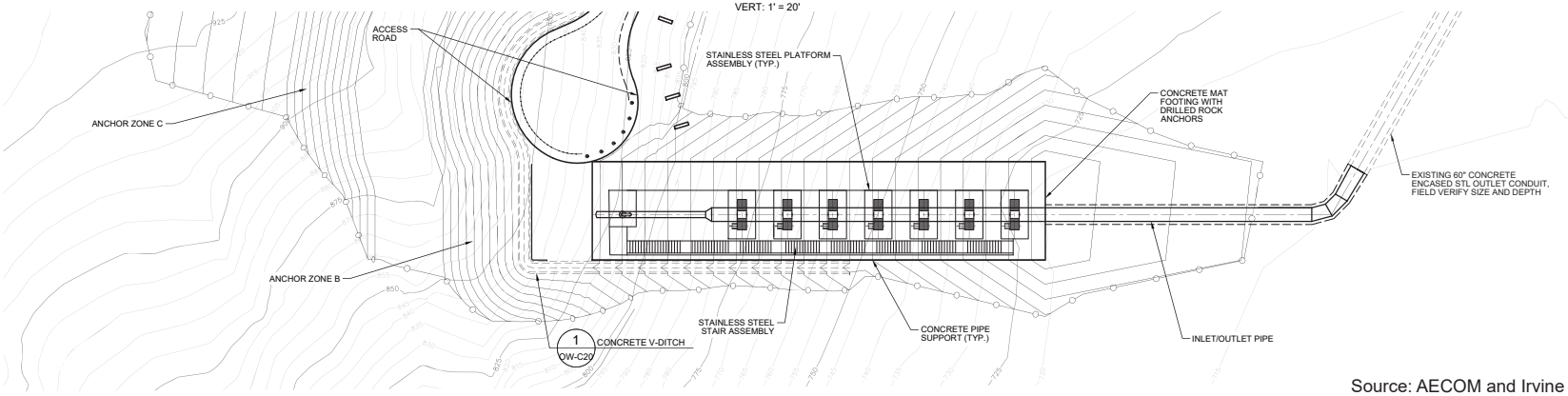
PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-3.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-3.ai



PROFILE
HORIZ: 1" = 40'
VERT: 1' = 20'



Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Inlet/Outlet Structure Plan and Profile

Exhibit 3-4

Santiago Creek Dam Improvement Project

N W E S

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-4.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-4.ai

is drawn down. A metal stairway consisting of stringers, posts, handrail, and stair treads would also be provided to connect the individual platforms.

Downstream Outlet Works

Bifurcation Valve Vault

A new bifurcation valve vault would be constructed near the terminus of the new spillway structure to direct flow either to the ILP or Santiago Creek. Access to the interior of the vault would be through an access hatch and metal ladder with appropriate safety measures. Inside the vault would be two approximately 54-inch valves. One valve would direct flow to the downstream ILP, while the other valve would direct flow to the emergency outlet pipe. A conceptual layout of the bifurcation valve vault is illustrated on Exhibit 3-5, Conceptual Valve Vault Plan and Sections. The exact location would be determined based on final design within the Project boundary.

Emergency Outlet Valve Vault

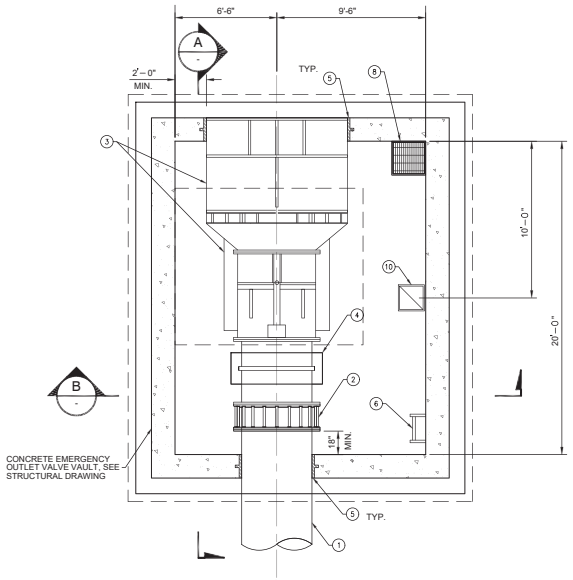
The proposed emergency outlet pipe would terminate at the emergency outlet valve vault to be located near the end of the proposed energy dissipater basin for the new spillway structure as described below. The emergency outlet facility would include a means to control flow and dissipate energy as water is released into Santiago Creek. Erosion control measures would be implemented to minimize the potential for erosion in the creek. The vault would contain an approximately 54-inch fixed-cone valve with discharge hood that would dissipate the energy of the high-velocity emergency discharge flow prior to release into the existing Santiago Creek. The proposed layout of the emergency outlet valve vault is illustrated on Exhibit 3-6, Conceptual Emergency Outlet Valve Vault Plan and Sections.

Spillway

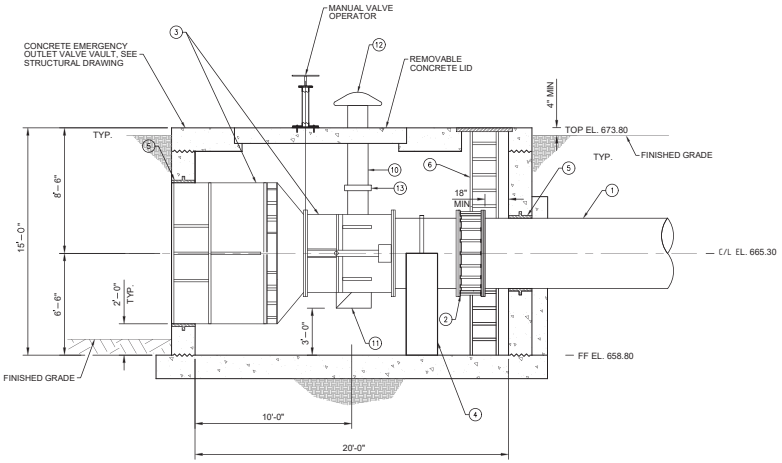
In addition to the modifications to the existing outlet works, the existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment of the dam. The proposed replacement consists of three components: a concrete side-channel control structure, a concrete-lined rectangular chute, and a downstream stilling basin for energy dissipation. The overall length of the replacement spillway structure would be approximately 930 to 1,100 feet. The proposed layout of the spillway is illustrated on Exhibit 3-7, Conceptual Spillway General Arrangement.

The side-channel control structure would consist of a crest control structure, left and right tieback walls, and reinforced concrete slab. The spillway control structure would consist of an approximately 350-foot-long ogee weir with a crest at an approximate elevation of 797.9 feet. The long side of the weir would be approximately 260 feet long and generally perpendicular to the embankment, while the short side of the weir would be approximately 90 feet long and generally parallel to the embankment. The long side and short side would be joined by an approximately 50-foot-radius curve. The weir structure has an ogee-shaped cross section and, due to the longer weir length required to pass the probable maximum flood (PMF)[3] at an approximate elevation of 797.9 feet, the weir would extend into the reservoir in an L-shaped alignment. This alignment was selected as a result of several constraints at the site including the footprint of the dam embankment, the location of the sloped outlet structure, and the steeply sloped hillside along the left abutment.

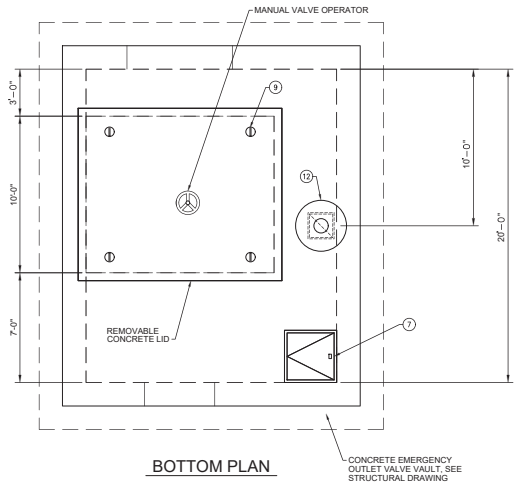
[3] The Probable Maximum Flood (PMF) is a hypothetical flood event. The definition of the PMF is a flood that can be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in a region.



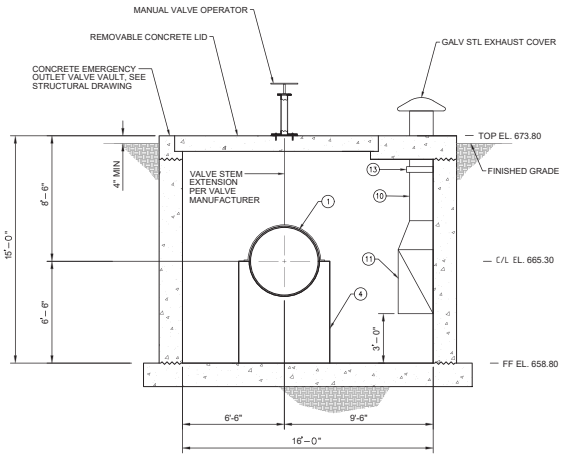
TOP PLAN



SECTION A



BOTTOM PLAN



SECTION B

CONSTRUCTION NOTES (DRAFT)

1. 54" CML&C STL EMERGENCY OUTLET PIPE, T=3/8", EXTEND MORTAR COATING MIN. 3" INSIDE VAULT
2. 54" DISMANTLING COUPLING
3. 54" FIXED CONE VALVE WITH 108" DISCHARGE HOOD
4. CONCRETE CRADLE SUPPORT PER DETAIL 1 SHEET OW-M05
5. WALL PENETRATION PER DETAIL 2 AND 3 SHEET OW-M05
6. METAL ACCESS LADDER WITH SAFETY POST PER DETAIL 8, SHEET OW-S13 IN ACCORDANCE WITH IRWD SPEC 05120
7. 36" SQ ACCESS HATCH, ALUMINUM CHECKER PLATE, DOUBLE LEAF, CHANNEL FRAME, SPRING ASSISTED, HINGED, RECESSED LOCKING, PEDESTRIAN RATED
8. 14" SQUARE X 18" DEEP CONCRETE SUMP WITH FIBERGLASS GRATE AND FRAME AND SUMP PUMP PER IRWD STD DWG G-6, TYPE 2
9. LIFTING LUG PER DETAIL 5 SHEET OW-M05
10. 12" SQ GALV STL EXHAUST AIR DUCTING
11. 2,400 CFM CENTRIFUGAL, DIRECT DRIVE, INLINE, EXHAUST FAN EF-3 (SEE ELECTRICAL SHEET E-06), MODEL SQ-12-M2-VG, 1.25 IN. W.G., 2 HP, 208V, 3PH, 60HZ
12. GALV STL EXHAUST COVER
13. DUCT SUPPORT
14. FOUNDATION SUBGRADE PREPARATION PER SPECIFICATION 02201

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Emergency Outlet Valve Vault Plan and Sections

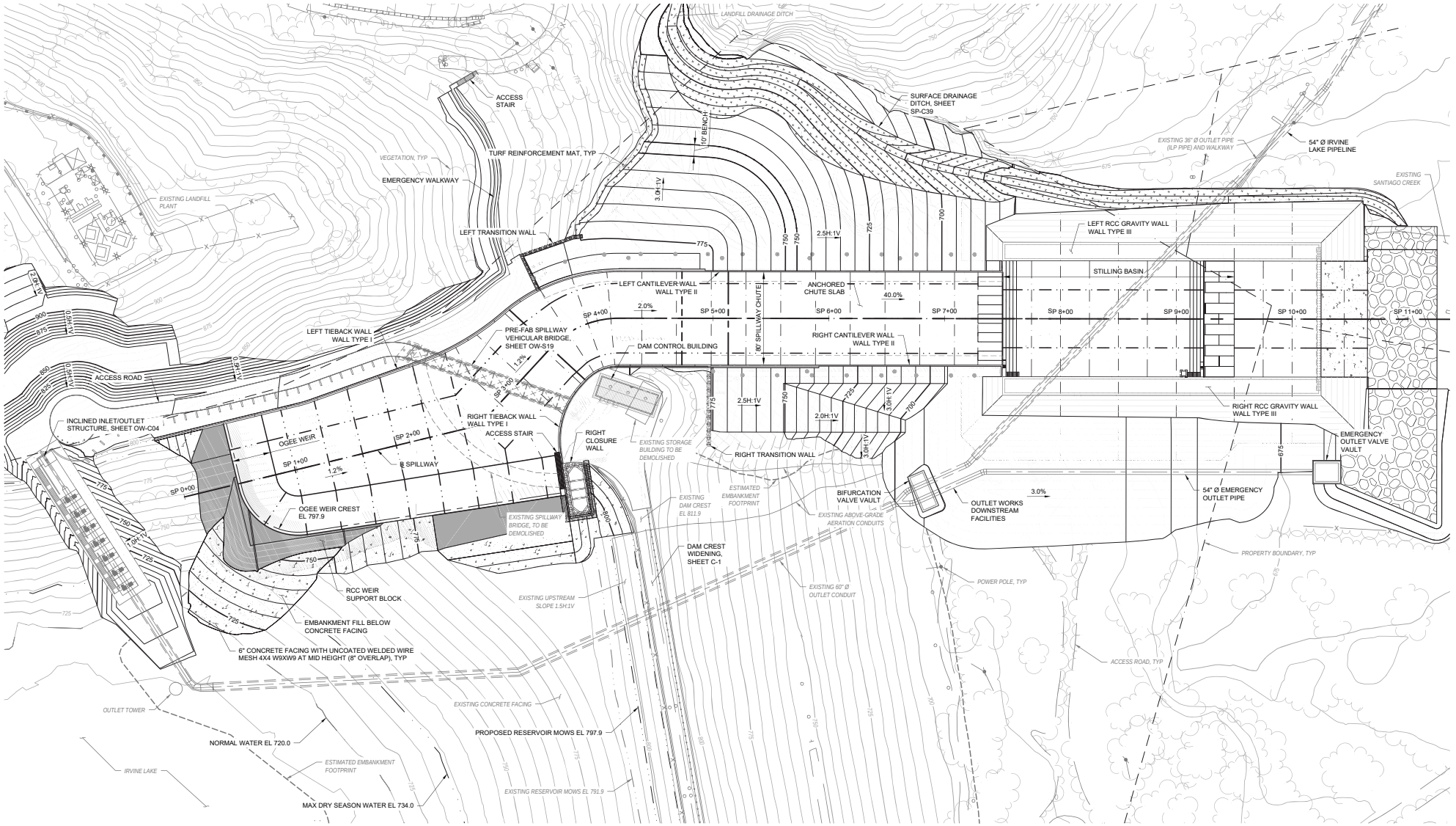
Exhibit 3-6

Santiago Creek Dam Improvement Project

Map not to scale

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-6.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-6.ai



Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Spillway General Arrangement

Exhibit 3-7

Santiago Creek Dam Improvement Project

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-7.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-7.ai

To ensure the spillway structure is constructed on sound foundational material, many areas under the spillway structure would include the placement of roller compacted concrete (RCC). Placement of RCC would vary depending on the geologic conditions exposed during construction, but the majority of the spillway foundation is expected to receive RCC treatment. In addition, the floor of the spillway would be anchored into bedrock materials. This includes drilling, grouting, post-tensioning and securing the anchors into the spillway slab.

The spillway chute is reinforced concrete and has a rectangular cross section with a bottom width that varies between approximately 80 feet and 128 feet and a total length of approximately 300 to 500 feet. The spillway chute varies in slope from approximately 2 percent slope from the end of the side-channel control structure to an approximately 35 to 45 percent slope, where the stilling basin begins. The chute walls consist of two wall types: tieback and cantilever.

The stilling basin consists of an approximately 100-foot-long section with a vertical drop of approximately 10 to 15 feet, five baffle blocks, and an approximately 150- to 200-foot-long flat section before discharging to a concrete and riprap apron. The walls of the spillway structure range in height from approximately 40 feet to 60 feet high and consist of tieback walls and RCC walls. At the end of the stilling basin, a scour protection cutoff is provided for additional mitigation of head cutting that may occur during significant discharges.

During construction, concrete crushing would occur in one of the staging areas, which may include the primary staging area as shown on Exhibit 3-8, Conceptual Primary Contractor Staging Area Plan. Concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may also occur at various stages of the Project as concrete is removed from the existing spillway or dam. When feasible, demolished and removed materials would be recycled or reused.

Pipelines

The existing ILP travels over Santiago Creek and is supported on piers. Historically, this pipeline has washed out during high flow events through the spillway and Santiago Creek. As part of the Project, approximately 1,000 linear feet of the ILP near the dam would be upsized from 36 inches to approximately 54 inches to match the inlet/outlet pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line and to improve the hydraulic performance of the system. These relocation and upsizing improvements would protect the pipeline from future flood events, thereby enhancing the overall reliability of delivering water from Irvine Lake to customers and would improve the system's hydraulics. Increasing the pipe size from Irvine Lake to the opposite side of Santiago Creek would improve system pressures for downstream customers.

Irvine Lake Pipeline Relocation

The proposed spillway alignment would conflict with the existing 36-inch above-grade ILP and catwalk assembly that spans Santiago Creek downstream of the existing dam. The ILP would be relocated below ground and routed underneath the proposed spillway structure. A new portion of the ILP would extend from the dam to the opposite side of Santiago Creek where it would connect with the existing ILP. The preliminary horizontal and vertical alignment for the proposed ILP relocation is provided on Exhibit 3-9, Conceptual Irvine Lake Pipeline Plan and Profile. From the bifurcation valve vault, the ILP would be routed downward to get below the proposed spillway footing. Once the ILP has crossed the spillway, it would then angle upward again to connect back to the existing buried portion of the ILP.

NOTES

1. CONTRACTOR SHALL EXERCISE CAUTION IN THE VICINITY OF THE UTILITY LINE CROSSING THE ACCESS ROAD AND RELOCATE IT IF DEEMED NECESSARY FOR SAFETY.
2. SURPLUS FILL DISPOSAL AREA FOR TEMPORARY DIVERSION BERM SOIL DISPOSAL LOCATION AND VOLUME OF FILL TO BE APPROVED BY DISTRACT.
3. MULTIPLE AGENCIES HAVE ACCESS TO ROLLING GATE. CONTRACTOR SHALL INSTALL FENCING TO PROTECT LAYDOWN AREA AND TRAILERS AT THE ROLLING GATE DURING CONSTRUCTION. CONTRACTOR SHALL REPLACE GATE DURING CLOSEOUT.
4. CONTRACTOR SHALL TRIM TREES ALONG ACCESS ROAD TO ENSURE ALL CONSTRUCTION VEHICLES DO NOT DAMAGE LANDSCAPING AND SURROUNDING AREA.

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Primary Contractor Staging Area Plan

Exhibit 3-8

Santiago Creek Dam Improvement Project

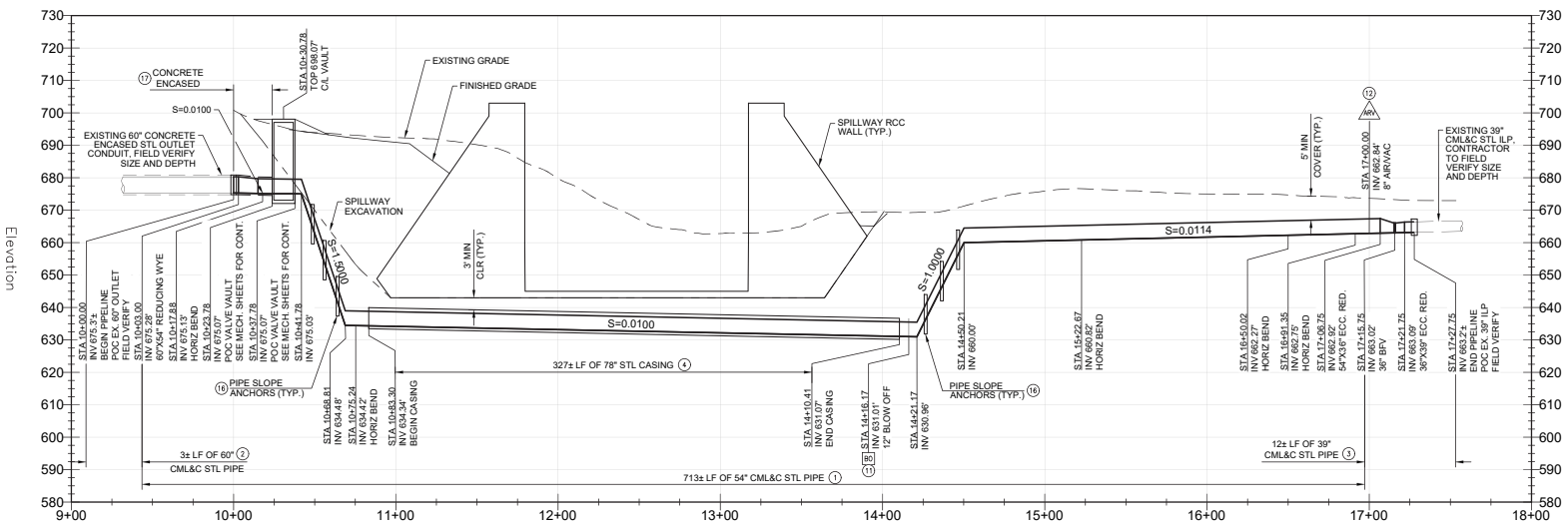
N
W E
S

Map not to scale

PSOMAS

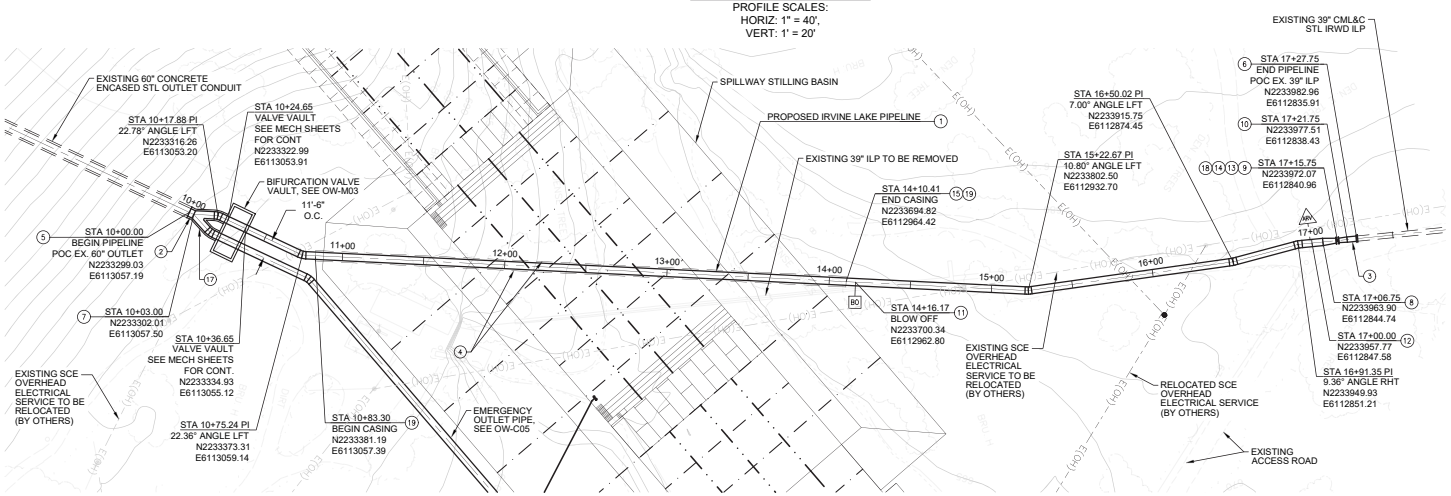
(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-8.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-8.ai



PROFILE

PROFILE SCALES:
HORIZ: 1" = 40',
VERT: 1' = 20'



GENERAL NOTES

1. CONTRACTOR TO FIELD VERIFY SIZE, LOCATION, AND DEPTH OF EXISTING OUTLET CONDUIT AND ILP PRIOR TO PIPE FABRICATION AND INFORM THE ENGINEER OF ANY DISCREPANCIES FROM WHAT IS PROVIDED HEREON.
2. MINIMUM PIPE DESIGN PRESSURE IS 100 PSI.
3. ALL PIPE TRENCHES SHALL BE IN ACCORDANCE WITH IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C12.
4. ALL NON-WELDED PIPE JOINTS SHALL BE BONDED PER IRWD STD DWG CP-9 SHOWN ON DETAIL 2, DWG OW-C14.
5. ALL BURIED PIPE JOINTS SHALL BE FULL FILLET WELDED LAP JOINTS, DOUBLE WELDED, WITH ONE INSIDE WELD AND ONE OUTSIDE WELD, MIN. TWO PASSES EACH, PER IRWD STD DWG W-20 SHOWN ON DETAIL 1 AND 2, DWG OW-C22.
6. CONTRACTOR SHALL PROVIDE INTERNAL PIPE ACCESS AS REQUIRED FOR INSPECTION AND APPROVAL.

CONSTRUCTION NOTES (DRAFT)

(1) 54" CML&C STL PIPE, T=3/8", DOUBLE WELDED LAP JOINTS PER IRWD STD DWG W-20 SHOWN ON DETAIL 2, DWG OW-C22, TRENCH PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C22

(2) 60" CML&C STL PIPE, T=3/8", DOUBLE WELDED LAP JOINTS PER IRWD STD DWG W-20 SHOWN ON DETAIL 2, DWG OW-C22, TRENCH PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C22

(3) 39" CML&C STL PIPE, T=1/4", DOUBLE WELDED LAP JOINTS PER IRWD STD DWG W-20 SHOWN ON DETAIL 2, DWG OW-C22, TRENCH PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C22

(4) 54" CML&C STL CARRIER PIPE IN 78" STL CASING PIPE, T=5/8", FULL CIRCUMFERENCE BUTT-WELDED JOINTS PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C22, TRENCH PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C12

(5) CONNECT TO EXISTING 60" OUTLET CONDUIT PER DETAIL 1, DWG OW-C23

(6) CONNECT TO EXISTING 39" CML&C STL ILP PER SHEET D-03

(7) 60"X54" CML&C STL, T=3/8", ECCENTRIC REDUCING 22.5° TRUE-WYE WITH OUTLET REINFORCEMENT PER AWWA M11, CONCRETE ENCASED

(8) 54"X36" CML&C STL, T=3/8", ECCENTRIC REDUCER

(9) 36" BFV, CL 150, FE X FE, PER IRWD DWG W-22 AND W-23 SHOWN ON DETAIL 1, DWG OW-C18 AND DETAIL 1, DWG OW-C13

(10) 39"X36" CML&C STL, T=1/4", ECCENTRIC REDUCER

(11) 12" BLOWOFF ASSEMBLY PER IRWD STD DWG W-14 SHOWN ON DETAIL 1, DWG OW-C15

(12) 8" AIR/VAC VALVE ASSEMBLY PER DETAIL 2, DWG OW-C20

(13) FLANGE INSULATING KIT ASSEMBLY PER IRWD STD DWG CP-10 SHOWN ON DETAIL 2, DWG OW-C12

(14) INSULATOR TEST STATION ASSEMBLY PER IRWD STD DWG CP-3 SHOWN ON DETAIL 3, DWG OW-C11

(15) CASING CATHODIC PROTECTION TEST STATION PER IRWD STD DWG CP-3 SHOWN ON DETAIL 2, DWG OW-C11

(16) CONCRETE SLOPE ANCHORS PER IRWD STD DWG G-10 SHOWN DETAIL 1, DWG OW-C14, EQUAL SPACING, 15' O.C. MAX

(17) CONCRETE PIPE ENCASEMENT PER DETAIL 3 ON DWG OW-C22

(18) INSTALL 39" BLIND FLANGE FOR TEMPORARY CONSTRUCTION ISOLATION TO ILP

(19) REFER TO DETAIL 3, DWG OW-C20 FOR PIPE CASING INFORMATION

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Irvine Lake Pipeline Plan and Profile

Exhibit 3-9

Santiago Creek Dam Improvement Project

Map not to scale

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-9.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-9.ai

Emergency Outlet Pipeline

The emergency outlet pipeline would be routed from the bifurcation valve vault to the emergency outlet valve vault as shown on Exhibit 3-10, Conceptual Emergency Outlet Pipe Plan and Profile. The horizontal alignment would parallel the right gravity wall of the proposed spillway structure, and the pipe would be placed in the backfill for the RCC gravity wall. The pipe would slope to drain to Santiago Creek.

Embankment Improvements

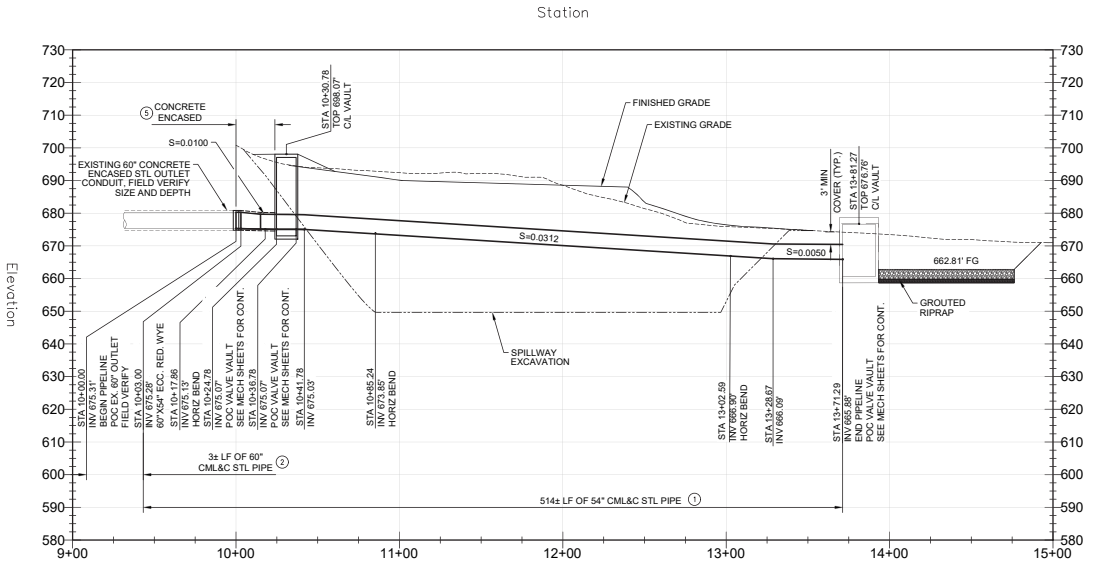
The Project includes improvements to the dam crest to improve the accessibility and overall and seismic performance of the embankment as shown in Exhibit 3-11, Conceptual Embankment Improvements. The improvements include removing the upper portion of the dam to a depth at least 15 feet below the dam crest as discussed in more detail in Section 3.12, Construction Detail, below. On the downstream side of the embankment, the Project includes removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material which is composed of pervious material. The filter drain system would include a layer of filter material, then a layer of drain material, and then a layer of transition materials. The filter material would be designed to trap sediment. The drain layer would be more porous in nature and designed to allow filtered water to pass through. A layer of transition materials would be installed atop the filter and drain layers and would be composed of sandy materials intended to keep the drain in place. Finally, an outer shell layer comprised of pervious material would be installed to stabilize the underlying layers and minimize erosion along the embankment. The Project would also involve widening the dam crest to approximately 35 to 45 feet and raising the elevation by up to approximately one foot; which would improve access and safety for dam maintenance. The paved dam crest would include protective railings on both sides of the road and replacement piezometers to monitor the performance of the embankment dam. These embankment improvements would require excavations along the toe of the dam to key in the earthwork improvements to the face of the dam.

Ancillary Site Improvements

Ancillary site improvements proposed for the Project, including a new inlet/outlet access roadway and bridge, a new dam control building, widening and raising the existing dam crest, new emergency access walkway and stairs, and a new spillway bridge are discussed in more detail below.

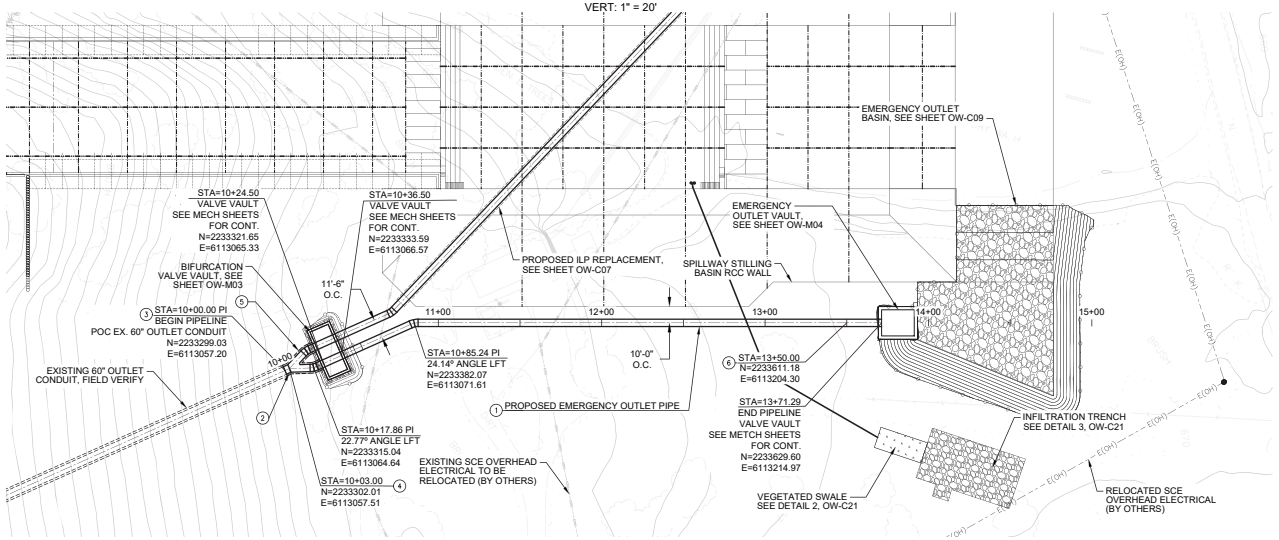
Inlet/Outlet Structure Access Roadway and Bridge

A new approximately 12-foot wide, gravel paved roadway would be constructed to provide access from the dam crest, across the spillway channel, and to the top of the new inlet/outlet structure as shown on Exhibit 3-12, Conceptual Inlet/Outlet Structure Access Road Plan and Profile. A new 160-foot-long steel bridge structure would be constructed to provide vehicle access from the dam crest, across the spillway channel, and to the top of the inlet/outlet structure. The bridge would be approximately 12 feet wide and span the upper portion of the spillway structure. The structure would be used to convey utilities to the inclined outlet structure and would be designed to support maintenance vehicles that would service the inclined outlet structure. The bridge would be supported on piles located on the left and right sides of the spillway structure. The new access road would terminate in a cul-de-sac type turn-around at the top of the inlet/outlet structure. A shotcrete tie-back wall would be required to cut the proposed roadway into the existing slope without affecting the existing landfill facilities above. The horizontal and vertical alignment of the proposed access road and vehicle bridge are illustrated on Exhibit 3-13, Conceptual Spillway Vehicle Bridge Plan.



EMERGENCY OUTLET PIPE PROFILE

PROFILE SCALES:
HORIZ: 1" = 40',
VERT: 1" = 20'



GENERAL NOTES

1. CONTRACTOR TO FIELD VERIFY SIZE, LOCATION, AND DEPTH OF EXISTING OUTLET CONDUIT AND ILP PRIOR TO PIPE FABRICATION AND INFORM THE ENGINEER OF ANY DISCREPANCIES FROM WHAT IS PROVIDED HEREON.
2. MINIMUM PIPE DESIGN PRESSURE IS 100 PSI.
3. ALL PIPE TRENCHES SHALL BE IN ACCORDANCE WITH IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C12.
4. ALL NON-WELDED PIPE JOINTS SHALL BE BONDED PER IRWD STD DWG CP-9 SHOWN ON DETAIL 2 ON DWG OW-C14.
5. ALL BURIED PIPE JOINTS SHALL BE FULL FILLET WELDED LAP JOINTS, DOUBLE WELDED, WITH ONE INSIDE WELD AND ONE OUTSIDE WELD, MIN. TWO PASSES EACH, PER IRWD STD DWG W-20 SHOWN ON DETAIL 1 AND 2 ON DWG OW-C22.
6. CONTRACTOR SHALL PROVIDE INTERNAL PIPE ACCESS AS REQUIRED FOR INSPECTION AND APPROVAL.

CONSTRUCTION NOTES

1. 54" CML&C STL PIPE, T=3/8", DOUBLE WELDED LAP JOINTS PER IRWD STD DWG W-20 SHOWN ON DETAIL 2, DWG OW-C22, TRENCH PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C12
2. 60" CML&C STL PIPE, T=3/8", DOUBLE WELDED LAP JOINTS PER IRWD DWG W-20 SHOWN ON DETAIL 2, DWG OW-C22, TRENCH PER IRWD STD DWG W-17 SHOWN ON DETAIL 1, DWG OW-C12
3. CONNECT TO EXISTING 60" OUTLET CONDUIT PER DETAIL 1, DWG OW-C23
4. 60"X54" CML&C STL, T=3/8", ECCENTRIC REDUCING 22.5° TRUE-WYE WITH OUTLET REINFORCEMENT PER AWWA M11, CONCRETE ENCASED
5. CONCRETE PIPE ENCASEMENT PER DETAIL 3 ON DWG OW-C22
6. TWO-WIRE TEST STATION PER IRWD STANDARD PLAN CP-1 SHOWN ON DETAIL 1, DWG OW-C11

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Emergency Outlet Pipe Plan and Profile

Exhibit 3-10

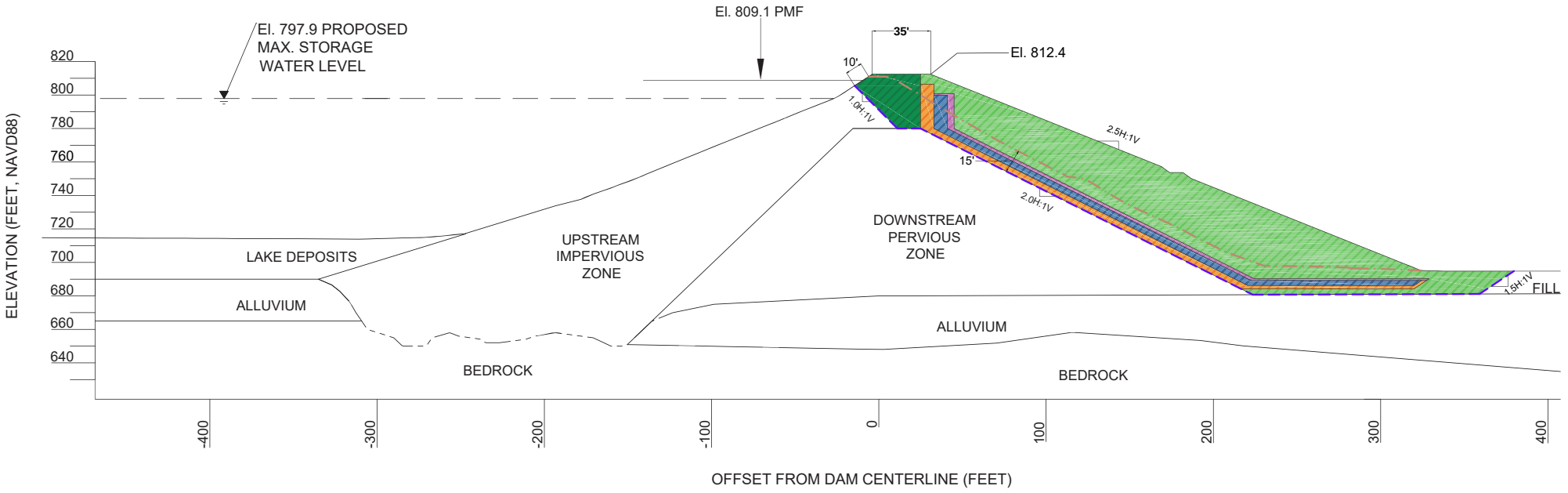
Santiago Creek Dam Improvement Project

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-10.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-10.ai



LEGEND:

PROPOSED MATERIALS

- SHELL
- TRANSITION
- DRAIN
- FILTER
- CORE

- EXCAVATION LIMITS
- EXISTING GRADE

NOTES:

1. ELEVATIONS PRESENTED CORRESPOND TO NAVD88 DATUM WHICH HAS BEEN CONVERTED FROM THE LOCAL PROJECT DATUM PRESENTED IN THE ORIGINAL CONSTRUCTION DOCUMENTS BY ADDING 1.9 FEET.
2. THE DAM CREST ELEVATION HAS BEEN RAISED TO 812.4 FT (0.5 FT INCREASE FROM THE EXISTING ELEVATION OF 811.9 FT) TO MEET DSOD PMF FREEBOARD REQUIRMENT.

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Embankment Improvements

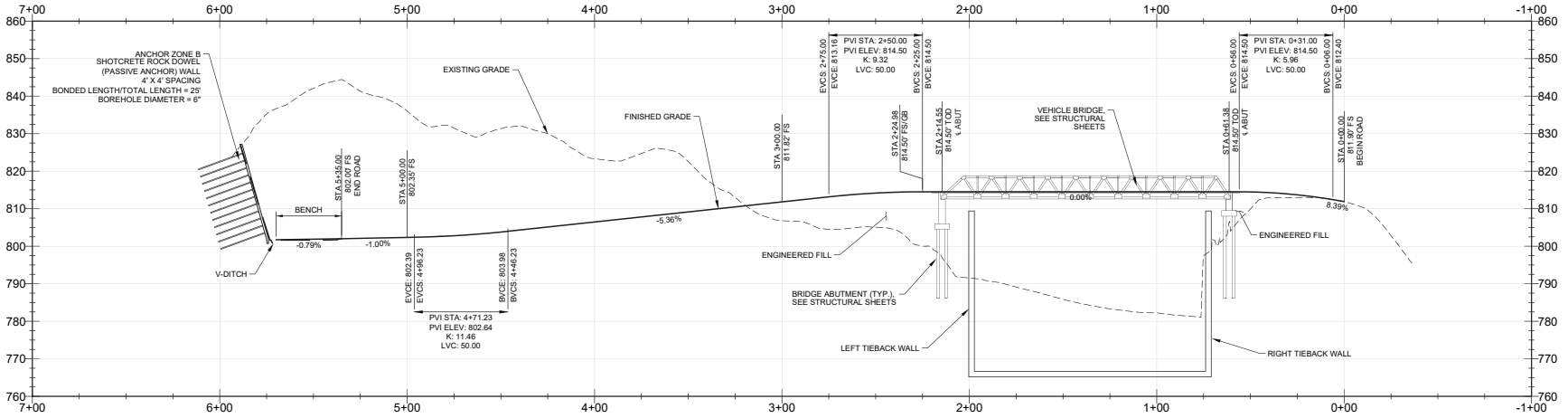
Exhibit 3-11

Santiago Creek Dam Improvement Project

Map not to scale

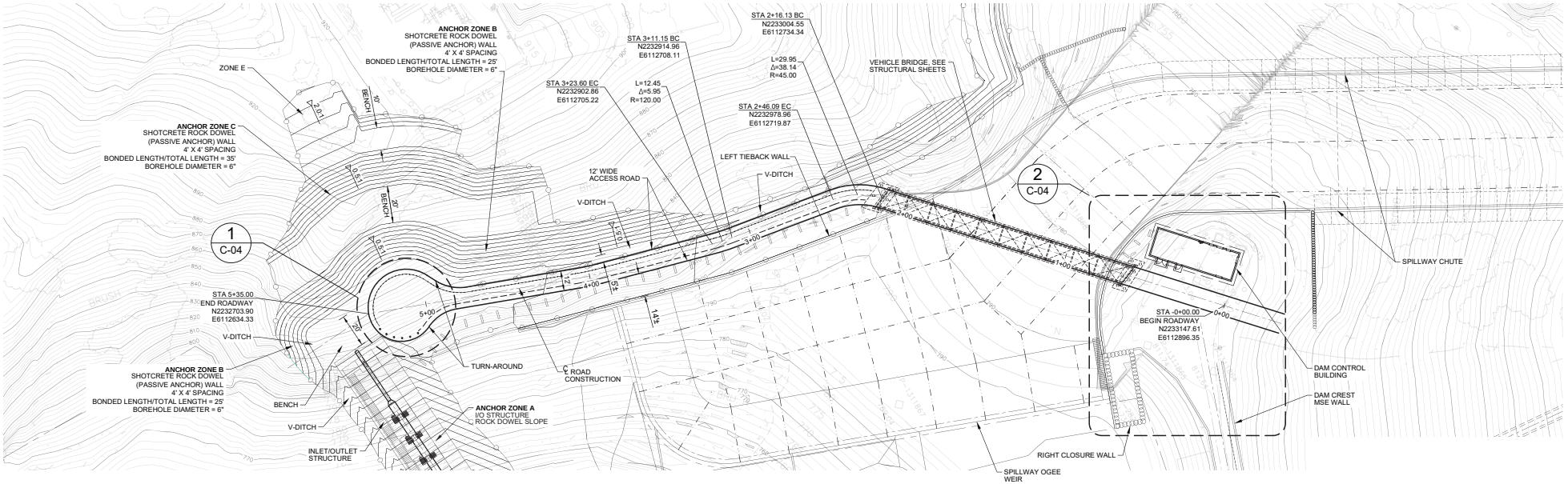
(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-11.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-11.ai



PROFILE

SCALES:
HORIZ: 1" = 30'
VERT: 1" = 15'



Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Inlet/Outlet Structure Access Road Plan and Profile

Exhibit 3-12

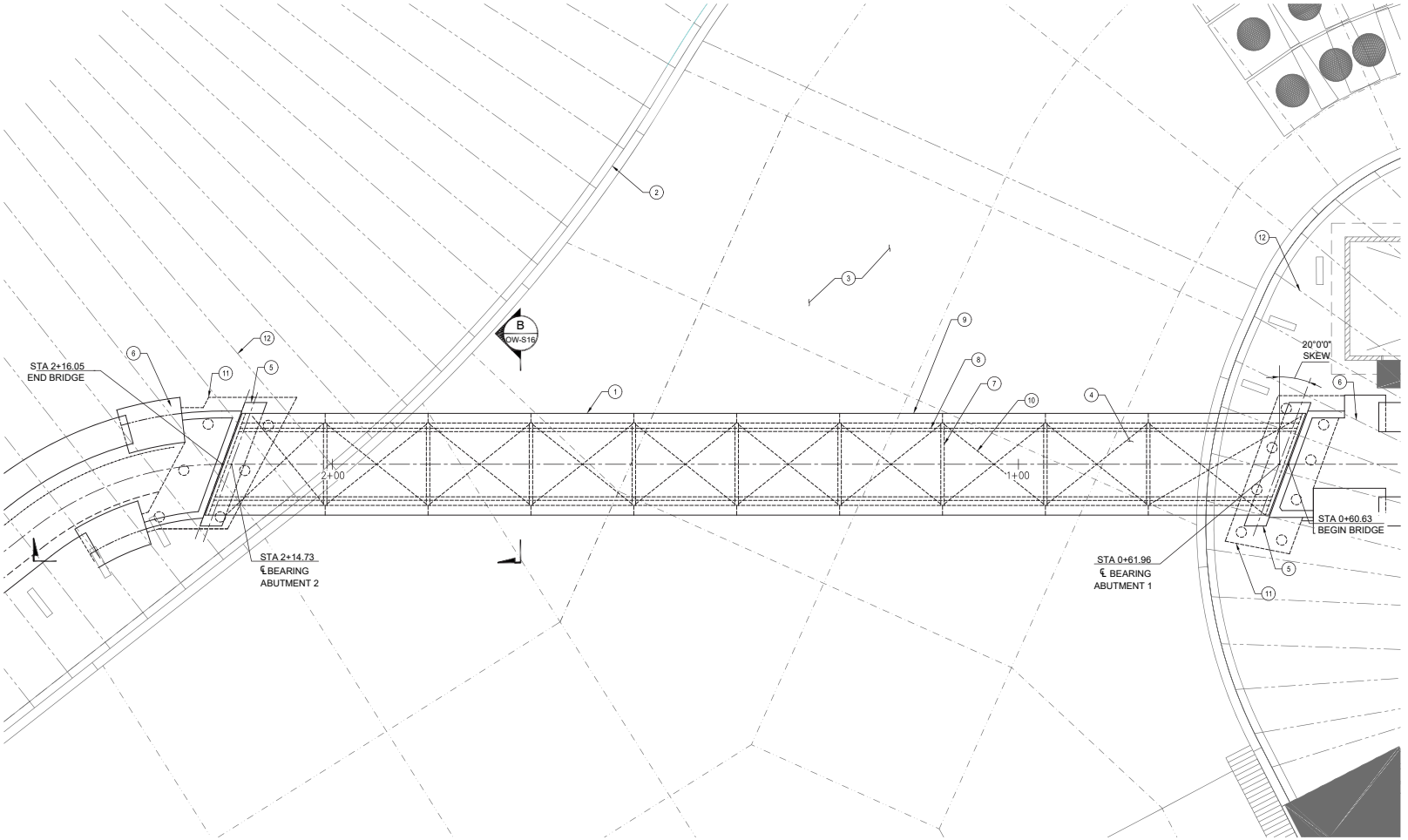
Santiago Creek Dam Improvement Project

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-12.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-12.ai



CONSTRUCTION NOTES (DRAFT)

1. PREFABRICATED/PRE-ENGINEERED STEEL TRUSS VEHICULAR BRIDGE
2. TIEBACK WALL
3. PROPOSED SPILLWAY
4. CIP CONCRETE BRIDGE DECK
5. ABUTMENT
6. WINGWALL
7. FLOOR BEAM
8. STRINGER
9. TOP CHORD
10. LATERAL BRACING
11. ABUTMENT FOUNDATION
12. TIEBACK

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Spillway Vehicle Bridge Plan

Exhibit 3-13

Santiago Creek Dam Improvement Project

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-13.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-13.ai

Dam Control Building

A new dam control building located on the dam crest near the spillway structure would be constructed to house the pneumatic system that operates the valves on the inclined outlet structure, the lake aeration systems, and the electrical and control equipment. The dam control building would be approximately 60 feet by 20 feet with a height of approximately 18 feet. The building, which would have a gable style roof, would be fire-hardened and constructed of non-combustible materials. The height of the interior of the building would allow for at least 12 feet of unobstructed clearance. The building is preliminarily sized to include what is required to house the pneumatic actuation system equipment as well as the reservoir aeration system equipment. A preliminary layout of the proposed dam control building is shown on Exhibit 3-14, Conceptual Dam Control Building Profile and Sections.

Existing Dam Crest Raise and Widening

The existing dam crest is currently only 10 feet wide, with portions that have become even narrower because of localized erosion of the downstream embankment. To increase safety and accessibility of the proposed inclined outlet structure, the existing dam crest would be widened from 10 feet to between 35 and 45 feet. The dam crest elevation would be raised and improvements would be constructed to ensure that vehicular traffic remains on the dam crest road. Metal beam guardrails would be provided on both the upstream and downstream sides of the new dam crest for safety. The dam crest widening and embankment improvements would include a slope stability analysis to meet minimum acceptable design criteria.

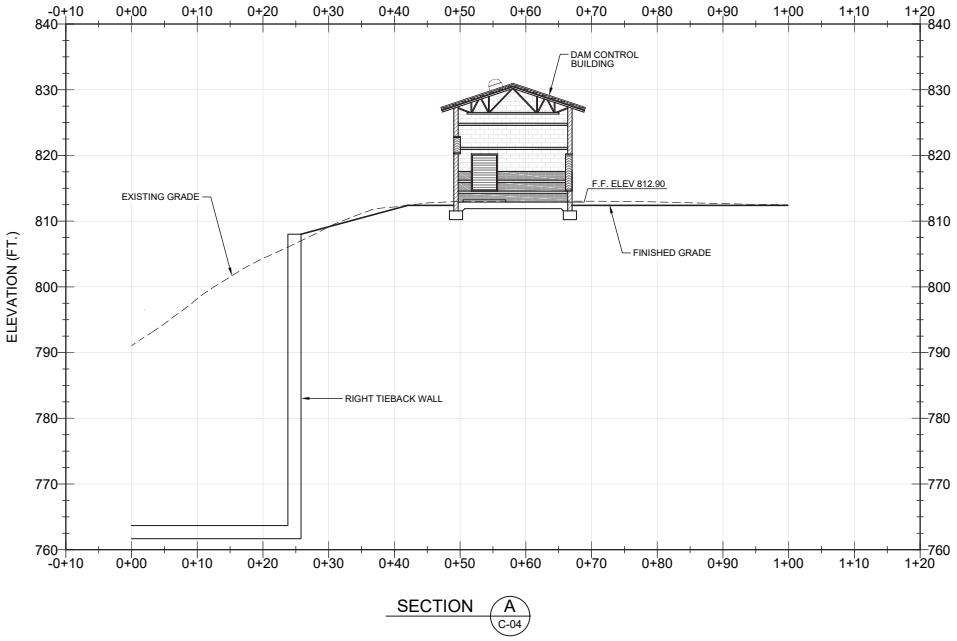
In addition to the dam crest widening, the dam crest would also be raised by up to approximately one foot on the upstream side of the dam crest. This would raise the effective dam crest from an elevation of 811.9 feet to up to approximately 812.9 feet for DSOD freeboard requirements during a PMF event, as well as help mitigate wave splashing and spray onto the dam crest during such an event. The wall would be designed for wave impact loads as well as vehicle impact loads.

Emergency Access Walkway and Stairs

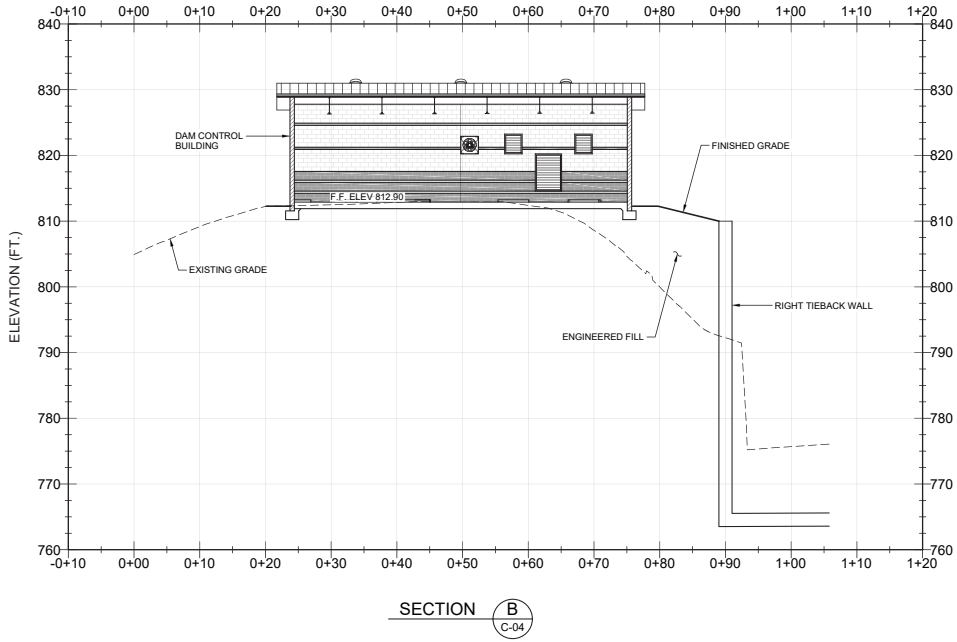
The existing orientation of the Santiago Creek Dam facilities does not allow for IRWD personnel to reach the crest of the dam during a reservoir spill event because the existing access road from Irvine Regional Park has an at-grade crossing through Santiago Creek, directly downstream of the new spillway outlet. Therefore, during a reservoir spill event, it would be impractical and unsafe for IRWD staff to use the existing access route to reach the dam crest. IRWD needs to have access to the dam crest during a spill event in order for operations staff to reach the new dam control building located on the dam crest. This control building would house the pneumatic actuation system as well as electrical and telemetry equipment for the new inclined inlet/outlet structure.

The primary emergency access route during a reservoir spill event would be from the adjacent closed Santiago Canyon Landfill Facility. At the termination of the landfill roadway, near the existing stormwater detention basin, a system of concrete walkways and stairs would be provided that would run along the left wall of the new spillway channel.

The walkway would be at least 5 feet wide to allow for mobile equipment and tools to have access. These structures would be cut into the existing hillside and be provided with handrailings for safety. The walkway would connect to the proposed inlet/outlet structure access road on the left abutment of the proposed spillway channel.



SECTION A C-04



SECTION B C-04

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Dam Control Building Profile and Sections

Exhibit 3-14

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-14.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-14.ai

3.7 SITE DEMOLITION

The Project requires that some of the existing site facilities be demolished or removed and relocated prior to construction as shown on Exhibit 3-15, Conceptual Demolition General Plan. The following existing features would be demolished or removed: vertical outlet tower and portions of 60-inch outlet conduit, significant portions (or possibly all) of the spillway chute and walls, spillway bridge and piers, portions of the upstream dam embankment concrete facing, storage building on the dam crest, outlet works control building and valve vault, outlet works energy dissipator vault, portions of the ILP, catwalk and stairs assembly across Santiago Creek, the dam keeper's house, boat shop (unless re-purposed for IRWD use), and piezometers/monitoring wells. Site demolition activities are anticipated to occur in 2027/2028, and spillway demolition is expected to occur in 2028. The potential removal of the boat shop building would occur at the end of the construction period in 2030. When feasible, demolished materials would be recycled or reused, as discussed in more detail under Section 3.12, Construction Detail, below. The exact timing of such demolition work is subject to change.

3.8 UTILITY RELOCATION

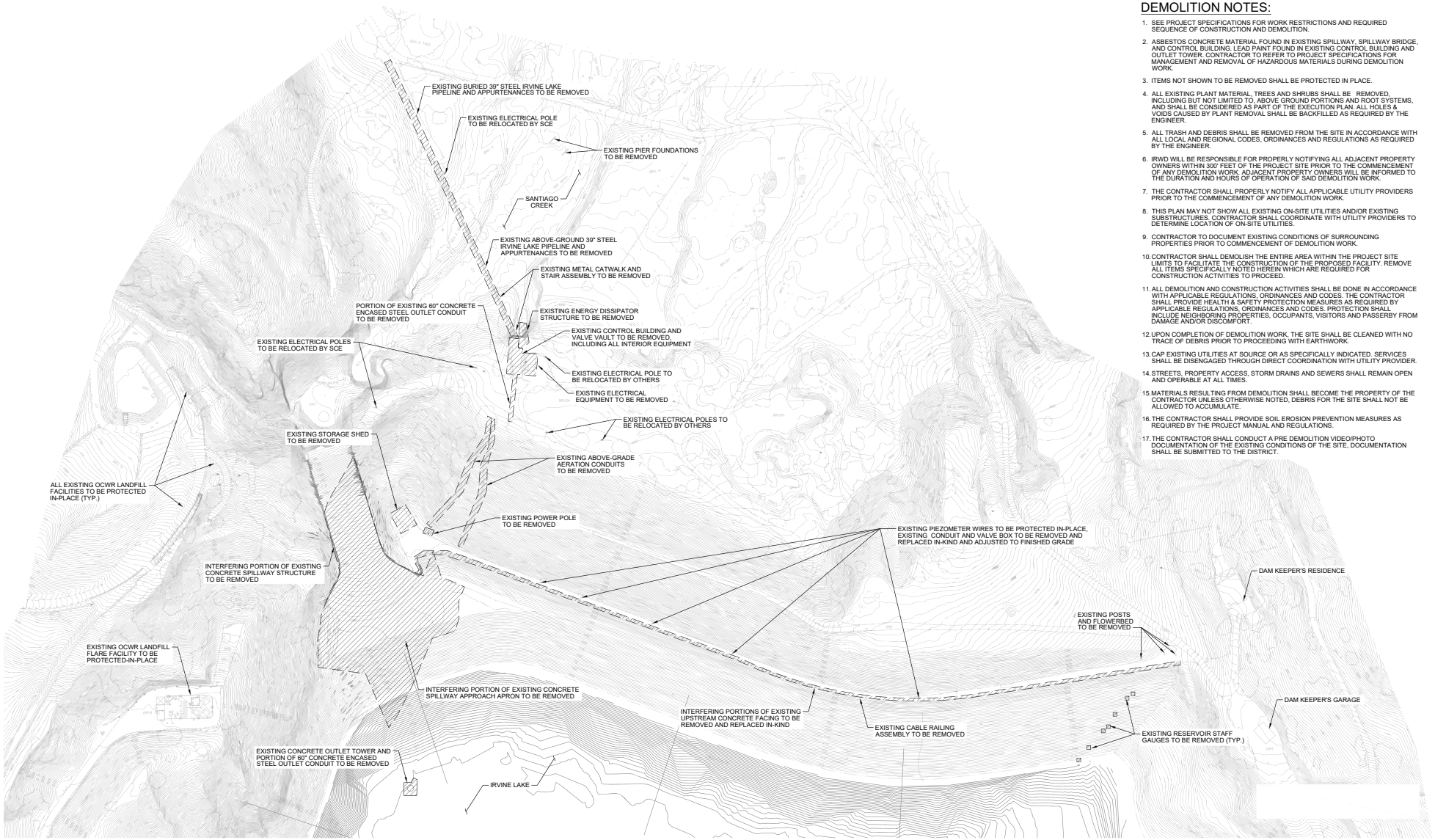
Construction of the Project would require the relocation of the existing Southern California Edison (SCE) overhead power lines and power poles located at the downstream toe of the dam within the Project vicinity. The existing power lines that currently pass over the existing spillway structure would be moved and placed outside of the construction limits. SCE would relocate the existing overhead electrical lines as shown on Exhibit 3-16, Conceptual SCE Site Plan. There is an approximately 15-foot-wide right-of-way (ROW) easement for long-term maintenance.

3.9 DEWATERING AND STREAM DIVERSION

Before beginning construction of the dam improvements, the lake would be dewatered, and an access road would be graded along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure as shown in Exhibit 3-1, General Arrangement Plan. IRWD would maximize withdrawals from Irvine Lake in the time leading up to construction initiation to minimize the amount required to be dewatered. The dewatering process would combine several methods including opening the critical valve to Santiago Creek to allow water from Irvine Lake to naturally flow downstream, modifying the existing outlet tower to allow the water level in Irvine Lake to be lowered further, implementing a temporary pumping system once the temporary diversion berm is constructed, and installing a subgrade dewatering system, which may consist of dewatering wells. The temporary pumping system includes diesel-driven pumps and temporary above ground piping that would convey the water from the lake to a discharge point along Santiago Creek near the existing Arizona crossing (a type of culvert crossing). Before discharging to the creek in compliance with discharge permits, the water may be treated for total dissolved solids if there are elevated levels of turbidity. The subgrade dewatering wells would operate as needed to maintain a dry work environment. All described means of dewatering may be used throughout the year as needed to successfully manage the water level during and after storm events and to maintain a dry work environment. As needed, IRWD would coordinate downstream releases with impacted agencies and entities.

Temporary Diversion Berm and Access Ramp

Once the lake is drained and before the first dry season, the contractor would construct a temporary diversion berm and access ramp. The access road on the temporary diversion berm would be generally 30 feet wide and traverse along the dam from the left abutment to the right abutment. The temporary diversion berm has a dual purpose - it serves as a physical barrier to protect the work area from seasonal storms, and it serves as an elevated access road to allow



DEMOLITION NOTES:

1. SEE PROJECT SPECIFICATIONS FOR WORK RESTRICTIONS AND REQUIRED SEQUENCE OF CONSTRUCTION AND DEMOLITION.
2. ASBESTOS CONCRETE MATERIAL FOUND IN EXISTING SPILLWAY, SPILLWAY BRIDGE, AND CONTROL BUILDING. LEAD PAINT FOUND IN EXISTING CONTROL BUILDING AND OUTLET TOWER. CONTRACTOR TO REFER TO PROJECT SPECIFICATIONS FOR MANAGEMENT AND REMOVAL OF HAZARDOUS MATERIALS DURING DEMOLITION WORK.
3. ITEMS NOT SHOWN TO BE REMOVED SHALL BE PROTECTED IN PLACE.
4. ALL EXISTING PLANT MATERIAL, TREES AND SHRUBS SHALL BE REMOVED, INCLUDING BUT NOT LIMITED TO, ABOVE GROUND PORTIONS AND ROOT SYSTEMS, AND SHALL BE CONSIDERED AS PART OF THE EXECUTION PLAN. ALL HOLES & VOIDS CAUSED BY PLANT REMOVAL SHALL BE BACKFILLED AS REQUIRED BY THE ENGINEER.
5. ALL TRASH AND DEBRIS SHALL BE REMOVED FROM THE SITE IN ACCORDANCE WITH ALL LOCAL AND REGIONAL CODES, ORDINANCES AND REGULATIONS AS REQUIRED BY THE ENGINEER.
6. IRWD WILL BE RESPONSIBLE FOR PROPERLY NOTIFYING ALL ADJACENT PROPERTY OWNERS WITHIN 300' FEET OF THE PROJECT SITE PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION WORK. ADJACENT PROPERTY OWNERS WILL BE INFORMED TO THE DURATION AND HOURS OF OPERATION OF SAID DEMOLITION WORK.
7. THE CONTRACTOR SHALL PROPERLY NOTIFY ALL APPLICABLE UTILITY PROVIDERS PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION WORK.
8. THIS PLAN MAY NOT SHOW ALL EXISTING ON-SITE UTILITIES AND/OR EXISTING SUBSTRUCTURES. CONTRACTOR SHALL COORDINATE WITH UTILITY PROVIDERS TO DETERMINE LOCATION OF ON-SITE UTILITIES.
9. CONTRACTOR TO DOCUMENT EXISTING CONDITIONS OF SURROUNDING PROPERTIES PRIOR TO COMMENCEMENT OF DEMOLITION WORK.
10. CONTRACTOR SHALL DEMOLISH THE ENTIRE AREA WITHIN THE PROJECT SITE LIMITS TO FACILITATE THE CONSTRUCTION OF THE PROPOSED FACILITY. REMOVE ALL ITEMS SPECIFICALLY NOTED HEREIN WHICH ARE REQUIRED FOR CONSTRUCTION ACTIVITIES TO PROCEED.
11. ALL DEMOLITION AND CONSTRUCTION ACTIVITIES SHALL BE DONE IN ACCORDANCE WITH APPLICABLE REGULATIONS, ORDINANCES AND CODES. THE CONTRACTOR SHALL PROVIDE HEALTH & SAFETY PROTECTION MEASURES AS REQUIRED BY APPLICABLE REGULATIONS, ORDINANCES AND CODES. PROTECTION SHALL INCLUDE NEIGHBORING PROPERTIES, OCCUPANTS, VISITORS AND PASSERBY FROM DAMAGE AND/OR DISCOMFORT.
12. UPON COMPLETION OF DEMOLITION WORK, THE SITE SHALL BE CLEANED WITH NO TRACE OF DEBRIS PRIOR TO PROCEEDING WITH EARTHWORK.
13. CAP EXISTING UTILITIES AT SOURCE OR AS SPECIFICALLY INDICATED. SERVICES SHALL BE DISENGAGED THROUGH DIRECT COORDINATION WITH UTILITY PROVIDER.
14. STREETS, PROPERTY ACCESS, STORM DRAINS AND SEWERS SHALL REMAIN OPEN AND OPERABLE AT ALL TIMES.
15. MATERIALS RESULTING FROM DEMOLITION SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE NOTED, DEBRIS FOR THE SITE SHALL NOT BE ALLOWED TO ACCUMULATE.
16. THE CONTRACTOR SHALL PROVIDE SOIL EROSION PREVENTION MEASURES AS REQUIRED BY THE PROJECT MANUAL AND REGULATIONS.
17. THE CONTRACTOR SHALL CONDUCT A PRE DEMOLITION VIDEO/PHOTO DOCUMENTATION OF THE EXISTING CONDITIONS OF THE SITE, DOCUMENTATION SHALL BE SUBMITTED TO THE DISTRICT.

Source: AECOM and Irvine Ranch Water District, 2023

Conceptual Demolition General Plan

Exhibit 3-15

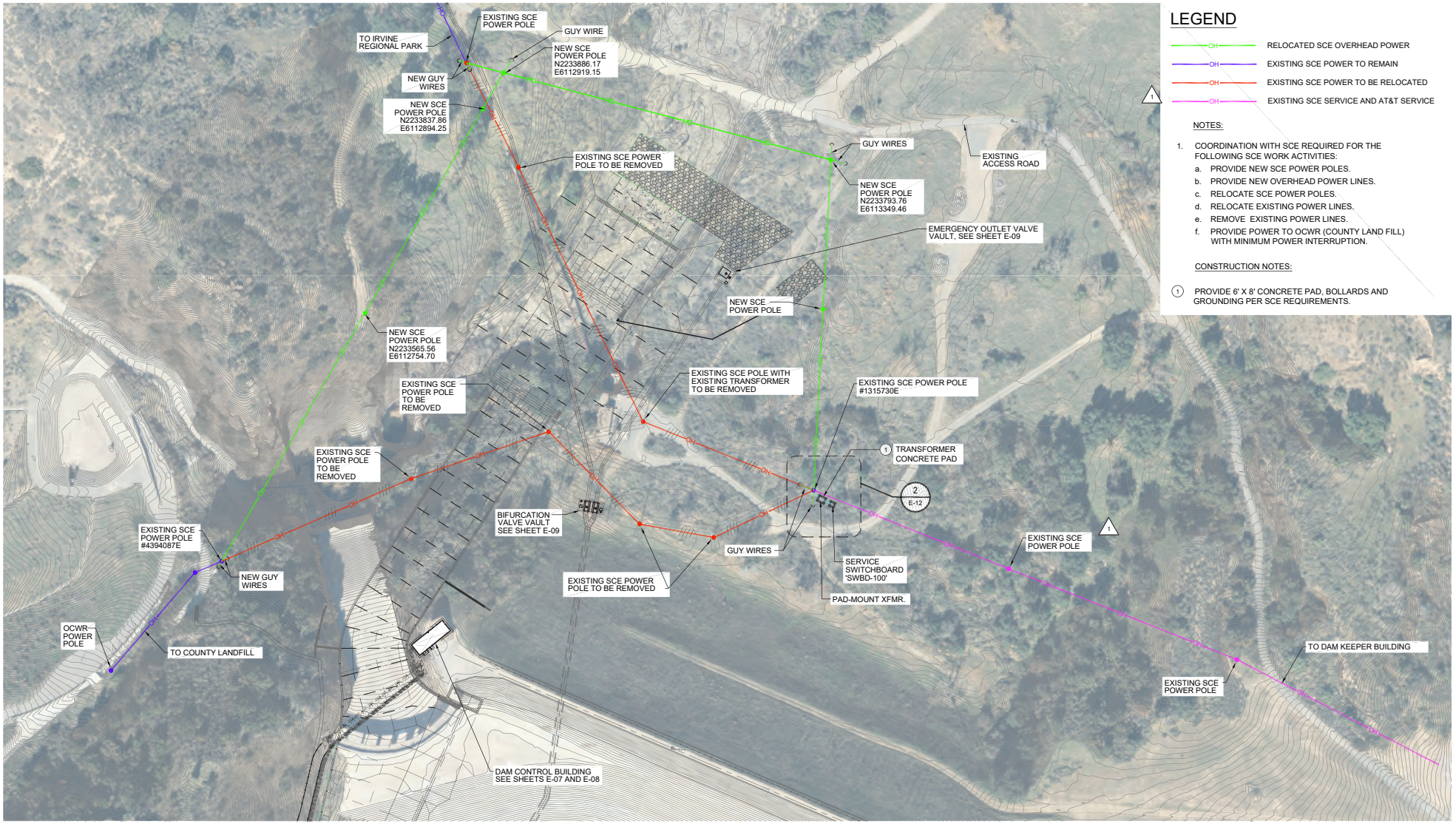
Santiago Creek Dam Improvement Project

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-15.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-15.ai



Source: AECOM and Irvine Ranch Water District, 2023

Conceptual SCE Site Plan

Exhibit 3-16

Santiago Creek Dam Improvement Project

N W E S

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-16.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-16.ai

construction equipment to access the downstream side of the dam from the lake side of the dam. The temporary diversion berm would increase in elevation as it traverses from left abutment to right abutment and would ultimately reach the top of the dam crest to allow construction equipment and workers to gain access up and around the dam.

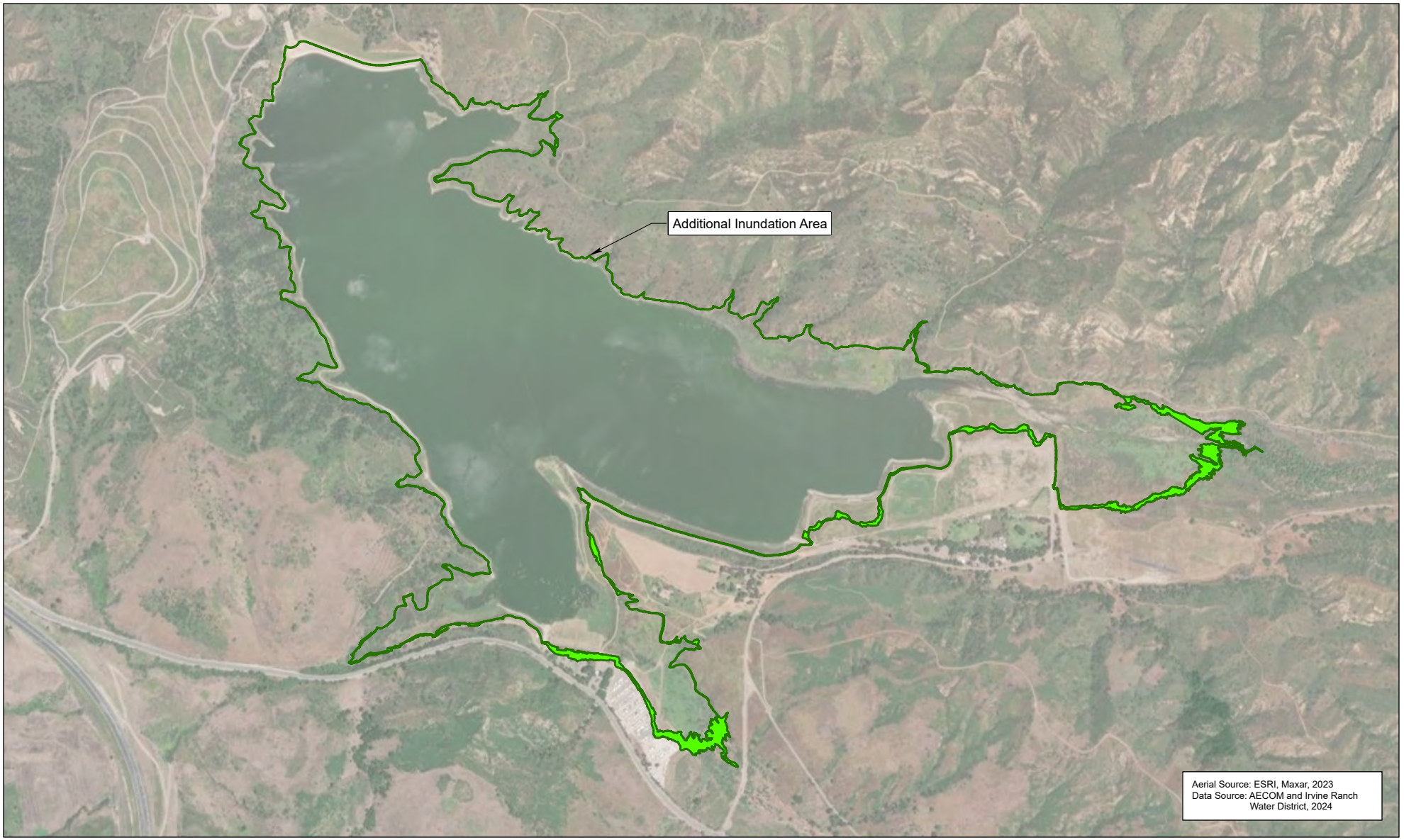
The temporary diversion berm would protect the work area from rain events that occur in the anticipated dry season (generally from April to October) and from incidental overflow discharges from the MWD Santiago Lateral, which feeds Irvine Lake with imported water. The contractor would implement a temporary pumping system to convey storm flows and incidental overflow discharges downstream of the dam to a discharge point along Santiago Creek near the existing Arizona crossing. The temporary pumping system is expected to be stationed on a barge system on the lake side of the temporary berm and would discharge flows around the right abutment of the dam. The diesel-driven generators that power the temporary diversion system may operate year-round until the Project is complete.

3.10 ADDITIONAL INUNDATION DURING OPERATIONS

The Project includes raising the spillway six feet to approximately 797.9 feet, which is two feet higher than the existing maximum water storage elevation of 795.9 feet. Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water. Under current operations, if Irvine Lake was full and water was conveyed to the Baker Water Treatment Plant at full production while also feeding the Howiler Water Treatment Plant, the water level in the lake would be lowered by approximately two feet in approximately 18 days, assuming no additional inflow into the reservoir and excluding evaporation. IRWD estimates that the upper two feet of the reservoir (i.e., 795.9 to 797.9 feet in elevation) could be inundated for an approximate maximum of 30 to 45 days in a year but typically would be inundated for less time and in some years not at all. As previously discussed, the existing lake capacity is currently approximately 24,000 AF, but it can hold an additional 2,700 AF when flash boards are installed on the spillway. With the proposed improvements, the lake would hold a maximum of 28,000 AF. The additional areas that would be inundated as a result of the increased storage capacity are shown on Exhibit 3-17, Additional Inundation Areas. Other than the impact of raising the spillway, all other operations would remain similar to the existing operations of the dam.

3.11 ADDITIONAL GEOTECHNICAL INVESTIGATIONS

Although IRWD previously completed geologic mapping in 2021 and subsequent geotechnical investigations in 2022 through 2024 to support Project design and the development of detailed construction documents, it has been determined that additional geotechnical investigations may be necessary to support the final design and construction of the Project. These investigations would occur during the design and construction phase to inform final design and may include the performance of exploratory test pits, soil borings, packer testing, and/or non-intrusive geologic investigations and observations. The additional geotechnical investigations would remain within the proposed limits of disturbance defined by the Project with any associated significant environmental impacts mitigated as part of the overall Project. IRWD would determine if additional CEQA documentation and/or permits are needed to facilitate the additional geotechnical investigations prior to proceeding with these activities.



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Additional_Inundation_Area

Additional Inundation Areas

Exhibit 3-17

Santiago Creek Dam Improvement Project

N W E S

0 750 1,500 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-17.pdf

3.12 CONSTRUCTION DETAIL

Construction Access and Staging

Access to the dam and reservoir facilities is currently provided through Irvine Regional Park. Use of this entry during construction of the Project would likely result in a disruption to the Park's facilities and would require extensive coordination with and approval from Orange County Parks. Furthermore, the one-way access road leading up to the dam crest and the dam crest itself are relatively narrow and it would be difficult for heavy construction equipment to maneuver on that road. Therefore, the primary access to the Project site during construction would be from the drained Irvine Lake.

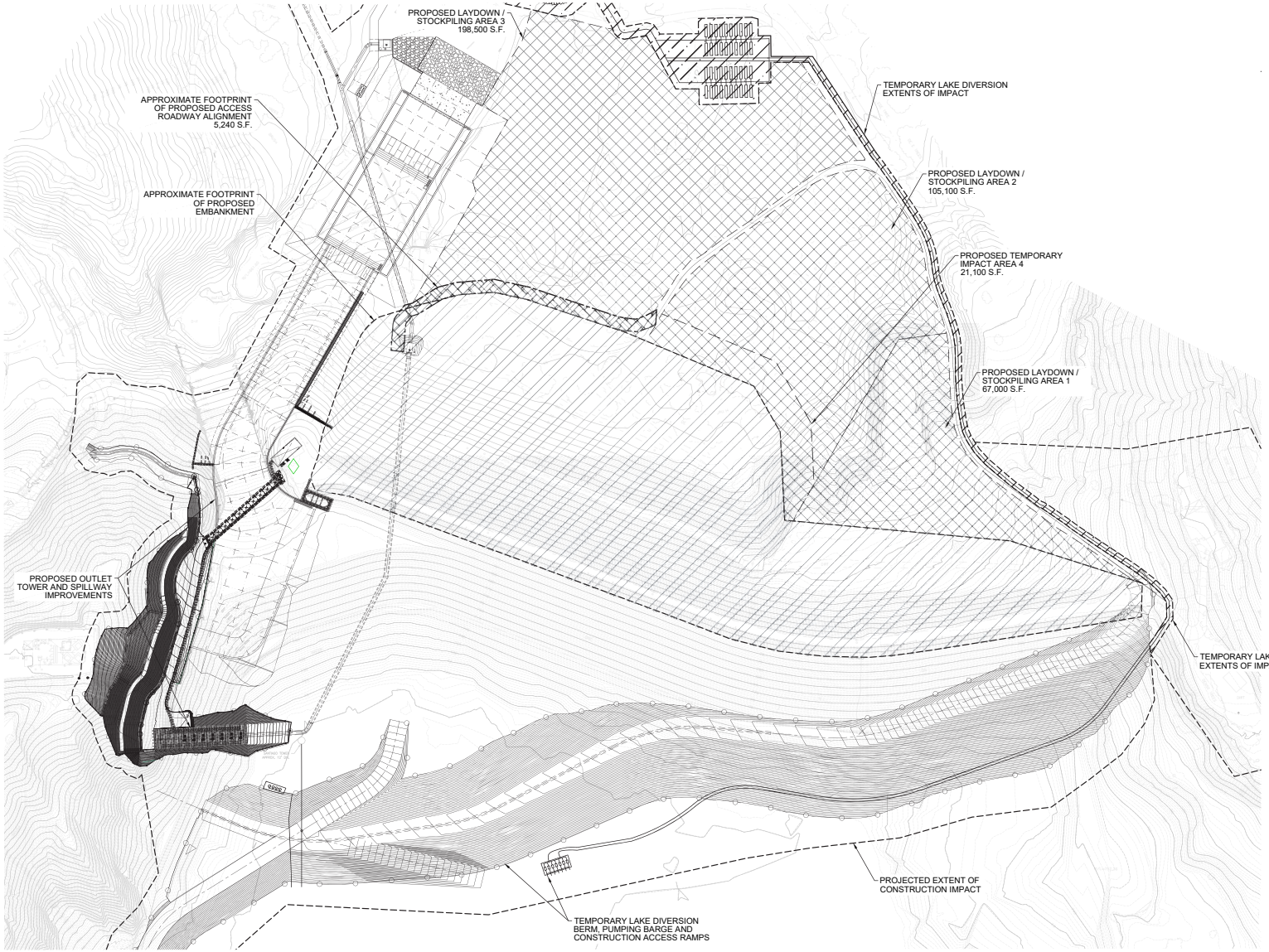
The primary construction access would lead into the lake from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area would be located in the large, flat plateau area, known as the Flats, at the upstream end of the reservoir after the lake is dewatered. This area is at a higher elevation and is unlikely to flood from typical storm events during construction. It is also anticipated that the construction trailers, conventional concrete batch plant and concrete crushing equipment (if utilized) would be located at the primary contractor staging area. The primary construction access/haul road would connect the staging area to the existing dam within the lakebed. An earthen ramp would be constructed up the right abutment of the existing dam to allow construction vehicles to access the downstream area to construct the outlet works and spillway stilling basin facilities.

To facilitate construction of the downstream features, a secondary staging area would be generally located on the downstream toe of the dam near the existing outlet structure building as shown on Exhibit 3-18, Proposed Stockpiling and Impact Areas. It is anticipated that the secondary staging area would be utilized by the contractor to mobilize the RCC batch plant, which is usually established close to where material is being placed to maintain quality control of the material. The secondary staging area may also be used to stage formwork, rebar, raw materials, and other related materials and equipment required to successfully construct the dam improvements. Material from the embankment would be removed, staged, and repurposed within the Project site. In addition to staging, laydown, and stockpiling areas, Exhibit 3-18 also graphically depicts the extent of construction impacts and impact areas associated with the temporary lake diversion, including the berm, pumping barge, and construction access ramps.

Temporary Construction Water

Water would be utilized for various construction activities, including RCC production for the spillway stilling basin walls, as well as for general mass earthwork. The available water source in the Project vicinity is a 12-inch potable water line running along East Santiago Canyon Road south of Irvine Lake. It is estimated that construction activities for the inlet/outlet structure and spillway improvements would require approximately 100 gallons per minute (gpm) during the peak day of demand for construction water, and the RCC batch plant and staging area would require approximately 200 gpm during the peak day of demand for construction water.

IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road, to the staging area. The temporary construction water line would be routed above-ground through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work area for the inlet/outlet structure and spillway construction. Construction activities may also use untreated water from the ILP as an additional water source.



NOTES

1. TEMPORARY FEATURES TO BE CONSTRUCTED PER PROJECT SPECIFICATIONS AND DETAILS PROVIDED IN THE PROJECT PLANS.
2. TEMPORARY FEATURES TO BE REMOVED AT THE END OF CONSTRUCTION AND SITE RETURNED TO PRE-CONSTRUCTION CONDITIONS.
3. THE AREA INDICATED AS PART OF THE PROPOSED ROADWAY ALIGNMENT EXCLUDES THAT OF THE EMBANKMENT IMPACT AREA AND EQUIPMENT/MATERIAL IMPACT AREA. ROADWAY TO BE INSTALLED FOLLOWING EMBANKMENT CONSTRUCTION.

LEGEND

- AREA IMPACTED BY LOCATION OF TEMPORARY LAKE DIVERSION EQUIPMENT
- POTENTIAL AREA FOR EQUIPMENT LAYDOWN/IMPACT AND/OR MATERIAL STOCKPILING
- POTENTIAL AREA FOR FOOTPRINT OF PROPOSED EMBANKMENT
- POTENTIAL AREA FOR ACCESS ROADWAY ALIGNMENT

Source: AECOM and Irvine Ranch Water District, 2023

Proposed Stockpiling and Impact Areas

Exhibit 3-18

Santiago Creek Dam Improvement Project

N W E S

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_3-18.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_3-18.ai

Construction Detail

Construction work is anticipated to begin in Fall 2027 and the Project is expected to be completed within four years as detailed in Table 3-1. The four-year construction window assumes downtime associated with weather restrictions with an average of 10-hour workdays during the wet season (October to April) and double 10-hour shifts (i.e., 20-hour workdays with nighttime work) during the dry season (April to October). The construction schedule assumes that a minimum of three dry seasons, which are generally between April to October, would be required to build the dam improvements in a systematic and phased fashion. It also assumes that the embankment improvements are built concurrently with the spillway improvements. The exact date that construction begins is subject to change. The construction schedule would be refined as Project design plans are developed and finalized.

TABLE 3-1
CONSTRUCTION PHASING

Construction Phase	Timeline
Initial Site Preparation including Construction of Temporary Diversion Berm, Stream Diversion System, and Dewatering System	2027
Spillway Demolition	2028
Spillway Construction	2028-2030
Outlet Works Improvements	2028
Embankment Improvements	2029-2030
Source: AECOM 2022	

Generally, construction activities would utilize the following equipment: Forklifts, Backhoes, Graders, Excavators, Loaders, Cranes, Dozers, Rollers, Generator Sets, Concrete Pumps, Concrete Mixers, Rock Drills, Concrete Batch Plant, Klemm Drills, Air Compressors, and Aerial Lifts.

As discussed in Section 4.2, Air Quality, the proposed Project would be required to comply with applicable South Coast Air Quality Management District (SCAQMD) rules and regulations, including Rule 403 for fugitive dust control. Rule 403 measures include regular watering of active grading areas and unpaved roads, limiting vehicle speeds on unpaved surfaces, stabilizing stockpiled earth, and curtailing grading operations during high wind conditions. Various public agencies (e.g., Orange County Fire Authority, Orange County Sheriff's Department, etc.) currently use portions of the proposed staging area for takeoff and landings associated with training and operational activities. During construction of the proposed Project, HeloPods[4] would be installed and operational near the Flats area at the eastern edge of the lake at the upstream end of the reservoir for use in the absence of stored water in Irvine Lake.

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These borrow areas are depicted on Exhibit 3-1. Approximately 12,000 haul truck trips, assuming 30 CY capacity trucks, would be required to haul this material from the borrow sites along the access road to the work area and to the dam. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would also include importing approximately 200,000 CY of material and exporting

[4] Portable, tactical helicopter dip sources, which provide a water source to fire crews to refill the helicopters' water tanks closer to the location of a wildfire.

approximately 315,000 CY of material over the four-year construction period. Project construction is anticipated to require a total of approximately 28,000 one-way truck trips for the import and export of material. Daily truck trips would vary from approximately 4 to 101 trips per day depending on the stage of construction, with an average of 34 truck trips per day.

3.13 OPERATION AND MAINTENANCE

Once operational, all Project components would operate and be monitored through IRWD's Supervisory Control and Data Acquisition (SCADA) system. Reservoir level sensors would continue to monitor water levels in the reservoir. In addition, instrumentation and monitoring systems would continuously monitor the stability of the dam and identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. Any upgrades to instrumentation and monitoring equipment would be determined during final design and may include, but are not limited to, survey monuments, inclinometers, seepage weirs, piezometers, reservoir level sensors, strong motion accelerographs, and a weather station.

Irvine Lake is generally operated in four IRWD operational modes as outlined in Table 3-2. Each mode has general operating parameters that allow for the safe, cost-effective operation of the lake while maximizing the potential average annual water runoff from storm events.

TABLE 3-2
IRWD/LAKE OPERATIONAL MODES

Season	
Winter[a]	During the Winter Mode any available rainfall is captured in the lake and stored for use. This period begins with the first rainfall event in November/December and reduces or eliminates the need to purchase untreated imported water from MWD if runoff equals or is greater than demands.
Spring[a]	During the Spring Mode under the first option, lake storage is evaluated to determine if available runoff captured during the winter will meet demands through October 1. If additional water is needed during a dry year, untreated imported water from MWD is purchased prior to May 1. Under the second option, water is not purchased prior to the summer season.
Summer	During the Summer Mode beginning May 1, under the first option, the lake is drafted down to meet IRWD demands. Under the second option water is purchased on a month-by-month basis to meet demands, which minimizes evaporation losses applied to imported supplies.
Fall	During the Fall Mode beginning October 1, purchased untreated imported water from MWD is used to maintain the Lake at the minimum operational level while maximizing available storage. Once sufficient runoff is received to meet demands or to begin filling the lake, staff transition to the Winter Mode.

[a] Under some water level and rain event conditions, the spillway may be utilized to pass storm flows around the dam. When the spillway is activated, the emergency outlet valve to Santiago Creek may be opened to release water and lower the water level in the reservoir and orders for untreated imported water are ceased.

Source: IRWD 2020.

Similar to the current reservoir, operation of the proposed Project would not require daily onsite staffing but would require only periodic maintenance. Water levels at Irvine Lake would fluctuate seasonally; water would be stored in winter when water supply exceeds demand, and the reservoir would be drawn down in summer when water demand exceeds supply. However, IRWD would develop a new operating plan for Irvine Lake that would be updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time based upon a wide variety of factors, such as:

seasonal storage needs, water quality considerations, and impoundment requirements based on rainfall projections.

During precipitation events, IRWD may maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify an operating strategy that would reduce the potential for utilizing the spillway and maximize stormwater capture. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands and other factors as needed.

Under normal operating conditions, all regulated flow out of the reservoir would be conveyed through the inlet/outlet pipeline. In the event of an emergency or for dam safety reasons, IRWD would release water through the cone valve to the creek. IRWD staff would continue to conduct routine safety and security checks of the site, similar to existing protocols.

3.14 INTENDED USES OF THE EIR

Pursuant to Section 15121 of the CEQA Guidelines, an EIR is primarily an informational document intended to inform public agency decision makers and the general public of the potentially significant environmental effects of a project. Prior to taking action on the proposed Project, IRWD, as the lead agency, must consider the information in this EIR and certify the Final EIR.

Section 15367 of the CEQA Guidelines defines Lead Agency as follows:

> "Lead Agency" means the public agency which has the principal responsibility for carrying out or approving a project. The Lead Agency will decide whether an EIR or Negative Declaration will be required for the project and will cause the document to be prepared.

Responsible Agencies are public agencies that have a level of discretionary approval over some component of the Project. Section 15381 of the CEQA Guidelines defines Responsible Agency as follows:

> "Responsible Agency" means a public agency which proposes to carry out or approve a project, for which a Lead Agency is preparing or has prepared an EIR or Negative Declaration. For the purposes of CEQA, the term "Responsible Agency" includes all public agencies other than the Lead Agency which have discretionary approval power over the project.

A Trustee Agency is defined in Section 15386 of the CEQA Guidelines as "a state agency having jurisdiction by law over natural resources affected by a project which are held in trust for the people of the State of California."

Responsible agencies may rely upon the EIR prepared by the Lead Agency (See Section 15096 of the CEQA Guidelines). Permits and other approvals required to implement the Project are identified. As noted above, it is intended that this EIR be used by agencies in their consideration of approval of required subsequent permits and approvals. The anticipated approvals associated with the Project are listed further below.

3.15 PROJECT PERMIT AND APPROVALS

Table 3-3 presents a preliminary list of the agencies and entities that would use this Draft EIR in their consideration of specific permits and other discretionary approvals that may apply to the Project. This Draft EIR is intended to identify those agencies required to be listed in CEQA Guidelines Section 15124, including, "(A) A list of the agencies that are expected to use the EIR in their decision making, and (B) A list of permits and other approvals required to implement the Project" to support their decision-making processes. Additionally, discretionary approval may be needed from federal agencies to meet federal funding requirements.

TABLE 3-3
DISCRETIONARY PERMITS OR APPROVALS POTENTIALLY REQUIRED

Agency	Permits and Authorizations Required
California Department of Fish and Wildlife (CDFW)	• Lake or Streambed Alteration Agreement, California Fish and Game Code, Section 1602 • Incidental Take Permit for Crotch's Bumble Bee
California Department of Water Resources, Division of Safety of Dams	• Dam Safety Inspection and Approval
Federal Emergency Management Agency	• Letter of Map Revision
State Water Resources Control Board; Regional Water Quality Control Board	• Waste Discharge Requirements • Storm Water Pollution Prevention Plan (SWPPP)
State Historic Preservation Officer (SHPO)	• National Historic Preservation Act Section 106 compliance
U.S. Fish and Wildlife Service (USFWS); CDFW	• NCCP/HCP Compliance (provides Coverage under the Federal Endangered Species Act and Section 2080.1 under California Endangered Species Act)
County of Orange	• Division of Drinking Water (DDW) Drinking Water Permit Amendment Update • Well Permits • Encroachment Permit • Noise Ordinance Waiver
U.S. Army Corps of Engineers (USACE)	• Section 404 Individual Permit

3.16 REFERENCES

AECOM. 2022 (July 15). Santiago Creek Dam Outlet Tower and Spillway Improvements Project, PR 01813, *Preliminary Design Report Volumes I and II*. Orange, CA: AECOM.

Irvine Ranch Water District. 2020 (August). *Irvine Lake Management Plan*. Irvine, CA: IRWD.

URS Corporation (URS). 2015 (July). *Santiago Creek Dam Outlet Tower Seismic Evaluation Structural Engineering Services*. Oakland, CA: URS.

This page intentionally left blank

SECTION 4.0 IMPACT ANALYSIS INTRODUCTION

In accordance with Sections 15125 and 15126(a) to (c) of the California Environmental Quality Act (CEQA) Guidelines, this section of the Environmental Impact Report (EIR) analyzes those environmental topics where the Project could result in "potentially significant impacts." Irvine Ranch Water District (IRWD) has determined that the EIR addresses all environmental topics with potential to result in significant effects. An Initial Study was prepared for the Project, and the environmental topics and issues within the topical areas with no potential for a significant impact are identified in Section 2.0, Introduction, Project History, and Setting, of the EIR and focused out from further analysis in the body of the EIR. Based on IRWD's determination and the comments received by IRWD on the Notice of Preparation, this EIR analyzes the following environmental topics:

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

Each topical section includes the following information: description of applicable regulations; information on the existing setting; identification of methodology used for the analysis presented in the section; identification of thresholds of significance; analysis of potential Project effects and identification of significant impacts; cumulative impacts; identification of mitigation measures, if required, to reduce the impacts; level of significance after mitigation; and a list of references used to complete the analysis.

Section 15064.7 of the CEQA Guidelines addresses thresholds of significance and encourages each public agency to develop thresholds of significance through a public review process. IRWD has not formally adopted thresholds of significance. In accordance with CEQA and the CEQA Guidelines, the analysis and significance thresholds used in this EIR have been derived from several sources, including the General Plan standards and applicable regulatory standards.

In evaluating the potential impacts associated with the Project, the EIR, in addition to the mitigation measures in the EIR, identifies a number of components that will serve to avoid or minimize impacts. These measures have been incorporated into the Mitigation Program presented in this EIR and will be tracked in the Mitigation Monitoring and Reporting Program (MMRP) that would be adopted in conjunction with the Project approval.[1]

Where a potentially significant environmental effect has been identified, applicable Project-specific mitigation measures have been included where feasible. Any mitigation measure, and timing thereof, is subject to the approval of IRWD. The two components of the Mitigation Program are described below.

- **Regulatory Requirements.** Regulatory requirements are based on local, State, or federal regulations or laws that are frequently required independently of CEQA review and also serve to offset or prevent specific impacts. Typical regulatory requirements include compliance with the provisions of the California Building Code, South Coast Air Quality Management District Rules, local agency requirements, and other regulations and standards. IRWD does not have an adopted set of standard conditions; however, IRWD may impose additional conditions during the approval process, as appropriate. These requirements may be specific to the proposed Project or standard to all projects.
- **Mitigation Measures.** Where a potentially significant environmental effect has been identified and is not reduced to a level considered less than significant through the application of regulatory requirements, Project-specific mitigation measures have been identified.

4.0.1 CUMULATIVE IMPACT ASSUMPTIONS

Discussion of the cumulative impacts of the proposed Project is provided in Sections 4.1 through 4.17, relative to each CEQA topical issue evaluated herein. The following is an overview and introduction to the cumulative analysis per the CEQA Guidelines. This avoids the undue repetition of CEQA requirements relative to cumulative analysis within individual sections.

In requiring the State Office of Planning and Research to develop guidelines for the implementation of CEQA, Section 21083(b) of the *Public Resources Code* requires that the guidelines shall specifically include criteria for public agencies to follow in determining whether or not a proposed project may have a "significant effect on the environment." The criteria shall require a finding that a project may have a "significant effect on the environment" if one or more of the following conditions exist:

(1) A proposed project has the potential to degrade the quality of the environment, curtail the range of the environment, or to achieve short-term, to the disadvantage of long-term, environmental goals.

(2) The possible effects of a project are individually limited but cumulatively considerable. As used in this paragraph, "cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the

[1] The California Public Resources Code Section 21081.6 (Assembly Bill [AB] 3180) requires that a lead or responsible agency adopt a MMRP when approving or carrying out a project where an environmental document, either an EIR or a mitigated negative declaration, has identified measures to reduce potential adverse environmental impacts. The MMRP identifies the mitigation measure; the method by which the adopted measure will be implemented; the responsible party for verifying the measure has been satisfactorily completed; the method of verification; and the appropriate time or phase for the implementation of each mitigation measure. The MMRP is formally adopted by the Board in conjunction with the certification of the EIR.

effects of past projects, the effects of other current projects, and the effects of probable future projects.

(3) The environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly.

This directive has been carried forth in Section 15064 of the CEQA Guidelines, which establishes the criteria for determining the significance of environmental effects caused by a project. Subsection 15064(h)(1) directs the preparation of an EIR in the following circumstance:

> [I]f the cumulative impact may be significant and the project's incremental effect, though individually limited, is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

Section 15355 of the CEQA Guidelines defines cumulative impacts as:

> Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.
>
> (a) The individual effects may be changes resulting from a single project or a number of separate projects.
>
> (b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

Pursuant to Section 15130(b) of the CEQA Guidelines:

> The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

Methodology

A project's cumulative impact is an impact to which that project contributes and to which other projects contribute as well. The project must make some contribution to the impact; otherwise, it cannot be characterized as a cumulative impact of that project.

Section 15130(b) of the CEQA Guidelines indicates:

> The following elements are necessary for an adequate discussion of significant cumulative impacts:
>
> (1) Either:
>
> (A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or

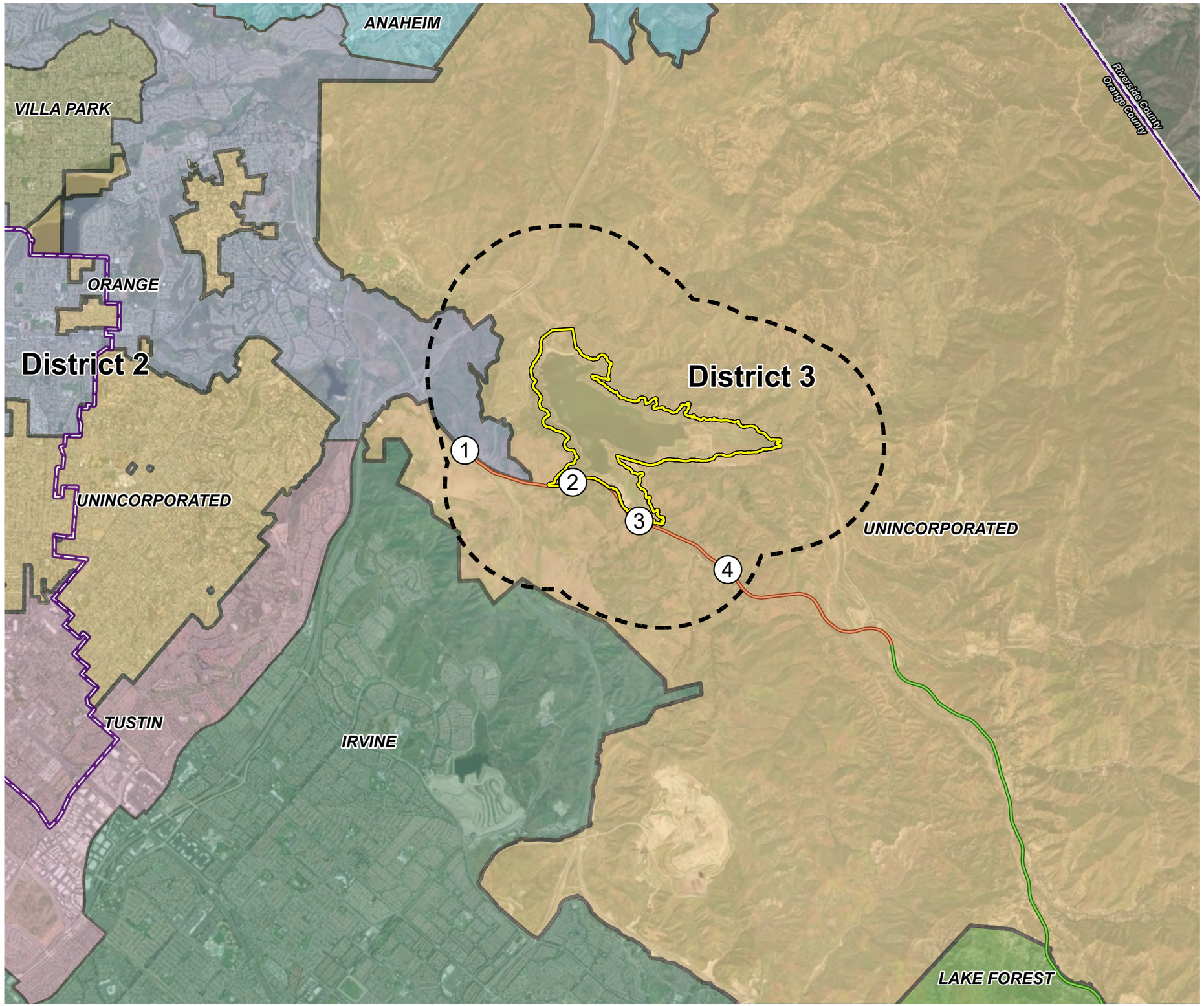
(B) A summary of projections contained in an adopted local, regional, or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan, or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan. Such projections may be supplemented with additional information such as a regional modeling program. Any such document shall be referenced and made available to the public at a location specified by the lead agency.

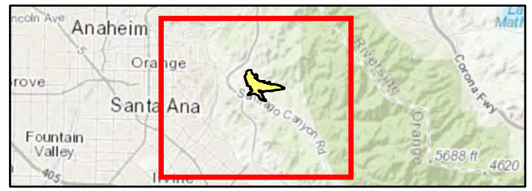
To provide an evaluation of the potential cumulative impacts for the proposed Project, both the list approach (Section 15130(b)(1)(A)) and the growth projections approach (Section 15130(b)(1)(B)) to the analysis have been used. In keeping with the CEQA Guidelines, this cumulative evaluation: (1) includes specific projects that, because of their size or proximity to the project site, have the potential to cause cumulative impacts ("related projects"); (2) considers the adopted general plans for the affected local jurisdictions; and (3) includes regional development projections. The following sections provide an overview of how the regional projections have been incorporated from adopted plans into the cumulative evaluation and a summary of the related projects that have been identified as potentially cumulative.

Reasonably Foreseeable Probable Future Projects

To ensure that the cumulative impact analysis is as comprehensive as possible, pending projects in surrounding cities are also included. Table 4-1 lists the approved and pending projects. It should be noted that, while the projects listed in Table 4-1 have been considered in the analysis, not all related projects would contribute to significant cumulative impacts for each topical area. The cumulative impact analysis in each topical area provides an evaluation of the cumulative projects that would contribute to that particular environmental topic's cumulative impacts. Some impacts are site-specific and would not compound the impacts associated with the proposed Project. Additionally, in certain cases, short-term impacts would not contribute to cumulative impacts because the construction of the cumulative projects and the development of the Project would not occur within the same time frame or in proximity to each other.

The locations of these projects listed in Table 4-1 are shown on Exhibit 4-1, Nearby Projects.





Biological Study Area

Biological Study Area - 1-mile Buffer

Supervisorial Districts

City Boundaries

Anaheim

Irvine

Lake Forest

Orange

Tustin

Unincorporated

Villa Park

Projects within 1-mile Buffer

Santiago Canyon Road Safety Improvements Project

SR-241 to Silverado Canyon Road

Silverado Canyon Road to Live Oak Canyon Road

1 - Loma Ridge Jeep Trail

2 - Below Irvine Lake

3 - Haul Rd and SR-241

4 - Blue Diamond Haul Rd

City of Orange Housing Element*

County of Orange Housing Element*

**Housing Plan Elements apply to various areas throughout County of Orange and City of Orange and are not reflected in this map.*

N
W E
S

0 2,500 5,000 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Nearby Projects

Exhibit 4–1

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Nearby.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Nearby_Projects

TABLE 4-1
APPROVED AND PENDING PROJECTS WITHIN 1-MILE RADIUS OF THE PROJECT SITE

Project	Proposed Land Uses/Project Description	Location	Determination/ Status
Santiago Canyon Road Safety Improvements Project - Loma Ridge Jeep Trail - Below Irvine Lake - Haul Rd and SR-241 - Blue Diamond Haul Rd	The Santiago Canyon Road Safety Improvements project includes various roadway measures designed to improve safety for road users, enhance driver awareness, and reduce the likelihood of vehicular accidents.	Santiago Canyon Road	In Construction
City of Orange Housing Element	This update is the 6th Cycle Housing Element update and will plan for the period from 2021–2029. The Housing Element provides the primary policy guidance for housing for the City's decisionmakers crafted to address housing opportunities and needs for present and future residents.	City of Orange	Planning
County of Orange Housing Element	The County of Orange is currently updating the Housing Element for the 6th cycle, which covers the planning period from 2021–2029.	County of Orange	Planning

This page intentionally left blank

4.1 AESTHETICS

This section of the Environmental Impact Report (EIR) describes the existing aesthetic character and visual resources of the Project area and identifies associated potential aesthetic impacts related to development of the proposed Project.

4.1.1 REGULATORY SETTING

Federal

National Scenic Byway Program

The National Scenic Byways program is part of the U.S. Department of Transportation, Federal Highway Administration. The program was established under the Intermodal Surface Transportation Efficiency Act of 1991 and was reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. The only National Scenic Byway located within Southern California is the Arroyo Seco Historic Parkway–Route 110 in Los Angeles County (Federal Highway Administration 2023). This National Scenic Byway is located 38 miles from the proposed Project site.

State

California Department of Transportations (Caltrans)

The State Scenic Highway Program, created by the California Legislature in 1963, was established to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to the highways. A highway is designated under this program when a local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation (Caltrans) for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a scenic highway. When a city or county nominates an eligible scenic highway for official designation, it defines the scenic corridor, which is land generally adjacent and visible to a motorist on the highway. The nearest officially designated State scenic highway is a segment of State Route (SR) 91, which is approximately 6 miles northwest of the Project site (Caltrans 2023).

Local

County of Orange General Plan

Resources Element

The County of Orange General Plan, Resources Element, contains a comprehensive strategy for the development, management, preservation and conservation of resources that are necessary to meet Orange County's existing and future demands. This strategy entails a framework of resource goals, policies, and programs. The General Plan identifies Landforms as a natural resource and discusses the aesthetic value of the diverse combination of mountains, hills, flatlands, and shoreline within the County of Orange. Additionally, the General Plan discusses policies in use to maintain scenic views such as sign restriction zoning and the Scenic Highway Component of the Transportation Element.

The Resources Element also discusses the value of Open Space within the County of Orange and how that relates to the aesthetic quality of the County. The value of open space to Orange County includes shaping the overall urban form, providing outdoor recreation opportunities, enhancing and protecting scenic vistas, ensuring public health and safety, preserving valuable natural resources, and providing areas for the managed production of resources.

The following are relevant policies, goals, and objectives related to aesthetic resources identified in the General Plan, Resources Element:

Natural Resources Component

Policy 5: To protect the unique variety of significant landforms in Orange County through environmental review procedures and community and corridor planning activities.

Open Space Component

Goal 1: Retain the character and natural beauty of the environment through the preservation, conservation, and maintenance of open space.

Policy 1.1: To guide and regulate development of the unincorporated areas of the County to ensure that the character and natural beauty of Orange County is retained.

Transportation Element

The County of Orange General Plan, Transportation Element, contains a Scenic Highway Plan, which designates “landscape corridors” and “viewscape corridors” within the county. No designated landscape corridors occur near the site. The closest viewscape corridor to the Project site is Santiago Canyon Road, approximately 1.3 miles west of the Project site. The Transportation Element defines the goals, objectives, and policies pertaining to the implementation of the Scenic Highways Plan. The following are relevant policies, goals, and objectives related to aesthetic resources identified in the General Plan, Transportation Element:

Scenic Highway Plan

Goal 1: Preserve and enhance unique or special aesthetic and visual resources through sensitive highway design and the regulation of development within the scenic corridor.

Objective 1.1: Protect and enhance the County’s beauty, amenities, and quality of life within the unincorporated areas.

4.1.2 METHODOLOGY

The aesthetics analysis in this section is based on a variety of data sources including field reconnaissance, site photographs, and evaluation of the Project in the context of surrounding existing land uses. Additionally, the Project was evaluated for potential conflicts with applicable zoning and other regulations governing aesthetics.

4.1.3 EXISTING CONDITIONS

Visual Character of the Site and Surrounding Areas

Santiago Creek Dam is located at the northwest end of Irvine Lake in unincorporated Orange County, California. The Project is south of SR-261 and east of SR-241 and Santiago Canyon Road. Existing structures include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, a portion of the Irvine Lake pipeline, and dam access road.

The Project site is located on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle. It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. Irvine Lake (also called the Santiago Creek Reservoir) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

The Santiago Creek Dam is a compacted earthfill embankment constructed in 1933 that is under the jurisdiction of the State of California, Department of Water Resources, Division of Safety of Dams. Santiago Creek Dam allows Irvine Ranch Water District (IRWD) to impound water within Irvine Lake, a critical water supply reservoir for IRWD. Per the terms of the Water Service Reliability Agreement between IRWD and Serrano Water District (SWD), water provided by IRWD to SWD to either backstop or augment SWD's use of groundwater may be sourced from Irvine Lake. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level within the lake varies throughout the lake; however, it is estimated that the accumulated sediment occupies approximately 2,150 acre-feet of the lake to date.

The outlet works for the dam consists of a tower, an outlet conduit, and downstream control house. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where a bifurcation valve splits the flow into a main pipe and diverter pipe. The main pipe supplies water to IRWD.

The existing spillway is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest elevation is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years). The downstream end of the spillway was extensively modified in 1969 and 1970 after sustaining significant damage during a February 1969 flood event. The damaged waste channel and spillway chute were removed, and a new flip bucket was constructed at the end of the existing spillway chute.

This EIR includes a series of photographs depicting the Project site in its existing condition. Exhibit 4.1-1a depicts the site photograph locations. Exhibits 4.1-1b through 4.1-1d present photographs that depict the existing visual character of the site.

- **View 1 – View from the East Bank Looking Northwest Toward the Lake and Dam.** As shown in Exhibit 4.1-1b, the main focal point of this view is Irvine Lake, which is shown surrounded by sparse vegetation. The dam and accessory structures are visible in the background. Additionally, views of the surrounding Santa Ana Mountains can be seen beyond the dam.
- **View 2 – View from the Midpoint of the Dam Access Road Looking East Toward the Eastern Property Boundary.** As shown in Exhibit 4.1-1b, the access road is currently

Site Photograph Locations

Exhibit 4.1-1a

Santiago Creek Dam Improvement Project

N
W E
S

0 900 1,800
Feet

PSOMAS

(Rev: 03/13/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Site_Photograph_Locations.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Site_Photograph_Locations

View 1: View from the East Bank Looking Northwest Toward the Lake and Dam.

View 2: View from the Midpoint of the Dam Access Road Looking East Toward the Eastern Property Boundary.

D:\Projects\3IRW\001101\GRAPHICS\MND\ex4b_SitePhotographs.ai

Site Photographs

Exhibit 4.1-1b

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SitePhotographs.pdf

View 3: View from the North Bank Looking North toward the North Side of the Dam from the Bridge.

View 4: View from the West Bank Looking East toward the Dock.

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex4c_SitePhotographs.ai

Site Photographs

Exhibit 4.1-1c

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SitePhotographs.pdf

View 5: View from Santiago Canyon Road Looking Northwest toward the Dam.

View 6: View from Santiago Canyon Road Looking East toward Oak Canyon Park.

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex4d_SitePhotographs.ai

Site Photographs

Exhibit 4.1-1d

Santiago Creek Dam Improvement Project

PSOMAS

(03/13/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SitePhotographs.pdf

lined with metal safety poles. Irvine Lake is visible to the right in this view. In the distance, the dam keeper's house can be seen at the end of the access road and the Santa Ana Mountains can be seen in the background.

- **View 3 – View from the North Bank Looking North toward the North Side of the Dam from the Bridge.** As shown in Exhibit 4.1-1c, the main focal point of this view is the empty concrete spillway, which can be seen from the bridge. The spillway is surrounded by dense vegetation. Additionally, the Santa Ana Mountains can be seen in the background.
- **View 4 – View from the West Bank Looking East toward the Dock.** As shown in Exhibit 4.1-1c, the prominent view of this photograph is the dock located on the west bank. A boat can be seen moored along the dock. The bank is covered with sand and sparse vegetation. A trash bin and orange/reflective poles can be seen lining the bank. Past Irvine Lake, views of the Santa Ana Mountains can be seen in the background.
- **View 5 – View from Santiago Canyon Road Looking Northwest toward the Dam.** As shown in Exhibit 4.1-1d, the prominent view of this photograph is the boat ramp located on the south bank. Green, low-growing vegetation is present along the bank, and Irvine Lake is fully visible. The dam is visible from this location, and the Santa Ana Mountains are visible in the background.
- **View 6 – View from Santiago Canyon Road Looking East toward Oak Canyon Park.** As shown in Exhibit 4.1-1d, the main focal point of this view is Irvine Lake and the bank located to the south. Green, low-growing vegetation is visible in the mid-ground, and the bank areas farther to the northeast are comprised of sand and sparse vegetation. Additionally, the foothills of the Santa Ana Mountains can be seen in the background.

Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241 approximately 1.8 miles away from the Project.

4.1.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, the Project would result in a significant aesthetics impact if it would:

Threshold 4.1-1 Substantially degrade the existing visual character or quality of public views of the site and its surroundings (Public views are those that are those that are experienced from publicly accessible vantage points). If the project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality.

Threshold 4.1-2 Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

4.1.5 IMPACT ANALYSIS

Project Design Features

PDF AES-1 The Project will design and operate lighting for construction, security, or equipment maintenance to conform to the requirements of the Occupational Safety and Health Administration, Code of Federal

Regulations (CFR)-29, Standard 1926.56 and any Orange County light pollution regulations. Additionally, the Project will orient lighting to minimize effects to the community and adjacent sensitive habitat areas.

PDF AES-2 To the extent feasible, the Project will direct night lighting away from sensitive native habitats and provide low-sodium or similar lighting equipped with shields to focus light downward.

Threshold 4.1-1

Would the Project substantially degrade the existing visual character or quality of public views of the site and its surroundings (Public views are those that are experienced from publicly accessible vantage points)? If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?

Less Than Significant Impact. As described above in Section 4.1.3, Existing Conditions, Santiago Creek Dam is located at the north end of Irvine Lake. The Project is located south of SR-261 and east of SR-241 and Santiago Canyon Road. Existing structures include the dam crest, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, a portion of the Irvine Lake pipeline, and dam crest access road.

As discussed in Section 3.0, Project Description, the proposed Project requires replacement of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located near the left abutment of the existing dam and to replace the existing spillway with a side-channel spillway on the left abutment. The proposed outlet tower would be similar in size and height to the existing tower and would provide visual improvements over the older outlet tower. As replacement of the outlet tower would be similar to the existing visual setting, the Project would not significantly alter the long-term visual character of the site associated with these improvements. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest elevation would also be raised up to approximately one foot and widened to approximately 35 to 45 feet wide to accommodate a wider access road, and protective railings would be installed on both sides of the access road. The modifications would alter the dam embankment and crest; however, these components would remain similar in function and visual appearance to existing conditions, and these changes would not significantly alter the visual character of the site. In addition, no changes would be made to the property limits as part of this Project.

The proposed Project would modify the existing views of the site during short-term construction activities and long-term operation; long-term changes to views during Project operation would be associated with improvements to the dam, spillway, outlet tower, and dam embankment and crest; removal of existing minor features such as the existing dam keeper's house; and relocation of existing Southern California Edison (SCE) overhead power lines and power poles (refer to Exhibit 3-16, Conceptual SCE Site Plan). However, proposed visual changes associated with Project improvements would be mainly related to relocation, replacement, and upgrade of the existing site features, and would be consistent with the existing character of the Project site. As no new or visually unique uses are proposed, long-term operational impacts would be less than significant.

As Irvine Lake is visible from Santiago Canyon Road and SR-241, there would be temporary visual impacts during construction, due to the lake being drained and the presence of construction equipment. Draining the lake would temporarily alter the visual appearance of the site, exposing

the dry lakebed and creating a contrast with the surrounding vegetation and hills. However, these impacts would be short-term, and the lake would be refilled after construction is completed. Therefore, draining the lake would not result in a substantial or permanent degradation of the visual environment.

Also, primary viewers of construction activities would include passing motorists along Santiago Canyon Road and SR-241 who would have limited views of the Project site and visitors to Oak Canyon Park. However, construction and construction equipment staging impacts would be temporary in nature. Although the construction schedule would occur over approximately three years or 36-month period, the actual areas impacted by construction would shift among various locations on the Project site throughout this time, allowing for some visual relief from public viewpoints during this time period. Therefore, due to the temporary nature of construction, the Project would not substantially degrade the existing visual character or quality of public views of the site and its surroundings and a less than significant impact would occur. No mitigation is required.

Impact Conclusion: *The proposed Project would not substantially degrade the existing visual character or quality of public views of the site and its surroundings. Additionally, the Project would not conflict with applicable zoning and other regulations governing scenic quality. Impacts would be less than significant, and no mitigation is required.*

Threshold 4.1-2

Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact. Under existing conditions, the Santiago Creek Dam has on-site security lighting; this type of lighting would remain as part of the proposed Project. As with existing on-site security lighting, there would be minimal overspill beyond the physical limits of the facilities. Additionally, the Project would implement **PDF AES-1**, which requires conformance with all applicable light pollution regulations, and would orient lighting to minimize effects to the community and nearby sensitive habitat areas.

During Project construction, occasional nighttime lighting, primarily for safety and security reasons, would be required resulting in a temporary impact. However, the Project would implement **PDF AES-2**, which would direct construction lighting away from adjacent residences and nearby sensitive habitats, in addition to providing lighting equipped with shields to focus light downward. Due to the remote nature of the Project site and its distance from residential land uses, these temporary impacts would be less than significant. Project impacts pertaining to light or glare would be less than significant, and no mitigation is required.

Impact Conclusion: *The proposed Project would not create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Impacts would be less than significant with implementation of **PDF AES-1** and **PDF AES-2**, and no mitigation is required.*

4.1.6 CUMULATIVE IMPACTS

When evaluating cumulative aesthetic impacts, a number of factors must be considered. In order for a cumulative aesthetic impact to occur, the proposed elements of the cumulative projects would need to be visible together or in proximity to each other. If the projects were not in proximity to each other, the viewer would not perceive them in the same visual landscape. The context in

which a project is being viewed would also influence the significance of the aesthetic impact. The contrast the Project presents with its surrounding environment may actually be reduced by the presence of other cumulative projects. As it pertains to aesthetic impacts, the key projects in terms of cumulative impacts analysis would be the projects in proximity to the site. These projects include the following segments of the Santiago Canyon Road Safety Improvements project: Loma Ridge Jeep Trail, Below Irvine Lake, Haul Road and SR-241, and Blue Diamond Haul Road. Locations of these segments in relation to the Project site can be found on Exhibit 4-1, Nearby Projects, in Section 4.0, Impact Analysis. These related projects are all beyond the Project viewshed and would not be visible in combination with the proposed Project. Therefore, cumulative aesthetic impacts would be less than significant.

4.1.7 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant aesthetics impacts; therefore, no mitigation measures are required.

4.1.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project-specific and cumulative impacts to aesthetics associated with the Project would be less than significant. No significant unavoidable impacts would occur.

4.1.9 REFERENCES

California Department of Transportation (Caltrans). 2023. California Scenic Highway Mapping System. https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways.

Federal Highway Administration. 2023 (March 28, date accessed). America's Byways: California. https://fhwaapps.fhwa.dot.gov/bywaysp/States/Show/CA. Washington, CA: FHA.

4.2 AIR QUALITY

This section identifies and evaluates the proposed Project's potential to have adverse effects related to air quality during construction and operation. Emission calculations associated with this Project can be found in Appendix B of this EIR. Impacts from greenhouse gas (GHG) emissions are addressed in Section 4.7, Greenhouse Gas Emissions, of this EIR.

4.2.1 BACKGROUND

The U.S. Environmental Protection Agency (USEPA) defines seven "criteria" air pollutants: Sulfur Dioxide (SO_2), Carbon monoxide (CO), Nitrogen Dioxide (NO_2), Ozone (O_3), inhalable particulate matter with particles equal to or smaller than 10 microns in size (PM_{10}), fine particulate matter, with particles smaller than or equal to 2.5 microns ($PM_{2.5}$), and lead. Criteria air pollutants are those that have established ambient air quality standards that are designed to protect public health. The characteristics and health effects of these criteria pollutants are described below:

Ozone (O_3)

O_3 is a secondary pollutant; it is not directly emitted. O_3 is formed by chemical reactions between volatile organic compounds (VOCs; also referred to as reactive organic gases [ROGs]) and nitrogen oxides (NO_x), which occur only in the presence of bright sunlight. VOC/ROG emissions are generally unburned hydrocarbons that are a result of motor vehicle travel and other combustion sources. NO_x is also a result of the combustion process, most notably due to the operation of motor vehicles. Sunlight and hot weather cause ground-level O_3 to form. (Not to be confused with the "ozone layer" which occurs very high in the atmosphere and shields the planet from some ultraviolet rays.) As a result, O_3 is known as a summertime air pollutant. Ground-level O_3 is the primary constituent of smog. Because ground-level O_3 is formed in the atmosphere, high concentrations can occur in areas well away from sources of its constituent pollutants.

People with lung disease, children, older adults, and people who are active are the most sensitive when O_3 levels are unhealthy. Numerous scientific studies have linked ground-level O_3 exposure to a variety of health problems, including:

- lung irritation that can cause inflammation;
- wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities;
- permanent lung damage to those with repeated exposure to O_3 pollution; and
- aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.

Ground-level O_3 can also have detrimental effects on plants and ecosystems. These effects include:

- interfering with the ability of sensitive plants to produce and store food, making them more susceptible to certain diseases, insects, other pollutants, competition, and harsh weather;
- damaging the leaves of trees and other plants, negatively impacting the appearance of urban vegetation, national parks, and recreation areas; and
- reducing crop yields and forest growth, potentially impacting species diversity in ecosystems.

Currently, the South Coast Air Basin (SoCAB) is designated as a "Nonattainment Area" for the State and federal O_3 standards.

Particulate Matter (PM_{10}, $PM_{2.5}$, and UFP)

Particulate matter includes both aerosols and solid particles of a wide range of size and composition. Of particular concern are PM_{10}; $PM_{2.5}$; and ultrafine particulate matter (UFP), which are particles less than 0.1 micron in diameter. The size of the particulate matter refers to the aerodynamic diameter of the particulate. Smaller particulates are of greater concern because they can penetrate deeper into the lungs than large particles. $PM_{2.5}$ is directly emitted in combustion exhaust and fugitive dust and is formed from atmospheric reactions between various gaseous pollutants, including NO_x, sulfur oxide (SO_x), and VOCs. PM_{10} is directly emitted as a result of mechanical processes that crush or grind larger particles or from the re-suspension of dust, most typically through construction activities and vehicular travel. $PM_{2.5}$ and PM_{10} can remain suspended in the atmosphere for days and/or weeks and can be transported long distances. Ultrafine particles are the smallest particles and are good indicators of any kind of fuel burning, from diesel engines to refinery operations.

The principal health effects of airborne particulate matter are on the respiratory and cardiac systems. According to the USEPA, some people are more sensitive than others to breathing fine particles (USEPA 2023).

Short-term exposure to high $PM_{2.5}$ levels is associated with premature mortality and increased hospital admissions and emergency room visits. Long-term exposure to high $PM_{2.5}$ levels is associated with premature mortality and development of chronic respiratory disease. Short-term exposure to high PM_{10} levels is associated with hospital admissions for cardiopulmonary diseases, increased respiratory symptoms, and possible premature mortality. There are national and State 24-hour PM_{10} standards, but there is no annual long-term standard. With respect to long-term PM_{10} health effects, the USEPA concluded in a 2006 standards review that analysis of air quality data showed that the 24-hour PM_{10} standard generally resulted in annual average PM_{10} levels at or below the annual standard of 50 micrograms per cubic meter ($\mu g/m^3$) and that available evidence did not suggest an association between long-term exposure to PM_{10} at 2006 ambient levels and health problems. Based on this conclusion, the national PM_{10} annual standard was revoked (USEPA 2006). However, the State of California maintains an annual PM_{10} standard.

No federal or State standards have been established for UFP. Currently, the SoCAB is designated as a "Nonattainment area" for State standards for PM_{10} and an "Attainment/Maintenance area" for federal standards for PM_{10}. The SoCAB is designated as "Nonattainment area" for State and federal standards for $PM_{2.5}$.

Carbon Monoxide (CO)

CO is a colorless and odorless gas which, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. CO combines with hemoglobin in the bloodstream and reduces the amount of oxygen that can be circulated through the body. High CO concentrations can lead to headaches, aggravation of cardiovascular disease, and impairment of central nervous system functions. Carbon monoxide concentrations can vary greatly over comparatively short distances. Relatively high concentrations are typically found near crowded intersections; along heavily used roadways carrying slow moving traffic; and at or near ground level. Even under the most severe meteorological and traffic conditions, high CO concentrations are limited to locations within a relatively short distance (i.e., up to 600 feet or 185 meters) of heavily traveled roadways. Overall, CO emissions are decreasing as a result of the Federal Motor

Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973.

Currently, the SoCAB is in attainment for State and federal one-hour and eight-hour standards for CO.

Nitrogen Dioxide (NO_2)

Nitrogen gas, normally relatively inert (unreactive), comprises about 80 percent of the air. At high temperatures (i.e., in the combustion process) and under certain other conditions, it can combine with oxygen to form several different gaseous compounds collectively called nitrogen oxides (NO_x). Nitric oxide is converted to NO_2, a red-brown pungent gas, in the atmosphere. Motor vehicle emissions are the main source of NO_x in urban areas.

NO_2 is toxic to various animals and to humans. Its toxicity relates to its ability to form nitric acid with water in the eye, lung, mucus membrane, and skin. In animals, long-term exposure to NO_x increases susceptibility to respiratory infections, lowering their resistance to such diseases as pneumonia and influenza. Laboratory studies show susceptible humans, such as asthmatics, exposed to high concentrations of NO_2 can suffer lung irritation and, potentially, lung damage. Epidemiological studies have also shown associations between NO_2 concentrations and daily mortality from respiratory and cardiovascular causes and with hospital admissions for respiratory conditions.

NO_x is primarily a combination of nitric oxide and NO_2. While the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) only address NO_2, the total group of nitrogen oxides is of concern. Nitric oxide and NO_2 are both precursors in the formation of O_3 and $PM_{2.5}$. Because of this and the fact that nitric oxide emissions largely convert to NO_2, NO_x emissions are typically examined when assessing potential air quality impacts. Currently, the SoCAB is in attainment for State and federal standards for NO_2.

Sulfur Dioxide (SO_2)

Sulfur oxides (SO_x) constitute a class of compounds of which SO_2 and sulfur trioxide (SO_3) are included. Ninety-five percent of pollution-related SO_x emissions are in the form of SO_2. SO_x emissions are typically examined when assessing potential air quality impacts of SO_2. Combustion of fossil fuels for generation of electric power is the primary contributor of SO_x emissions. Industrial processes, such as nonferrous metal smelting, also contribute to SO_x emissions. SO_x is also formed during combustion of motor fuels. However, most of the sulfur has been removed from fuels, greatly reducing SO_x emissions from vehicles.

SO_2 combines easily with water vapor, forming aerosols of sulfurous acid (H_2SO_3), a colorless, mildly corrosive liquid. This liquid may then combine with oxygen in the air, forming the even more irritating and corrosive sulfuric acid (H_2SO_4). Peak levels of SO_2 in the air can cause temporary breathing difficulty for people with asthma who are active outdoors. Longer-term exposures to high levels of SO_2 gas and particles cause respiratory illness and aggravate existing heart disease. SO_2 reacts with other chemicals in the air to form tiny sulfate particles which are measured as $PM_{2.5}$. SO_2 is monitored at several sites in the SoCAB, and the SoCAB is in attainment for the State and federal SO_2 standards.

Lead

Lead is a stable compound, which persists and accumulates both in the environment and in animals. In humans, it affects the blood-forming (or hematopoietic), the nervous, and the renal systems. In addition, lead has been shown to affect the normal functions of the reproductive, endocrine, hepatic, cardiovascular, immunological, and gastrointestinal systems, although there is significant individual variability in response to lead exposure. Since 1975, lead emissions have been in decline due in part to the introduction of catalyst-equipped vehicles and the decline in production of leaded gasoline. In general, an analysis of lead is limited to projects that emit significant quantities of the pollutant (e.g., lead smelters, battery manufacturers, and battery recyclers) and is not undertaken for transportation, residential, or commercial development projects. The SoCAB is in attainment for the State lead standard. The Los Angeles County portion of the SoCAB is classified nonattainment for the federal lead standard, but Orange County is in attainment.

Visibility Reducing Particles

Visibility reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consist of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt. The State standard is intended to limit the frequency and severity of visibility impairment due to regional haze. The SoCAB is "unclassified" for this pollutant. There are no federal standards for visibility reducing particulates.

Sulfates (SO_4)

Sulfates (SO_4) are the fully oxidized ionic form of sulfur. SO_4 occurs in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to SO_4 takes place comparatively rapidly and completely in California urban areas due to regional meteorological features.

The State SO_4 standard is designed to prevent aggravation of respiratory symptoms. Effects of SO_4 exposure at levels above the standard include a decrease in respiratory function; aggravation of asthmatic symptoms; and an increased risk of cardiopulmonary disease. SO_4 is particularly effective in degrading visibility and, due to fact that it is usually acidic, can harm ecosystems and damage materials and property. The SoCAB is in attainment for the State SO_4 standard.

Hydrogen Sulfide (H_2S)

H_2S is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. It can also be present in sewer gas and some natural gas, and it can be emitted as the result of geothermal energy exploitation. Breathing H_2S at levels above the standard will result in exposure to a very disagreeable odor. In 1984, a CARB committee concluded that the ambient standard for H_2S is adequate to protect public health and to significantly reduce odor annoyance (California Air Resources Board [CARB] 20023. The SoCAB is "unclassified" for this pollutant.

Vinyl Chloride (Chloroethene)

Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.

Short-term exposure to high levels of vinyl chloride in air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Long-term exposure to vinyl chloride through inhalation and oral exposure causes liver damage. Cancer is a major concern from exposure to vinyl chloride via inhalation. Vinyl chloride exposure has been shown to increase the risk of angiosarcoma, a rare form of liver cancer in humans. Vinyl chloride is not routinely measured in the SoCAB. California has a vinyl chloride standard, but there is no corresponding federal standard.

Toxic Air Contaminants

In addition to criteria air pollutants, toxic air contaminants (TACs) emitted from mobile and stationary sources must be taken into consideration for projects proposing new sources of TAC emissions. TACs are those pollutants that are known or suspected to cause cancer or other serious health effects (e.g., reproductive effects or birth defects) or adverse environmental effects.

Installation and operation of stationary equipment that emit TACs generally require permits from the applicable air district, and a Health Risk Assessment (HRA) of TAC emissions may be a requirement under the permitting process. Land uses that would result in a long-term increase in mobile TAC emissions (e.g., distribution centers with diesel emissions from delivery trucks) also may require the preparation of an HRA. The HRA evaluates the risks posed to sensitive receptors (e.g., residents, schools, hospitals, and parks) in the vicinity of proposed TAC source(s) and must not exceed significance thresholds. Significance thresholds have been established in terms of cancer risk and hazard index.

Carcinogenic risks (i.e., cancer risks) are estimated as the incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a probability (e.g., 10 in 1 million). Hazard indices (HIs) express the potential for chemicals to result in non-cancer health impacts, and non-carcinogenic chemicals should not be present at levels expected to cause adverse health effects (i.e., HI greater than one). HIs are expressed using decimal notation (e.g., 0.001). If there is a reference exposure level of greater than 1, then impacts would be considered potentially significant. The National Contingency Plan (NCP, in accordance with *Code of Federal Regulations* [CFR], Title 40, Part 300) is commonly cited as the basis for target risk and hazard levels. According to the NCP, lifetime incremental cancer risks posed by a site should not exceed the range of between 1 in 1 million and 100 in 1 million.

Diesel Particulate Matter

Diesel particulate matter (DPM) is part of a complex mixture that makes up diesel exhaust emitted from a broad range of diesel engines, including on-road diesel engines of trucks, buses, and cars and the off-road road diesel engines that include locomotives, marine vessels, and heavy-duty equipment. Diesel exhaust is composed of gas and particles. The gas phase is composed of many urban hazardous air pollutants, such as acetaldehyde, benzene, and formaldehyde. The particle phase includes categories of fine and ultra-fine particles that, when inhaled, can cause immunological effects including lung inflammation and cellular changes in the lung. Human epidemiological studies demonstrate an association between diesel exhaust exposure and

increased lung cancer rates in occupational settings. In 1998, the California Office of Environmental Health Hazards listed DPM as a TAC based on its potential to cause cancer and other adverse health effects. Under California regulatory guidelines, diesel exhaust, as a mixture, is identified as a known carcinogen.

4.2.2 REGULATORY SETTING

Air quality in the SoCAB is regulated by USEPA, CARB, and the South Coast Air Quality Management (SCAQMD). Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although USEPA regulations may not be superseded, both State and local regulations may be more stringent. The Southern California Association of Governments (SCAG) is an important partner to the SCAQMD and produces estimates of anticipated future growth and vehicular travel in the basin that are used for air quality planning. The federal, State, regional, and local regulations for criteria air pollutants and TACs are discussed below.

Federal

The Federal Clean Air Act (CAA) requires the adoption of NAAQS, which are periodically updated to protect the public health and welfare from the effects of air pollution. The USEPA is responsible for setting and enforcing the NAAQS for criteria pollutants. Primary standards set limits to protect public health, including the health of at-risk populations such as people with pre-existing heart or lung disease (such as asthmatics), children, and older adults. Secondary standards set limits to protect public welfare, including protection against visibility impairment as well as damage to animals, crops, vegetation, and buildings.

Current federal standards are set for O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. These pollutants are called criteria pollutants because the USEPA has established NAAQS for the concentrations of these pollutants. CARB has also established standards for the criteria pollutants, known as CAAQS, and the State standards are generally more restrictive than the NAAQS. When a region has air quality that fails to meet the standards, the USEPA and the CARB designate the region as “nonattainment” and the regional air quality agency must develop plans to attain the standards. NAAQS are shown above in Table 4.2-1.

TABLE 4.2-1
CALIFORNIA AND FEDERAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary[a]	Secondary[b]
O_3	1 Hour	0.09 ppm (180 µg/m^3)	–	–
	8 Hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
PM_{10}	24 Hour	50 µg/m^3	150 µg/m^3	Same as Primary
	AAM	20 µg/m^3	–	Same as Primary
$PM_{2.5}$	24 Hour	–	35 µg/m^3	Same as Primary
	AAM	12 µg/m^3	9.0 µg/m^3	15.0 µg/m^3
CO	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	–
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
NO_2	AAM	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary
	1 Hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)	–
SO_2	24 Hour	0.04 ppm (105 µg/m^3)	–	–
	3 Hour	–	–	0.5 ppm (1,300 µg/m^3)
	1 Hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)	–
Lead	30-day Avg.	1.5 µg/m^3	–	–
	Calendar Quarter	–	1.5 µg/m^3	Same as Primary
	Rolling 3-month Avg.	–	0.15 µg/m^3	
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per km – visibility ≥ 10 miles (0.07 per km – ≥30 miles for Lake Tahoe)	**No Federal Standards**	
Sulfates	24 Hour	25 µg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m^3)		

O_3: ozone; ppm: parts per million; µg/m^3: micrograms per cubic meter; PM_{10}: respirable particulate matter 10 microns or less in diameter; AAM: Annual Arithmetic Mean; –: No Standard; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter; CO: carbon monoxide; mg/m^3: milligrams per cubic meter; NO_2: nitrogen dioxide; SO_2: sulfur dioxide; km: kilometer.

[a] *National Primary Standards:* The levels of air quality necessary, within an adequate margin of safety, to protect the public health.

[b] *National Secondary Standards:* The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Note: More detailed information on the data presented in this table can be found at the CARB website (www.arb.ca.gov).

Source: CARB 2024

Specific geographic areas are classified as either “attainment” or “nonattainment” areas for each pollutant based upon the comparison of measured data with the NAAQS. Attainment areas have concentrations of the criteria pollutant that are below the NAAQS, and a Nonattainment classification indicates the criteria pollutant concentrations have exceeded the NAAQS. When an area has been reclassified from a nonattainment to an attainment area for a federal standard, the status is identified as “maintenance”, and there must be a plan and measures that will keep the

region in attainment for the following ten years. Areas designated as nonattainment are required to prepare regional air quality plans, which set forth a strategy for bringing an area into compliance with the standards. These regional air quality plans, which are developed to meet federal requirements, are included in an overall program referred to as the State Implementation Plan (SIP).

State

CARB, a part of the California Environmental Protection Agency (CalEPA), has also established the CAAQS shown in Table 4.2-1, which are generally more restrictive than the NAAQS. CARB conducts research; compiles emissions inventories; develops suggested control measures; provides oversight of local programs; and prepares the SIP. For regions that do not attain the CAAQS, CARB requires the local air districts to prepare plans for attaining the standards. CARB establishes emissions standards for motor vehicles sold in California, consumer products (e.g., hair spray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

Based on monitored air pollutant concentrations, the USEPA and the CARB designate an area's status in attaining the NAAQS and the CAAQS, respectively, for selected criteria pollutants. These attainment designations are shown in Table 4.2-2. As identified in Table 4.2-2, Orange County is a nonattainment area for O_3, PM_{10}, and $PM_{2.5}$.

TABLE 4.2-2
ATTAINMENT STATUS OF CRITERIA POLLUTANTS
IN THE SOUTH COAST AIR BASIN

Pollutant	State	Federal
O_3 (1 hour)	Nonattainment	No standard
O_3 (8 hour)		Extreme Nonattainment
PM_{10}	Nonattainment	Attainment/Maintenance
$PM_{2.5}$	Nonattainment	Serious Nonattainment
CO	Attainment	Attainment/Maintenance
NO_2	Attainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Lead	Attainment	Attainment/Nonattainment*
All others	Attainment/Unclassified	No standards

O_3: ozone; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter; CO: carbon monoxide; NO_2: nitrogen dioxide; SO_2: sulfur dioxide; SoCAB: South Coast Air Basin.

* Los Angeles County is classified nonattainment for lead; the remainder of the SoCAB is in attainment of the State and federal lead standards.

Source: SCAQMD 2016.

Regional

South Coast Air Quality Management District and Southern California Association of Governments

In the SoCAB, the SCAQMD is the agency responsible for protecting public health and welfare through the administration of federal and State air quality laws, regulations, and policies. Included in the SCAQMD's tasks are the monitoring of air pollution; the preparation of the Air Quality Management Plan (AQMP) for the SoCAB; and the promulgation of rules and regulations.

In the Project area, SCAG is the federally designated Metropolitan Planning Organization and the State-designated transportation planning agency for six counties: Riverside, San Bernardino, Los Angeles, Ventura, Imperial, and Orange. On April 4, 2024, SCAG's Regional Council adopted the 2024–2050 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS; Connect SoCal). The RTP/SCS is a long-range visioning plan that balances future mobility and housing needs with economic, environmental, and public health goals. The RTP/SCS includes a strong commitment to reduce emissions from transportation sources in order to improve public health and to meet the NAAQS as set forth by the CAA.

The SCAQMD and SCAG are jointly responsible for formulating and implementing the AQMP for the SoCAB. SCAG's Regional Mobility Plan and Growth Management Plan form the basis for the land use and transportation control portion of the AQMP.

Air Quality Management Plan

Air quality in Orange County is partially regulated by the SCAQMD, which is the agency principally responsible for comprehensive air pollution control in the SoCAB. The SCAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary. The SCAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources.

The Federal CAA requires the preparation of plans to demonstrate attainment of the NAAQS for which an area is designated as being in nonattainment. Furthermore, the CAA requires the revision of these plans every three years to address reducing pollutant concentrations that exceed the CAAQS. The SCAQMD and SCAG, in coordination with local governments and the private sector, develop the AQMP for the SoCAB to satisfy these requirements. The AQMP is the most important air management document for the SoCAB because it provides the blueprint for meeting State and federal ambient air quality standards.

The current regional plan applicable to the Project is the SCAQMD's 2022 AQMP. The SCAQMD is responsible for ensuring that the SoCAB meets the NAAQS and CAAQS by reducing emissions from stationary (area and point), mobile, and indirect sources. To accomplish this goal, the SCAQMD prepares AQMPs in conjunction with the SCAG, County transportation commissions, and local governments; develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary.

The 2022 AQMP was adopted on December 2, 2022, by the SCAQMD Governing Board. The 2022 AQMP evaluates integrated strategies and measures to meet the following NAAQS (SCAQMD 2022):

- 8-hour O_3 target of 80 parts per billion (ppb) by 2024, 75 ppb by 2032, 70 ppb by 2038;
- Annual $PM_{2.5}$ (12 micrograms per cubic meter [µg/m^3]) by 2025;
- 1-hour O_3 (120 ppb) by 2023; and
- 24-hour $PM_{2.5}$ (35 µg/m^3) by 2023.

South Coast Air Quality Management District Rules

The Project will be required to comply with existing SCAQMD rules for the reduction of fugitive dust and criteria pollutant emissions. The following rules are most relevant to the proposed Project:

SCAQMD Rule 402, Nuisance, states that a project shall not "discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property".

SCAQMD Rule 403, Fugitive Dust, requires actions to prevent, reduce, or mitigate fugitive particulate matter emissions. These actions include applying water or chemical stabilizers to disturbed soils; managing haul road dust by applying water; covering all haul vehicles before transporting materials; restricting vehicle speeds on unpaved roads to 15 miles per hour (mph); and sweeping loose dirt from paved site access roadways used by construction vehicles. In addition, Rule 403 requires that vegetative ground cover be established on disturbance areas that are inactive within 30 days after active operations have ceased. Alternatively, an application of dust suppressants can be applied in sufficient quantity and frequency to maintain a stable surface. Rule 403 also requires grading and excavation activities to cease when winds exceed 25 mph.

Local

Unincorporated Orange County

There are no County regulations applicable to the Project's potential impacts on air quality. However, the Orange County General Plan addresses air quality in the unincorporated territory where the Project takes place. Within its Transportation Element, updated in 2020, the General Plan states that it is responsive to the AQMD objectives, and regional planning objectives of the SCAG.[1] Similarly, the Land Use Element notes that "the purpose of the Enhancement of Environment Policy is to ensure that all land use activities seek to enhance the physical environment, including the air, water, sound levels, landscape, and plant and animal life."[2] The Resources Element (2013) has the most robust discussion on air quality affecting the area. It advances the goal to promote optimum sustainable environmental standards for air resources with an explicit policy to develop and support programs which improve air quality or reduce air pollutant emissions.[3] The Project is consistent with these General Plan goals, plans, and objectives to enhance the physical environment including air and water in Orange County.

4.2.3 METHODOLOGY

California Emission Estimator Model

Proposed Project emissions were calculated by using California Emissions Estimator Model (CalEEMod) version 2022.1.1.20 (CAPCOA 2023). CalEEMod is a computer program accepted by the SCAQMD that can be used to estimate criteria pollutant and GHG emissions associated

[1] Orange County General Plan, Chapter IV. Transportation Element Update 2020. Accessed June 2023, https://ocds.ocpublicworks.com/sites/ocpwocds/files/2020-12/Chapter%20IV-%20Transportation%202020.pdf

[2] Orange County General Plan, Chapter III. Land Use Element Update 2024. Accessed November 2024, https://ocds.ocpublicworks.com/sites/ocpwocds/files/2024-07/Adopted%20Land%20Use%20Element%20Amendment%20-%20June%202024.pdf

[3] Orange County, General Plan, Resources Element 2013. Accessed June 2013, https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/40235.pdf

with land development projects in California. CalEEMod has separate databases for specific Counties and air districts. The Orange County database was used for the Project. The model calculates emissions of CO, SO_2, PM_{10}, $PM_{2.5}$, and the O_3 precursors VOC and NO_x. For this analysis, the results are expressed in pounds per day (lbs/day) and are compared with the SCAQMD mass daily thresholds to determine impact significance.

Specific inputs to CalEEMod include land uses and acreages. Construction input data include, but are not limited to, (1) the anticipated start and finish dates of each Project construction activity (e.g., grading, building, and paving);[4] (2) inventories of construction equipment to be used during each Project activity; (3) areas to be excavated and graded for development; (4) volumes of materials to be imported to and exported from the Project site; and (5) areas to be paved. The input data and assumptions are discussed below and are shown in notes on the CalEEMod data in Appendix B. The CalEEMod has the capability to calculate reductions in construction emissions from the effects of dust control, off-road diesel-engine classifications, low-emission paints, and other selected measures.

Due to the lack of changes in operations between the existing dam and conditions under the proposed dam improvements, operations phase emissions have been addressed qualitatively.

Local Concentrations of Criteria Pollutants from On-Site Sources

As part of the SCAQMD's environmental justice program, attention has focused on localized effects of air quality and the exposure of persons to criteria pollutants generated on a project site. The SCAQMD developed localized significance threshold (LST) methodology and mass rate look-up tables that public agencies can use to determine whether or not a project may generate significant adverse localized air quality impacts. In addition to the mass daily emissions for regional thresholds, the SCAQMD established California Environmental Quality Act (CEQA) significance thresholds for ambient air quality to address localized impacts. The localized impact analysis is based on the concentration of a pollutant at a receptor site. The concentration standard is either the same as the NAAQS or CAAQS or is based upon a health-based standard. It is possible for a pollutant to have a significant impact regionally and a less than significant impact locally or vice versa. It is also possible for both impacts (i.e., regional and local) to be significant or less than significant. The look-up tables allow the evaluation of impacts without the complex task of dispersion modeling.

The analysis was not performed for operations because there would be no substantial on-site stationary sources of criteria pollutants with the proposed Project. The LST methodology translates the concentration standards into emissions thresholds.

The LST methodology addresses NO_2, CO, PM_{10}, and $PM_{2.5}$ emissions. SO_2 and lead are not included because these pollutants are generated in very small amounts in construction projects. O_3 is not included because it is a secondary pollutant, and local concentrations cannot be estimated from precursor emissions. For NO_2 and CO, the one-hour standards are used and receptors that could be exposed for one hour are considered. For PM_{10} and $PM_{2.5}$, the 24-hour standards are used, and the receptors of interest are those where persons could be exposed for 24 hours, such as residences. Because emissions are based on the ambient air quality standards, exceedance of the LST represents a potential health impact. As noted above, even if a standard

[4] Construction emissions were modeled in CalEEMod assuming a start date of 2024, which provides a conservative estimate of emissions given that construction equipment and vehicles generally become more efficient over time due to increasingly stringent regulations.

is exceeded, the potential impact can be confirmed or found to be less than significant by a more detailed analysis.

4.2.4 EXISTING CONDITIONS

Existing Air Quality Conditions

Air quality data for the Project site is represented by the Saddleback Valley monitoring station located in Lake Forest. Pollutants measured at the Saddleback Valley Monitoring Station include CO, O_3, PM_{10}, $PM_{2.5}$, and NO_2. The monitoring data presented in Table 4.2-3, Air Quality Levels Measured at the Saddleback Valley Monitoring Station, were obtained from the SCAQMD. Federal and State air quality standards are presented with the number of times those standards were exceeded.

TABLE 4.2-3
AIR QUALITY LEVELS MEASURED AT THE SADDLEBACK VALLEY MONITORING STATION

Pollutant	California Standard	National Standard	Year	Max. Level	Days State Standard Exceeded	Days National Standard Exceeded
O_3 (1 hour)	0.09 ppm	None	2020	0.171	20	—
			2021	0.105	2	—
			2022	0.110	1	—
O_3 (8 hour)	0.070 ppm	0.070 ppm	2020	0.122	32	32
			2021	0.081	8	8
			2022	0.088	6	5
CO (1 hour)	20 ppm	35 ppm	2020	1.7	0	0
			2021	0.8	0	0
			2022	1.2	0	0
CO (8 hour)	9 ppm	9 ppm	2020	0.8	0	0
			2021	1.0	0	0
			2022	1.0	0	0
PM_{10} (24 hour)	50 µg/m^3	150 µg/m^3	2020	53	0	1
			2021	35	0	0
			2022	31	0	0
PM_{10} (AAM)	20 µg/m^3	None	2020	16.8	0	0
			2021	15.6	0	0
			2022	15.3	0	0
NO_2 (1 Hour)	0.18 ppm	0.100 ppm	2020	—	—	—
			2021	—	—	—
			2022	—	—	—
$PM_{2.5}$ (24 Hour)	None	35 µg/m^3	2020	35	—	0
			2021	28.7	—	0
			2022	—	—	—

O_3: ozone; ppm: parts per million; —: Data Not Reported or insufficient data available to determine the value; CO: Carbon Monoxide; PM_{10}: respirable particulate matter with a diameter of 10 microns or less; µg/m^3: micrograms per cubic meter; AAM: Annual Arithmetic Mean; NO_2: nitrogen dioxide; $PM_{2.5}$: fine particulate matter with a diameter of 2.5 microns or less. N/A indicates that there is no applicable standard.

Source: SCAQMD 2024.

The monitoring data shows that O_3 is the air pollutant of primary concern in the Project area. At the monitoring station, the State 1-hour O_3 standard was exceeded 1–20 days annually between 2020–2022. The State and federal O_3 8-hour standard was also exceeded 6–32 days annually over the same time period. O_3 is a secondary pollutant and is not directly emitted from a source; it occurs as the result of photochemical reactions from O_3 precursors, which include VOCs and NO_2 and sunlight.

Sensitive Air Quality Receptors

Sensitive receptors include, but are not limited to, children, the elderly, persons with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. These sensitive receptors include, but are not limited to, schools, athletic facilities, hospitals, residential areas, parks, and convalescent homes. The Project site is located in a remote area with the nearest residential land uses located approximately 9,500 feet to the west. There are nearby parks which include Oak Canyon Park, which abuts Irvine Lake to the southeast; Irvine Regional Park, which is located approximately 1 mile northwest of Irvine Lake; and Irvine Lake Park, which abuts Irvine Lake to the southwest.

4.2.5 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant air quality impact if it would:

Threshold 4.2-1 Conflict with or obstruct implementation of the applicable air quality plan.

Threshold 4.2-2 Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State Ambient Air Quality Standard.

Threshold 4.2-3 Expose sensitive receptors to substantial pollutant concentrations.

Threshold 4.2-4 Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

The SCAQMD's Air Quality Analysis Handbook (CEQA Handbook) provides significance thresholds for both construction and operation of projects within the SCAQMD's jurisdictional boundaries (SCAQMD 2023). The SCAQMD recommends that projects be evaluated in terms of the quantitative thresholds established to assess both the regional and localized impacts of project-related air pollutant emissions. Irvine Water Ranch District (IRWD) uses the current SCAQMD thresholds to determine whether a proposed project would have a significant impact. These SCAQMD thresholds are identified in Table 4.2-4.

TABLE 4.2-4
SOUTH COAST AIR QUALITY
MANAGEMENT DISTRICT AIR QUALITY
SIGNIFICANCE THRESHOLDS

Mass Daily Thresholds (lbs/day)		
Pollutant	**Construction**	**Operation**
VOC	75	55
NO_X	100	55
CO	550	550
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
Lead	3	3

lbs/day: pounds per day; VOC: volatile organic compound; NO_x: nitrogen oxides; CO: carbon monoxide; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter; SO_x: sulfur oxides.

Source: SCAQMD 2023

4.2.6 IMPACT ANALYSIS

Project Design Feature

PDF AQ-1 Upon the initial dewatering of the reservoir at the start of construction, all exposed organic matter shall be removed from the reservoir by construction crews. Organic matter removal, including removal of plant and animal species, shall occur in accordance with all applicable laws, regulations, and permit conditions.

Threshold 4.2-1

Would the Project conflict with or obstruct implementation of the applicable air quality plan?

Significant and Unavoidable Impact. The SCAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary. It is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources and has prepared an AQMP that establishes a program of rules and regulations directed at attaining the NAAQS and CAAQS. As discussed previously, the current regional plan applicable to the Project is the SCAQMD's 2022 AQMP.

The main purpose of an AQMP is to bring an area into compliance with the requirements of federal and State air quality standards. For a project to be consistent with the AQMP, the pollutants emitted from the project should not (1) exceed the SCAQMD CEQA air quality significance thresholds or (2) conflict with or exceed the assumptions in the AQMP. As shown in Threshold 4.2-2 below, while long-term air pollutant emissions associated with Project operations would be less than significant, short-term air pollutant emissions associated with Project construction would exceed the SCAQMD thresholds and would result in a significant impact during construction even with the implementation of mitigation measures and compliance with SCAQMD regulatory requirements.

The County of Orange's General Plan designates the Project site as Open Space (5) (County of Orange 2015); additionally, the Project site falls within an Open Space Reserve (OSR) overlay. The Open Space (5) designation indicates the current and near-term use of the land, while the OSR overlay identifies lands of scenic and natural attraction, and areas of ecological, cultural, historical and recreational significance that are permanently preserved as and restricted to open space and compatible uses (County of Orange 2024). The County's General Plan allows for the development of water resource areas within these designations; moreover, the proposed Project is consistent with existing uses at the Project site. As such, the Project is consistent with the Zoning and Land Use designation of the County's General Plan. The General Plans of cities and counties within the SoCAB are used to determine the regional emissions of the Basin; therefore, emissions related to the Project site are therefore consistent with the growth expectations for the region.

While the operations phase of the Project is consistent with the AQMP, construction emissions associated with the Project would exceed the SCAQMD's significance thresholds despite the implementation of **MM AQ-1** due to the large amount of construction equipment that would be in operation as well as the proposed 20-hour workdays, which would result in greater emissions than over a standard eight-hour workday. As such, the Project's construction activities would conflict with the 2022 AQMP's goal of reducing criteria pollutant emissions. Consequently, the Project would result in a temporary significant and unavoidable impact related to consistency with the AQMP.

Impact Conclusion: *Based on the analysis presented, air pollutant emissions from the proposed Project would exceed the SCAQMD thresholds during construction and would result in a significant impact even with the implementation of mitigation measures and compliance with SCAQMD regulatory requirements. As a result, the Project's construction activities would conflict with the 2022 AQMP's goal of reducing criteria pollutant emissions. Subsequently, the Project would result in a temporary significant and unavoidable impact related to consistency with the AQMP, pursuant to Threshold 4.2-1.*

Threshold 4.2-2

Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?

Significant and Unavoidable Impact. A project may have a significant impact where project-related emissions would exceed federal, State, or regional standards or thresholds, or where project-related emissions would substantially contribute to an existing or projected air quality violation. As identified in Table 4.2-2, Orange County is a nonattainment area for O_3, PM_{10}, and $PM_{2.5}$. The Project would generate PM_{10}, $PM_{2.5}$, NO_2, and O_3 precursors (NO_x and VOC) during short-term construction and long-term operations. The SCAQMD has developed construction and operations thresholds to determine whether projects would result in a cumulatively considerable net increase of criteria pollutants. A project with daily emission rates below the SCAQMD's established air quality significance thresholds (shown previously in Table 4.2-4) would have a less than significant effect on regional air quality. Project emissions were estimated using the CalEEMod. CalEEMod is designed to model construction and operational emissions and allows for the input of project- and county-specific information. CalEEMod modeling results can be found in Appendix B.

Construction Emissions

Air pollutant emissions would occur from construction equipment exhaust; grading; exhaust and particulate emissions from trucks hauling building materials to and from the Project site; from automobiles and light trucks driven to and from the Project site by construction workers; and VOCs from asphalt paving operations. The proposed Project would comply with applicable SCAQMD rules and regulations, including Rule 403 for fugitive dust control. Rule 403 measures include regular watering of active grading areas and unpaved roads, limiting vehicle speeds on unpaved surfaces, stabilizing stockpiled earth, and curtailing grading operations during high wind conditions. Watering of active grading areas is included in the CalEEMod emissions analysis and results in reduced PM_{10} and $PM_{2.5}$ emissions. The emission reductions associated with compliance with Rule 403 have been included in the emissions calculations.

Regional Emissions Thresholds – Maximum Daily Regional Emissions

Project construction activities are those associated with the development of the Project components. Table 4.2-5 presents the estimated unmitigated maximum daily emissions during construction of the Project and compares the estimated emissions with the SCAQMD's daily regional emission thresholds.

TABLE 4.2-5
UNMITIGATED PROJECT MAXIMUM DAILY
REGIONAL CONSTRUCTION EMISSIONS

Year[1]	Emissions (lbs/day)					
	VOC	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Summer						
Year 1	5	49	43	<1	5	2
Year 2	241	468	573	1	68	35
Year 3	46	374	433	1	52	32
Winter						
Year 1	23	205	179	1	21	13
Year 2	55	472	501	1	56	35
Year 3	34	280	349	1	37	19
Year 4	7	59	56	<1	31	15
Maximum Project (Years 1 to 4)	**241**	**472**	**573**	**1**	**68**	**35**
SCAQMD Thresholds (Table 4.2-4)	*75*	*100*	*550*	*150*	*150*	*55*
Exceeds SCAQMD Thresholds?	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**

lbs/day: pounds per day; VOC: volatile organic compound; NO_x: nitrogen oxides; CO: carbon monoxide; SO_x: sulfur oxides; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter; SCAQMD: South Coast Air Quality Management District.

Source: SCAQMD 2023 (thresholds); see Appendix B for CalEEMod model outputs.

As shown in Table 4.2-5, Project related construction emissions would exceed the SCAQMD's significance thresholds for VOC and NO_x in Year 1; VOC, NO_x, and CO in Year 2; and NO_x and CO in Year 3. These exceedances are primarily due to the large number of construction equipment that would be in operation as well as the proposed 20-hour workdays, which would result in greater emissions than over a standard eight-hour workday. and would result in a significant impact to regional air quality prior to the implementation of mitigation measures. The Project would implement **MM AQ-1** which requires use of Tier 4 offroad construction engines to

minimize emissions during construction of the Project. Table 4.2-6 shows the emissions with the use of cleaner engines required under **MM AQ-1.**

TABLE 4.2-6
MITIGATED PROJECT MAXIMUM DAILY REGIONAL CONSTRUCTION EMISSIONS

Year	Emissions (lbs/day)					
	VOC	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Summer						
Year 1	2	22	69	<1	4	1
Year 2	221	147	749	1	61	25
Year 3	16	112	617	1	41	21
Winter						
Year 1	6	46	293	1	15	7
Year 2	19	137	733	1	44	22
Year 3	14	87	560	1	35	17
Year 4	2	9	76	<1	29	13
Maximum Project (Years 1 to 4)	**221**	**147**	**749**	**1**	**61**	**25**
SCAQMD Thresholds (Table 4.2-4)	*75*	*100*	*550*	*150*	*150*	*55*
Exceeds SCAQMD Thresholds?	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**

lbs/day: pounds per day; VOC: volatile organic compound; NO_x: nitrogen oxides; CO: carbon monoxide; SO_x: sulfur oxides; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter; SCAQMD: South Coast Air Quality Management District.

Source: SCAQMD 2019 (thresholds); see Appendix B for CalEEMod model outputs.

As shown in Table 4.2-6, even with implementation of **MM AQ-1**, Project construction would exceed established thresholds for VOC, CO and NO_x for Maximum Daily Regional Construction Emissions. Additionally, as shown in Table 4.2-6, implementation of **MM AQ-1** requiring use of Tier 4 offroad engine standards may result in higher CO emissions than for equipment with other engine standards. While CO emissions are higher with implementation of **MM AQ-1**, VOCs and NO_x would be reduced. VOCs and NO_x contribute to O_3 (smog) which has more health/environmental implications than CO; additionally, the region is in a state of attainment for CO pursuant to the ambient air quality standards. Therefore, **MM AQ-1** would reduce overall impacts associated with this threshold. Because the Project would exceed the SCAQMD's construction emissions thresholds even with implementation of **MM AQ-1**, construction emissions would be cumulatively considerable, and the impact would be significant and unavoidable.

Relating Adverse Air Quality Impacts and Health Effects

Estimating a project's pollutant concentration levels relies on a range of assumptions and uncertainties, leading to a high margin of error. Therefore, modeling these concentrations using existing tools would produce unreliable data and results. Moreover, due to the complexity of O_3 formation, a specific amount of NO_x or VOCs emitted in a particular area does not directly translate to a specific concentration of O_3 in that area. For example, areas with relatively low emissions of NO_x or VOCs can have high O_3 concentrations due to wind transport and other meteorological conditions such as temperature inversion and high-pressure systems. Conversely, areas with significantly higher NO_x and VOC emissions might experience lower O_3 concentrations due to factors like sea breezes, which disperse emissions. For projects where regional construction and operational emissions exceed the SCAQMD's recommended daily significance thresholds, it is not feasible to accurately determine the concentration of O_3 that would be created at or near the

project site on a specific day or month, or the specific human health effects that may occur as a result. Factors such as meteorology, sunlight, geographical distribution of emissions, and other complex photochemical processes all combine to determine the ultimate concentrations and locations of O_3 (City of Los Angeles 2019).

According to the Brief of Amicus Curiae (Brief) by the SCAQMD in the Friant Ranch case (April 6, 2015), SCAQMD staff lack a method to accurately quantify ozone-related health impacts from NO_x or VOC emissions from relatively small projects, due to photochemistry and regional model limitations. The Brief concludes that, for the Friant Ranch Environmental Impact Report (EIR), even if data were input into a methodology, the results would not be reliable or meaningful. Additionally, it should be noted that the occurrence of specific health conditions depends on numerous other factors that are difficult to quantify, such as an individual's genetic predisposition, diet, exercise regimen, stress, and other behavioral characteristics (SCAQMD 2015).

Conversely, SCAQMD does state in the Brief that this analysis may be feasible for very large regional projects and that SCAQMD has been able to correlate potential health outcomes with significant emission sources. For instance, emissions of 6,620 lbs/day of NO_x and 89,180 lbs/day of VOC were projected to cause approximately 20 premature deaths per year and 89,947 school absences due to O_3. As shown in Table 4.2-5, and Table 4.2-6, Project construction would not generate emissions of this magnitude. With implementation of **MM AQ-1**, Project construction would produce approximately 147 lbs/day of NO_x and 221 lbs/day of VOCs during construction. Therefore, although the Project's construction emissions would be significant and unavoidable, the emissions are too low to use a regional modeling program to correlate health effects on a basin-wide level (SCAQMD 2015). However, as discussed in Section 4.2.1, Background, elevated levels of ground-level O_3 are generally linked to respiratory issues, such as lung irritation, aggravated asthma, and breathing difficulties, and elevated levels of CO can lead to headaches, aggravation of cardiovascular disease, and impairment of central nervous system functions. Because the SoCAB is currently nonattainment for State and federal O_3 standards, adverse health effects are already occurring in the region, and Project construction emissions would temporarily contribute to this nonattainment status and its associated health effects on a regional scale. The SoCAB is in attainment for State and federal CO standards; therefore, Project construction emissions are not expected to contribute to health effects from CO on a regional scale.

Furthermore, this Draft EIR includes an assessment of the Project's localized impact on air quality for emissions of CO, NO_x, PM_{10}, and $PM_{2.5}$ by comparing the Project's on-site emissions to SCAQMD's applicable LST thresholds, as shown in Threshold 4.2-3 below. According to this analysis, the Project would not result in emissions exceeding SCAQMD's LSTs. Thus, the Project is not expected to surpass the most stringent federal or state ambient air quality standards for CO, NO_x, PM_{10}, and $PM_{2.5}$ emissions.

Operational Emissions

The Project involves improvements to existing dam infrastructure and would not result in substantial increases in air pollutant sources such as vehicular or energy consumption. Existing operations related to dam inspection and maintenance activities would be comparable to those which would occur under the proposed Project. As such, air pollutant emissions would likewise be essentially the same as existing conditions and would result in a less than significant impact related to operations phase emissions contributions to regional air quality.

Impact Conclusion: *Pursuant to Threshold 4.2-2, short-term construction emissions of nonattainment pollutants and their precursors would be cumulatively considerable and would result in a significant and unavoidable impact to*

*regional air quality with implementation of **MM AQ-1**. Project operations would result in a less than significant impact to regional air quality.*

Threshold 4.2-3

Would the Project expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact. Exposure of sensitive receptors is addressed for the following situations: CO hotspots (based on the methodology provided in the California Department of Transportation CO Protocol [Institute of Transportation Studies - University of California, Davis 1997]); criteria pollutants from on-site construction; and TACs from on-site construction.

Carbon Monoxide Hotspot

A CO hotspot is an area of elevated CO concentrations that is caused by severe vehicle congestion on major roadways, typically near intersections. If a project substantially increases average delay at signalized intersections that are operating at Level of Service (LOS) E or F or causes an intersection that would operate at LOS D or better without the Project to operate at LOS E or F with the Project, there is a potential for a CO hotspot. As such, a CO hotspot is an area of localized CO pollution caused by severe vehicle congestion on major roadways, typically near intersections. The Project would not result in a substantial change in vehicle trips associated with the operation of the dam infrastructure. Existing operations of the dam involve minimal amounts of vehicle trips associated with maintenance and inspection operations, which do not substantially result in local traffic congestion. Therefore, the proposed Project would not increase congestion and would result in a less than significant impact related to CO hotspots.

Criteria Pollutants from On-Site Construction

In addition to the mass daily emissions thresholds, the SCAQMD has developed localized significance thresholds (LSTs) to evaluate short-term localized impacts to nearby sensitive receptors from on-site emissions of NO_2, CO, PM_{10}, and $PM_{2.5}$. LSTs represent the maximum emissions that can be generated at a project site without expecting to cause or substantially contribute to an exceedance of the most stringent national or state ambient air quality standards. LSTs are based on the distance to the nearest sensitive receptor and the ambient concentrations of pollutants within a project's source receptor area (SRA). The SCAQMD provides LST lookup tables for one-, two-, and five-acre projects emitting CO, NO_X, $PM_{2.5}$, and/or PM_{10}. The assessment of localized air quality impacts was developed to provide a conservative estimate of the level of Project-generated air pollutants that have the potential to exceed the NAAQS or CAAQS, which could consequently result in adverse health impacts. Exceedance of these air quality standards does not describe the prevalence, magnitude, or specific health effects, but rather assesses the potential for a Project-related health effect to occur.

For the purposes of an LST analysis, SCAQMD considers receptors where it is possible that an individual could remain for 1 hour for NO_2 and CO exposure and 24 hours for PM_{10} and $PM_{2.5}$ exposure. The LSTs utilized for this analysis account for the Project site's location within SRA 19, Saddleback Valley and receptors located at 500 meters (1,640 feet) of the Project site. The nearest residential uses along Jamboree Road are located approximately 2,596 meters (9,500 feet) to the west of the Project site, and use of the 500-meter separation distance provides a conservative analysis of potential impacts.

The LST methodology is recommended for projects that have five acres or less of site disturbance per day. Per SCAQMD guidance, site disturbance is calculated by the number of acres a particular piece of equipment would likely disturb per day. The disturbance values provided by the SCAQMD

to determine site disturbance are provided below in Table 4.2-7 SCAQMD Disturbance Area by Equipment Type.

TABLE 4.2-7
SCAQMD DISTURBANCE AREA BY EQUIPMENT TYPE

Equipment Type	Acres/8hr-day
Crawler Tractors	*0.5*
Graders	*0.5*
Rubber Tired Dozers	*0.5*
Scrapers	*1*

The Project would actively disturb a maximum of approximately 4 acres during the peak day (Roadway Excavation and Cleanup) of all construction phases. Therefore, the LST thresholds for 4 acres were used for the construction LST analysis. The emissions limits in the lookup tables are based on the SCAQMD's Ambient Air Quality Standards (SCAQMD 2016). As stated above, the Project site is located within SRA 19, Saddleback Valley and the nearest receptors are located along Jamboree Road, approximately 2,596 meters (9,500 feet) to the west of the Project site. The LSTs for receptors located at 500 meters (1,640 feet) of the Project site were utilized.

Table 4.2-8, Construction-Phase Localized Significance Threshold Emissions shows the maximum daily on-site emissions for construction activities compared with the SCAQMD LST screening thresholds. The thresholds shown are from the lookup tables for a site disturbance area of 4 acres. The Project's maximum daily on-site emissions would occur during the roadway excavation and site preparation phase for all pollutants. As shown in Table 4.2-8, localized unmitigated emissions for all analyzed criteria pollutants would be less than the applicable SCAQMD LSTs and therefore would be less than significant.

TABLE 4.2-8
UNMITIGATED CONSTRUCTION-PHASE
LOCALIZED SIGNIFICANCE THRESHOLD EMISSIONS

Emissions and Thresholds	Emissions (lbs/day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Project maximum daily on-site emissions	148	147	37	19
Localized Significance Threshold	263	9,820	142	85
Exceed threshold?	No	No	No	No

lbs/day: pounds per day; NO_x: nitrogen oxides; CO: carbon monoxide; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter.

Note: Data is for SCAQMD Source Receptor Area 19, Saddleback Valley.

Source: SCAQMD 2009 (thresholds); see Appendix B for CalEEMod model outputs.

Although unmitigated localized construction emissions would not exceed SCAQMD LSTs, estimated localized construction emissions with implementation of **MM AQ-1** (described under Threshold 4.2-2) are presented in Table 4.2-9 for informational purposes and are likewise below the applicable SCAQMD LSTs.

TABLE 4.2-9
MITIGATED CONSTRUCTION-PHASE
LOCALIZED SIGNIFICANCE THRESHOLD EMISSIONS

Emissions and Thresholds	Emissions (lbs/day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Project maximum daily on-site emissions	20	152	34	17
Localized Significance Threshold	263	9,820	142	85
Exceed threshold?	No	No	No	No

lbs/day: pounds per day; NO_x: nitrogen oxides; CO: carbon monoxide; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter.

Note: Data is for SCAQMD Source Receptor Area 19, Saddleback Valley.

Source: SCAQMD 2009 (thresholds); see Appendix B for CalEEMod model outputs.

Toxic Air Contaminant Emissions from On-Site Construction

Construction activities would result in short-term, Project-generated emissions of DPM from the exhaust of off-road, heavy-duty diesel equipment used for site preparation (e.g., excavation and grading); paving; and other miscellaneous activities. CARB identified DPM as a TAC in 1998. The dose to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer time period. According to the Office of Environmental Health Hazard Assessment, health risk assessments—which determine the exposure of sensitive receptors to TAC emissions—should be based on a 30-year or 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the Project.

Health risks associated with DPM are due to substantial long-term exposure to this pollutant. While there are park uses nearby, exposure to construction related DPM would occur to park visitors on a short-term (1–7 days) and intermittent basis as compared to the same individuals at residential uses being exposed on a 24-hour basis for a period of 30 or 70 years, which is typically utilized in evaluating health risk. DPM does not have any identified health effects associated with short-term acute exposures and is evaluated relative to long-term chronic and carcinogenic exposures. As such, park users would not be substantially affected by DPM emitted during construction activities due to the relative brevity that individual park visitors would be exposed when they are at the park and the infrequency of attendance of an individual park visitor. As such, park visitors are not anticipated to be significantly affected by TACs related to construction activities. The nearest residential uses are located approximately 1.8 miles away from construction activities. This substantial distance would disperse, and dilute air pollutants generated at the Project site. As indicated in CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, decreases in DPM emissions occur substantially within the first 300 feet and stabilize to background levels at approximately 500 feet (CARB 2005). Considering that the nearest residential uses are approximately 9,500 feet away, Project-related construction DPM emissions would have a negligible impact on health risks at the nearest residential uses. As such, construction emissions of TACs would not expose sensitive receptors to substantial emissions of TACs. The impact would be less than significant. In addition, **MM AQ-1** (described under Threshold 4.2-2) would require the use of Tier 4 offroad engines, which would lead to reductions in exhaust particulate emissions.

Impact Conclusion: *The proposed Project would not increase congestion or result in a significant impact related to CO hotspots. The construction period would be relatively short when compared to the 30- or 70-year exposure period typically used in health risk assessments. Additionally, combined with the highly dispersive properties of DPM and additional reductions in particulate emissions from newer construction equipment, as required by USEPA and CARB regulations, Project construction would not expose sensitive receptors to substantial emissions of TACs. Also, the proposed Project would not have the potential to expose sensitive receptors to substantial TACs from stationary or mobile sources. Overall, pursuant to Threshold 4.2-3, impacts would be less than significant, and no mitigation is required.*

Threshold 4.2-4

Would the Project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less than Significant Impact. According to the SCAQMD's *CEQA Air Quality Handbook* (1993), land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding (SCAQMD 1993). The Project does not propose any of these land uses and would not otherwise produce objectionable long-term operational odors. In addition, the SCAQMD has not identified dam/reservoir projects as sources of odors, which implies that dam/reservoir projects are not common sources of odor. Nevertheless, the dewatering of the reservoir for Project construction may result in the exposure organic matter, including vegetation and remains of fish. All residual organic matter would be removed from the reservoir by construction crews, in accordance with **PDF AQ-1**. Furthermore, the substantial distance between the Project site and the nearest sensitive receptors and the presence of SR-241 and SR-261 would further minimize potential odors emanating from the reservoir once the reservoir has been dewatered. During Project operations, the Project consists of dam infrastructure and would not result in any substantial onsite emissions that would result in a public nuisance.

Short-term construction equipment and activities would generate odors, such as diesel exhaust emissions from construction equipment and paving activities. There may be situations where construction activity odors would have an olfactory presence at nearby park uses, but these odors would not rise to the magnitude of a public nuisance. The odors would be temporary and would dissipate rapidly from the source with an increase in distance. The Project use is also regulated from nuisance odors or other objectionable emissions by SCAQMD Rule 402. Rule 402 prohibits discharge from any source of air contaminants or other material, which would cause injury, detriment, nuisance, or annoyance to people or the public. As such, all Project-related odors are construction related and short term in nature; no long-term operational odors would result. Consequently, the proposed Project would have less than significant impact in regard to other emissions, and no mitigation is required.

Impact Conclusion: *Project-related odors are construction related, low magnitude, and short-term in nature; no long-term operational odors would result. As such, the proposed Project would have less than significant impact in regard to other emissions, pursuant to Threshold 4.2-4.*

4.2.7 CUMULATIVE IMPACTS

The SCAQMD, in their White Paper on Regulatory Options for Addressing Cumulative Impacts from Air Pollution Emissions (presented to the Board on September 5, 2003), states that impacts that are less than significant on a Project level are also considered to be less than significant on a cumulative basis. The AQMD uses the same significance thresholds for project-specific and cumulative impacts analyzed in an Environmental Impact Report, except for the Hazard Index for TAC emissions (SCAQMD 2003). Any projects that are found to result in less than significant impacts on a project level are not considered to be cumulatively considerable and consequently would not result in a considerable contribution to cumulative impacts. Significant cumulative air quality impacts are already occurring in the SoCAB for those pollutants for which it is designated nonattainment (i.e., O_3, PM_{10}, $PM_{2.5}$). Construction activities associated with the proposed Project would result in significant project-level construction-related regional air quality impacts pertaining to ozone precursors VOC and NO_X as well as CO, as quantified above in Tables 4.2-5 and 4.2-6, respectively. Since the SCAQMD recommends that a project's potential contribution to cumulative impacts be assessed utilizing the same significance criteria as those for project-specific impacts, the Project's significant and unavoidable air quality impacts related to ozone precursors VOC and NO_X during construction would likewise be cumulatively considerable.

As discussed previously, the Project would not result in significant impacts to human health due to the substantial distance between the Project site and the nearest sensitive receptors. In terms of cumulative localized air quality impacts, the Project is located in a remote area with low potential for nearby concurrent development. As such, localized air quality impacts would not be cumulatively considerable.

4.2.8 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would result in significant impacts related to exceedance of the SCAQMD's construction phase emission thresholds and consequently result in significant impacts to air quality. The following mitigation measure is necessary to minimize Project-related impacts.

MM AQ-1 IRWD will require its construction contractor(s) to implement the following measures to minimize nitrogen oxide (NO_x) and volatile organic compound (VOC) emissions during construction:

- All off-road diesel-powered construction equipment greater than 50 horsepower will meet U.S. Environmental Protection Agency Tier 4 Final emission standards to the extent that the equipment is available. In addition, all construction equipment will be outfitted with Best Available Control Technology devices certified by the California Air Resources Board. If Tier 4 Final equipment is not available to the best of the construction contractor's understanding, the construction contractor(s) will provide IRWD with documentation showing the reasons for non-availability.
- Require the use of 2010 and newer diesel haul trucks (e.g., material delivery trucks and soil import/export). If the construction contractor(s) determines that 2010 model year or newer diesel trucks cannot be obtained, trucks that meet USEPA 2007 model year NO_x emissions requirements will be required. If 2007 model year or newer diesel trucks are not available, the construction contractor(s) will provide IRWD with reasonable documentation showing the reasons for non-availability.

- Construction equipment will be properly serviced and maintained to the manufacturer's applicable standards.

According to CEQA Guidelines Section 15126.4, lead agencies must consider feasible mitigation measures to avoid or substantially reduce a project's significant environmental impacts. Per Public Resources Code Section 21061.1, feasible means "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors." (Public Resources Code Section 21061.1) IRWD, as Lead Agency, reviewed additional potential mitigation measures involving implementation of a longer construction schedule and/or shorter construction workdays and found them to be infeasible. Both potential mitigation measures could reduce air pollutant emissions during Project construction to a degree by reducing the intensity of daily construction activities. However, construction of the proposed Project necessitates 20-hour workdays during the dry season to accomplish construction within a reasonable timeframe due to seasonal restrictions associated with work during the wet season. In addition, extending the overall duration of Project construction by another year would significantly increase the Project cost; would extend the amount of time the unimproved dam, outlet tower, and spillway would present safety risks to IRWD and the community; and would unduly prolong the length of time this critical water storage reservoir is out of service. Therefore, IRWD determined both of these potential mitigation measures to be infeasible.

4.2.9 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Construction emissions from the Project would exceed the SCAQMD's regional construction emissions thresholds and would result in a significant and unavoidable temporary impact related to regional air quality despite the application of mitigation measures (**MM AQ-1**). Localized construction emissions would be less than significant due to the large distance between the Project's construction activities and the nearest sensitive land uses. Because construction emissions would exceed the SCAQMD's regional thresholds, it would also not be consistent with the goals of the AQMP and would result in a significant impact relative to consistency with local air quality plans.

Long-term operational emissions, and exposure of sensitive receptors to long-term criteria pollutant and TAC emissions from stationary or mobile sources would be less than significant due to the lack of additional emission sources attributable to the Project. The Project would also not exceed the growth assumptions in the AQMP and would not result in impacts related to consistent with local air quality plans for the operations phase. The proposed Project would not increase congestion or result in a significant impact related to CO hotspots.

4.2.10 REFERENCES

California Air Pollution Control Officers Association (CAPCOA). 2023. California Emission Estimator Model (CalEEMod)TM Version 2022.1.1.20, CAPCOA. https://caleemod.com/release-notes.

California Air Resources Board (CARB). 2024. Ambient Air Quality Standards. Sacramento, CA: CARB. https://ww2.arb.ca.gov/sites/default/files/2024-08/AAQS%20Table_ADA_FINAL_07222024.pdf.

———. 2023 (June 12, access date). *Hydrogen Sulfide and Health*. Sacramento, CA: CARB. https://ww2.arb.ca.gov/resources/hydrogen-sulfide-and-health.

———. 2005. *Hair Quality and Land Use Handbook: A Community Health Perspective.* Sacramento, CA: CARB. https://ww2.arb.ca.gov/sites/default/files/2023-05/Land%20Use%20Handbook_0.pdfOrange, County of. 2024 (June, Updated). General Plan, Chapter III. Land Use Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2024-07/Adopted%20Land%20Use%20Element%20Amendment%20-%20June%202024.pdf.

———. 2020 (November). General Plan, Chapter IV. Transportation Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2020-12/Chapter%20IV-%20Transportation%202020.pdf.

———. 2015 (March 10, Adopted). General Plan Land Use Element Map (Amendment 14-02). Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/58442.pdf.

———. 2013. General Plan, Chapter VI. Resources Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/40235.pdf

South Coast Air Quality Management District (SCAQMD). 2024. Historical Data by Year. Diamond Bar, CA: SCAQMD. https://www.aqmd.gov/home/air-quality/historical-air-quality-data/historical-data-by-year.

———. 2023 (March, Revised). SCAQMD Air Quality Significance Thresholds. Diamond Bar, CA: SCAQMD. https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf?sfvrsn=25.

———. 2022 (December 2, Adopted). Air Quality Management Plan. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan.

———. 2016 (February). National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2.

———. 2009 (October). Mass Rate Localized Significance Thresholds Look-up Tables. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/appendix-c-mass-rate-lst-look-up-tables.pdf?sfvrsn=2.

———. 2003 (September 5). Attachment to BOARD MEETING DATE: September 5, 2003, AGENDA NO. 29. White Paper on Regulatory Options for Addressing Cumulative Impacts

from Air Pollution Emissions. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/home/governing-board/agendas-minutes.

———. 1993. CEQA Air Quality Handbook. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993).

Southern California Association of Governments (SCAG). 2024 (April 4, Adopted). *2024-2050 Regional Transportation Plan/Sustainable Communities Strategy—Connect SoCal*. Los Angeles, CA: SCAG. https://scag.ca.gov/sites/main/files/file-attachments/23-2987-connect-socal-2024-final-complete-040424.pdf?1714175547.

University of California Davis (UCD), Institute of Traffic Studies (ITS) 1997 (correspondence dated October 13, 2010). *Transportation Project-Level Carbon Monoxide Protocol* (Prepared for Environmental Program California Department of Transportation by V.J. Garza, P. Graney, and D. Sperling with revisions by D. Niemeier, D. Eisinger, T. Kear, D. Chang, and Y. Meng). Davis, CA: ITS. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/co-protocol-searchable-a11y.pdf.

U.S. Environmental Protection Agency (USEPA). 2023. Particle Pollution Exposure. Washington D.C.: USEPA. https://www.epa.gov/pmcourse/particle-pollution-exposure.

———. 2006. 2006 National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM2.5). Washington, D.C.: USEPA. https://www.epa.gov/pm-pollution/2006-national-ambient-air-quality-standards-naaqs-particulate-matter-pm25.

4.3 BIOLOGICAL RESOURCES

The information in this section is based on the Biological Technical Report for the *Santiago Creek Dam Improvements Project, Orange County, California* prepared by Psomas in March 2025 and the *Jurisdictional Delineation Report for the Santiago Creek Dam Improvements Project, Orange County, California* prepared by Psomas in April 2025. The Biological Technical Report summarized focused surveys for special status plant species conducted in 2020, 2022, 2024, and 2025; Quino checkerspot butterfly (*Euphydryas editha quino*) conducted in 2022; western spadefoot (*Spea hammondii*) conducted in 2025; arroyo toad (*Anaxyrus californicus*) conducted in 2020 and 2022; California gnatcatcher (*Polioptila californica californica*) conducted in 2020 and 2022; least Bell's vireo (*Vireo bellii pusillus*) conducted in 2020 and 2022; southwestern willow flycatcher (*Empidonax traillii extimus*) conducted in 2022; western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) conducted in 2022; Crotch's bumble bee (*Bombus crotchii*) conducted in 2024; and southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]) conducted in 2024. All focused survey reports and the Jurisdictional Delineation are included as appendices to the Biological Technical Report. The Biological Technical Report is included as Appendix C.

4.3.1 REGULATORY SETTING

Federal

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects plants and animals that the USFWS has listed as "Endangered" or "Threatened." A federally listed species is protected from unauthorized "take," which is defined in the FESA as acts to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 USC Sections 1532[19] and 1538[a]). In this definition, "harm" includes "any act which actually kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife" (50 *Code of Federal Regulations* [CFR], Title 50, Section 17.3). Unless performed for scientific or conservation purposes with the permission of the USFWS, take of listed species is only permissible if the USFWS issues an Incidental Take Permit (ITP). When issuing an ITP, all federal agencies, including the USFWS, must ensure that their activities are "not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species" (16 USC 1536[a]). Enforcement of the FESA is administered by USFWS.

The FESA also provides for designation of Critical Habitat: specific areas within the geographical range occupied by a species where physical or biological features "essential to the conservation of the species" are found and "which may require special management considerations or protection" (16 USC 1538[5][A]). Critical Habitat may also include areas outside the current geographical area occupied by the species that are nonetheless essential for the conservation of the species.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires consultation with the USFWS and the fish and wildlife agencies of States where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

Sections 404 and 401 of the Clean Water Act of 1972

Section 404 of the Clean Water Act (CWA) (33 USC 1251 et seq.) regulates the discharge of dredged or fill material into waters of the United States (WOTUS), including wetlands. The USACE is the designated regulatory agency responsible for administering the 404permit program and for making jurisdictional determinations. This permitting authority applies to all waters of the United States where the material has the effect of (1) replacing any portion of WOTUS with dry land or (2) changing the bottom elevation of any portion of WOTUS. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in WOTUS. Dredge and fill activities are typically associated with development projects; water resource-related projects; infrastructure development; and wetland conversion to farming, forestry, or urban development.

The definition of WOTUS has been the subject of shifting regulations. Past federal revisions to regulations addressing the extent of USACE jurisdiction and the definition of WOTUS have been issued by the Obama Administration in 2015 and the Trump Administration in 2020. On January 18, 2023, the United States Environmental Protection Agency (USEPA) published a final Water Rule in the Federal Register that went into effect on March 20, 2023 ("the 2023 Rule") (USACE and USEPA 2023a).

The definition of WOTUS changed again in response to the Supreme Court decision in the case of *Sackett v. USEPA*. On September 8, 2023, the USEPA and the USACE amended the Code of Federal Regulations to conform the definition of WOTUS to the Supreme Court decision (USACE and USEPA 2023b). This conforming rule amends the provisions of the agencies' definition of WOTUS that were invalid under the Supreme Court's interpretation of the CWA under *Sackett*. Based on these changes, tributaries must have at least relatively permanent flow to be considered WOTUS from the federal definition. This would exclude ephemeral drainages from being WOTUS. This represents a substantial change to areas under federal jurisdiction in the arid west. This report provides interpretations of WOTUS under the Amended 2023 Rule.

Under Section 401 of the CWA, an activity requiring a USACE Section 404 permit must obtain a State Water Quality Certification (or waiver thereof) to ensure that the activity will not violate established federal or State water quality standards. The State Water Resources Control Board (SWRCB), in conjunction with the nine California RWQCBs, is responsible for administering the Section 401 water quality certification program. The SWRCB's and RWQCB's jurisdiction also extend to all "waters of the State" when no WOTUS are present, including wetlands and non-wetland waters of the State (isolated and non-isolated).

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711), as amended in 1972, makes it unlawful at any time, by any means or in any manner, unless permitted by regulations, to "pursue; hunt; take; capture; kill; attempt to take, capture, or kill; possess; offer for sale; sell; offer to barter; barter; offer to purchase; purchase; deliver for shipment; ship; export; import; cause to be shipped, exported or imported; deliver for transportation; transport or cause to be transported; carry or cause to be carried; or receive for shipment, transportation, carriage, or export, any migratory bird; any part, nest, or eggs of any such bird; or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. . . ." (16 USC 703).

The MBTA covers the taking of any nests or eggs of migratory birds, except as allowed by permit pursuant to 50 CFR, Part 21. This regulation seeks to protect migratory birds and active nests. The MBTA protects over 800 species, including geese, ducks, shorebirds, raptors, songbirds, and

many relatively common species. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (50 CFR 10.13), as updated by the 1983 American Ornithologists' Union (AOU) Checklist and published supplements by the USFWS.

In 1972, the MBTA was amended to include protection for migratory birds of prey (e.g., raptors). Six families of raptors occurring in North America were included in the amendment: Accipitridae (kites, hawks, and eagles); Cathartidae (New World vultures); Falconidae (falcons and caracaras); Pandionidae (ospreys); Strigidae (typical owls); and Tytonidae (barn owls). The provisions of the 1972 amendment to the MBTA protect all species and subspecies of these families.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668) provides for the protection of the bald eagle (*Haliaeetus leucocephalus*) and the golden eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act and strengthened other enforcement measures. A 1978 amendment authorized the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations.

The Bald and Golden Eagle Protection Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Regulations further define "disturb" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.6).

In addition to immediate impacts, this definition also covers effects that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

A 1994 Memorandum from President William Clinton to the heads of Executive Agencies and Departments established the policy concerning collection and distribution of eagle feathers for Native American religious purposes.

State

California Endangered Species Act

The State of California implements the CESA, which is enforced by the CDFW. While the provisions of the CESA are similar to the FESA, CDFW maintains a list of California Threatened and Endangered species, independent of the FESA Threatened and Endangered species list. It also lists species that are considered Rare and Candidates for listing, which also receive protection. The California list of Endangered and Threatened species is contained in Title 14, Sections 670.2 (plants) and 670.5 (animals) of the *California Code of Regulations*.

State-listed Threatened and Endangered species are protected under provisions of CESA. Activities that may result in take of individuals (defined in CESA as acts to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") are regulated by CDFW. While habitat degradation or modification is not included in the definition of "take" under CESA, the

CDFW has interpreted "take" to include the destruction of nesting, denning, or foraging habitat necessary to maintain a viable breeding population of protected species.

If it is determined that the "take" would not jeopardize the continued existence of the species, an ITP can be issued by CDFW per Section 2081 of the *California Code of Regulations*. If a State-listed species is also federally listed, and the USFWS has issued an ITP that satisfies CDFW's requirements, CDFW may issue a consistency finding in accordance with Section 2080.1 of the *California Fish and Game Code*.

CEQA Guidelines Section 15380

With regards to plants and animals, Section 15380 of the CEQA Guidelines independently defines "Endangered" and "Rare" species separately from the definitions of the California Endangered Species Act (CESA). Under CEQA, Endangered species of plants or animals are defined as those whose survival and reproduction in the wild are in immediate jeopardy, while Rare species are defined as those that (1) have such low numbers that they could become Endangered if their environment worsens or (2) are likely to become endangered within the foreseeable future (i.e., "threatened" as used in the FESA). In addition, a Lead Agency can consider a non-listed species (e.g., species with a California Rare Plant Rank [CRPR], California Species of Special Concern, or species of Local Concern) to be treated as if it were Endangered, Rare, or Threatened for the purposes of CEQA if the species can be shown to meet the criteria in the definition of "Rare" or "Endangered" in the Project region.

California Fish and Game Code

CDFW administers the *California Fish and Game Code*. Particular sections of the Code are applicable to natural resource management.

Native Plant Protection

Sections 1900–1913 of the *California Fish and Game Code* were developed to preserve, protect, and enhance Endangered and Rare plants in the State of California. The act requires all State agencies to use their authority to carry out programs to conserve Endangered and Rare native plants. Provisions of the Native Plant Protection Act prohibit the taking of listed plants from the wild and require notification of the CDFW at least ten days in advance of any change in land use that would adversely impact listed plants. This allows the CDFW to salvage listed plant species that would otherwise be destroyed.

Unlawful Take or Destruction of Nests or Eggs

These sections duplicate federal protection under the MBTA. Section 3503 of the *California Fish and Game Code* makes it unlawful to take, possess, or destroy any bird's nest or any bird's eggs. Further, any birds in the orders *Falconiformes* or *Strigiformes* (i.e., birds of prey, such as hawks, eagles, and owls) and their nests and eggs are protected under Section 3503.5 of the *California Fish and Game Code*. Section 3513 of the *California Fish and Game Code* prohibits the take and possession of any migratory nongame bird, as designated in the MBTA.

California Fully Protected Species

The State of California created the "Fully Protected" classification in an effort to identify and provide additional protection to those animals that are rare or that face possible extinction. Lists were created for fish, amphibians and reptiles, birds, and mammals. Most of the species on these

lists have subsequently been listed under the State and/or Federal Endangered Species Acts; however, some have not been formally listed.

Various sections of the *California Fish and Game Code* provide lists of Fully Protected reptile and amphibian (§ 5050), bird (§ 3511), and mammal (§ 4700) species that may not be taken or possessed at any time, except as provided in Sections 2081.7, 2081.9, or 2835. CDFW is unable to authorize the issuance of permits or licenses to take these species, except for necessary scientific research.

Natural Communities Conservation Planning Act

The Natural Community Conservation Planning Act, codified in Sections 2800–2835 of the *California Fish and Game Code* and signed into law in October 1991, authorizes the preparation of Natural Community Conservation Plans (NCCPs). The Act is a State of California effort to protect critical vegetative communities and their dependent wildlife species. The purpose of an NCCP is to sustain and restore those species and their habitat identified by CDFW that are necessary to maintain the continued viability of those biological communities impacted by human changes to the landscape. The NCCP process provides an alternative to protecting species on a "single species basis" as in the federal and State ESAs. Under the Act, CDFW is responsible for creating process planning and conservation guidelines for NCCP programs. Local governments and landowners may then prepare the NCCPs so that they comply with the CESA.

California Fish and Game Code (Sections 1600 through 1616)

California Fish and Game Code Sections 1600 et seq. establish a process to ensure that projects conducted in and around lakes, rivers, or streams do not adversely impact fish and wildlife resources or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided.

California Fish and Game Code Section 1602 requires any person, State, or local governmental agency or public utility to notify CDFW before beginning any activity that will do one or more of the following:

- substantially obstruct or divert the natural flow of a river, stream, or lake;
- substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. CDFW's regulatory authority extends to include riparian habitat (including wetlands) supported by a river, stream, or lake regardless of the presence or absence of hydric soils and saturated soil conditions. Generally, CDFW takes jurisdiction to the top bank of the stream or to the outer limit of the adjacent riparian vegetation (outer drip line), whichever is greater. Notification is generally required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. A Section 1602 Lake or Streambed Alteration Agreement would be required if impacts to identified CDFW jurisdictional areas occur.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act broadly defines "waters of the State" as any surface water or groundwater, including saline waters, within the boundaries of the State." In 2020, the Office of Administrative Law (OAL) began implementing the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to waters of the State. Under these new regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS, and all waters that would have been considered WOTUS under any historical definition.

Impacts to WOTUS are authorized by the RWQCBs through a Water Quality Certification per Section 401 of the CWA. Impacts to "waters of the State" that are not considered WOTUS would be authorized by Waste Discharge Requirements (WDRs) issued by the RWQCB, pursuant to California's Porter-Cologne Water Quality Control Act.

Pursuant to the California Porter-Cologne Water Quality Control Act, the SWRCB and the nine RWQCBs may require permits (known as "Waste Discharge Requirements" or WDRs) for the fill or alteration of the waters of the State. The term "waters of the State" is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (*California Water Code,* Section 13050[e]). The SWRCB and RWQCB have interpreted their authority to require WDRs to extend to any proposal to fill or alter waters of the State, even if those same waters are not under USACE jurisdiction. Pursuant to this authority, the State and Regional Boards may require the submission of a "report of waste discharge" under Section 13260, which is treated as an application for WDRs.

The Porter-Cologne Water Quality Control Act charges the SWRCB and the nine RWQCBs statewide with protecting water quality throughout California. Typically, the SWRCB and RWQCB act in concert with the USACE under Section 401 of the CWA in relation to permitting fill of federally jurisdictional waters. SWRCB and the RWQCBs may require permits (i.e., WDRs) for the fill or alteration of the waters of the State.

Local

Central-Coastal Natural Community Conservation Plan/Habitat Conservation Plan

On August 30, 1991, the State Fish and Game Commission considered a petition in support of listing the coastal California gnatcatcher. The Commission decided not to list the coastal California gnatcatcher as an Endangered species in favor of pursuing preparation of a NCCP program as proposed by Assembly Bill (AB) 2172 (AB 2172/Natural Community Conservation Planning Act). AB 2172 authorized CDFW[1] to enter into agreements with any person for the purpose of preparing and implementing NCCPs and to prepare guidelines for development and implementation of NCCPs. AB 2172 also permits NCCPs to be prepared by local, State, or federal agencies independently or in cooperation with other persons and requires CDFW to be compensated for costs incurred in preparing and implementing NCCPs.

The purpose of the NCCP program is to provide regional or area wide protection and perpetuation of natural wildlife diversity while allowing compatible and appropriate development and growth. AB 2172 was designed in recognition of the fact that individual species protection under the state Endangered Species Act and the federal Endangered Species Act (FESA) is costly and historically ineffective as a mechanism for protection or prevention of extinction of plant and wildlife species, and that a habitat-based, multispecies or ecosystem-driven preservation

[1] The California Department of Fish and Wildlife (CDFW) was formerly known as the California Department of Fish and Game (CDFG).

approach has greater potential for long-term success. The focus of the NCCP program represents a dramatic shift from "individual species" to "habitat".

On March 25, 1993, the U.S. Department of the Interior listed the coastal California gnatcatcher as a "Threatened" species and adopted a special rule in accordance with Section 4(d) of the FESA that authorized landowners and local jurisdictions to voluntarily participate in the State of California NCCP Act of 1992.

The County of Orange, in conjunction with the state and federal resource agencies, local jurisdictions, utility companies (including IRWD), the Transportation Corridor Agencies, and major private landowners, prepared the NCCP/HCP for the Central–Coastal NCCP Subregion (NCCP/HCP approved on April 16, 1996, and Implementation Agreement [IA] executed on July 17, 1996). The plan is intended to ensure the long-term survival of the coastal California gnatcatcher and other special status coastal sage scrub-dependent plant and wildlife species while allowing for reasonable economic growth in accordance with state-sanctioned NCCP program guidelines. The Project occurs within the NCCP Central/Coastal Subregion.

The Habitat Reserve includes core habitat along the frontal slopes of the Lomas de Santiago and provides high densities of NCCP target species, including coastal California gnatcatcher and coastal cactus wren (*Campylorhynchus brunneicapillus couesi*). In addition, the Habitat Reserve provides linkages with other core habitat areas via a long strip of natural habitat between Portola Parkway and the Foothill Transportation Corridor, and other large blocks of core habitat in the vicinity of the frontal slopes of the Lomas de Santiago, including Syphon Reservoir and Rattlesnake Reservoir. The Habitat Reserve supports the largest subpopulation of coastal California gnatcatchers in the Central Subarea of the NCCP Central/Coastal Subregion Reserve System Design for Orange County (County of Orange 1996a).

The County of Orange has been issued a 10(a) permit as part of the approval of the NCCP/HCP which authorizes the "take" of coastal sage scrub and other specified habitats (e.g., oak woodland, cliff and rock, Tecate cypress) and provides regulatory coverage for a number of "Covered Species". Potential direct and indirect impacts are fully mitigated through the County's participation and contribution in the NCCP/HCP Mitigation Program. The participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other special status species designated as Covered Species by the NCCP/HCP. Mitigation measures outlined in the NCCP/HCP Mitigation Program are summarized below:

1. Creation of a Habitat Reserve System that will include coastal sage scrub and representative habitat of virtually all of the major habitat types currently existing within the Central/Coastal Subregion;
2. Creation and funding of an NCCP Non-Profit Corporation to coordinate management of the Reserve System;
3. Designation of Special Linkage Areas and Existing Use Areas to enhance biological connectivity within the Reserve System and Central/Coastal Subregion;
4. Implementation of the Adaptive Management Program, including specific management plans, defined by the NCCP/HCP, within the Reserve System, including provisions for restoration and enhancement funded both by Participating Landowners and Non-Participating Landowners as provided herein.

4.3.2 METHODOLOGY

This section summarizes survey methods used to conduct biological surveys for the Project. The Biological Study Area (BSA) discussed in this report generally includes the area around Santiago Creek Dam and Irvine Lake. Initial work (spring/summer 2020) was focused north (downstream) of the dam structure in a Project study area provided by IRWD. The BSA was expanded in fall 2020 to south (upstream) of the dam, including the entirety of Irvine Lake, to assess potential effects related to raising the spillway and additional staging/access areas in Oak Park. The BSA was developed by adding a 250-foot buffer around the 797.9-foot elevation contour. Where the buffer did not include the 811.9-foot contour, the BSA was extended 50-feet beyond the 811.9-foot contour[2]. However, the BSA was truncated at the ridgeline adjacent to Irvine Lake and at Santiago Canyon Road because indirect effects (e.g., noise) would not be expected to extend over the ridgeline. This BSA allows for an assessment of indirect impacts of inundation effects and construction activities on surrounding habitat (Exhibit 4.3-1).

The focused surveys that Psomas conducted in spring/summer 2020 were limited to the area downstream of the dam, while the focused surveys conducted in spring/summer 2022 were generally conducted upstream of the dam. Focused surveys conducted in 2024 and 2025 were conducted throughout suitable habitat within the BSA. The survey area for each species varied depending on target habitat and details of each species protocol. Vegetation mapping and the jurisdictional delineation were conducted throughout the BSA. It should be noted that when the term "survey area" is used, it does not refer to the entire BSA.

The methods in this section have been summarized; the detailed methods are included in the Biological Technical Report, which includes appendices with all focused survey reports and the Jurisdictional Delineation (Appendix C).

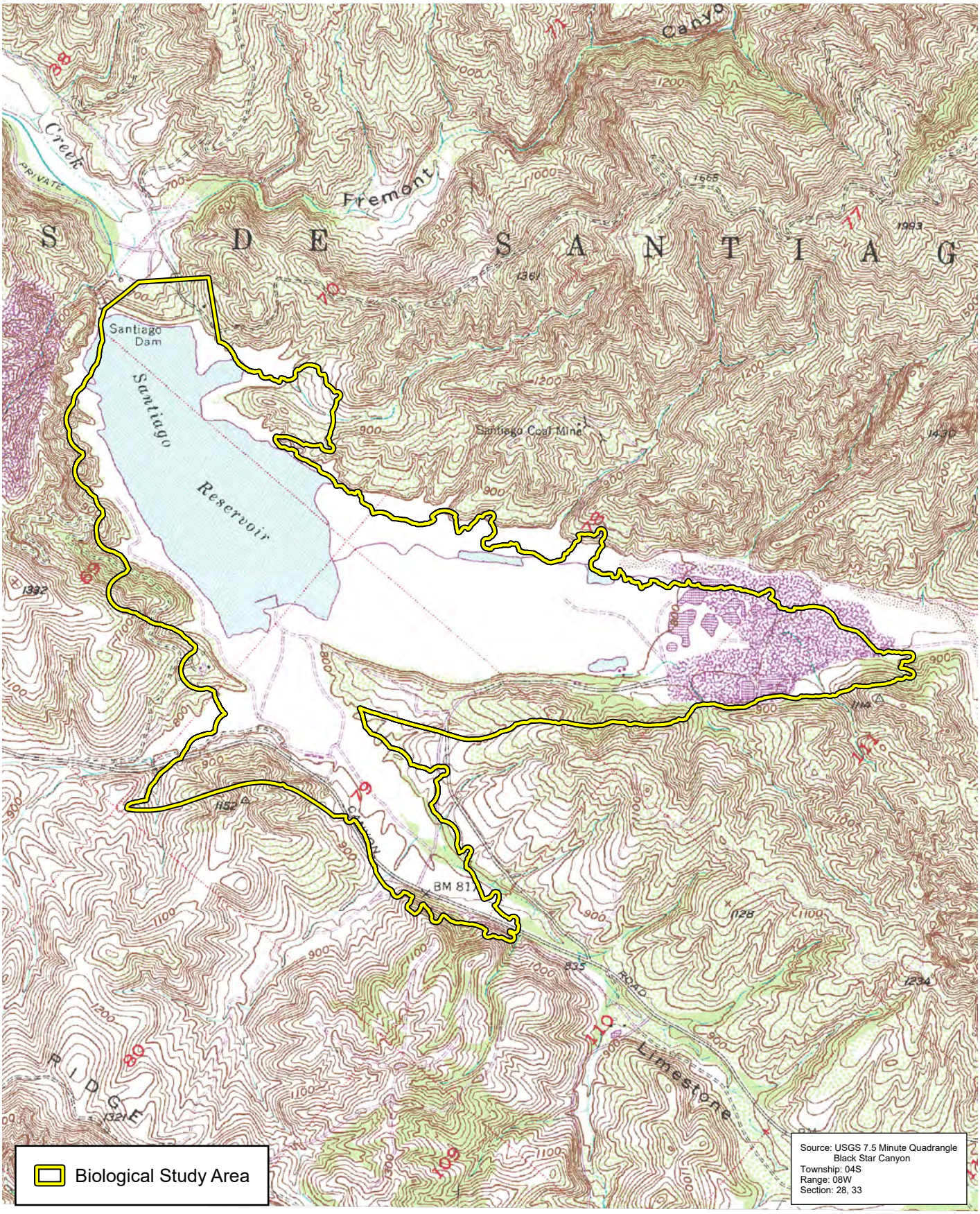
Literature Review

Prior to the start of surveys, Psomas conducted a literature search to identify special status plants, wildlife, and habitats reported from the vicinity of the BSA. The literature review was updated prior to the 2022 focused surveys and again in 2023 as documentation was completed; the most recent citation is given below. The BSA region is generally defined as the Central Subregion of the NCCP/HCP. Psomas reviewed the following sources of information:

- CDFW's California Natural Diversity Database (CNDDB); USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles (CDFW 2025a)
- The California Native Plant Society's (CNPS') Inventory of Rare and Endangered Plants; USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles (CNPS 2025)
- CDFW's *Natural Communities List* (CDFW 2025b), *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c), and *Special Animals* List (CDFW 2025d)
- Jepson eFlora (Jepson Flora Project 2024)
- County of Orange *Natural Community Conservation Plan and Habitat Conservation Plan* (County of Orange 1996a) and *Implementation Agreement* (County of Orange 1996b)
- USFWS Information for Planning and Consultation (IPAC) Database[3] (USFWS 2024)

[2] The study area extended to the elevation of the dam crest (811.9 feet) because the impact boundary had not yet been developed when the surveys began.

[3] The USFWS Official Species List is included in the Biological Technical Report (Appendix C).



U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 4.3-1

Santiago Creek Dam Improvement Project

N
W E
S

0 1,000 2,000
Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_USGS

Vegetation Mapping and General Surveys

Psomas Senior Biologist Allison Rudalevige performed a general survey and vegetation mapping north (downstream) of the dam on February 25, 2020. Ms. Rudalevige and Psomas Senior Biologist Lindsay Messett performed a general survey and vegetation mapping south (upstream) of the dam on September 16 and 17, 2020. Psomas biologists documented all plant and wildlife species detected during the survey. Representative photographs of the BSA are included in the Biological Technical Report (Appendix C).

Nomenclature of vegetation types generally follows Gray and Bramlet (1992) but is cross-referenced[4] to *A Manual of California Vegetation* (CNPS 2024), which is the most current vegetation classification system used by CDFW for assessing sensitive natural communities (CDFW 2025b). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c) for special status species and the Jepson eFlora (Jepson Flora Project 2024) for all other taxa. Nomenclature for wildlife follows the *Special Animals List* (CDFW 2025d) for special status species and, for other species, Crother (2017) for amphibians and reptiles, the American Ornithological Society (AOS 2023) for birds, and the Smithsonian National Museum of Natural History (SNMNH 2011) for mammals.

Jurisdictional Delineation

The jurisdictional delineation for the portion of the BSA downstream of the dam was conducted by Psomas on March 24, 2020. The jurisdictional delineation for the portion of the BSA upstream of the dam was conducted on October 14, 20, and 21, 2020. Psomas Senior Regulatory Specialist Allison Rudalevige performed all surveys with assistance from Psomas Senior Biologist Jonathan Aguayo on October 14 and 20, 2020 and Psomas Senior Biologist Lindsay Messett on October 21, 2020.

Jurisdictional water resources considered for this report include waters of the United States (WOTUS) under the regulatory authority of the USACE; waters of the State under the regulatory authority of the RWQCB; and the bed, bank, and channel of all lakes, rivers, and/or streams (and associated riparian vegetation), under the regulatory authority of CDFW.

Psomas assessed the presence of WOTUS by determining connectivity or adjacency of on-site features to points of discharge at a Traditional Navigable Waterway. Non-wetland WOTUS are delineated based on the limits of the Ordinary High Water Mark (OHWM), which can be determined by a number of factors, including (1) the presence of a clear, natural line impressed on the bank; (2) shelving; (3) changes in the character of the soil; (3) destruction of terrestrial vegetation; and (4) the presence of litter and debris. The OHWM limits (i.e., active floodplain) occurring in the BSA were further verified using methods contained in A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual (Lichvar and McColley 2008) and the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Curtis and Lichvar 2010).

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). This regional supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Both

[4] The cross-referencing to *A Manual of California Vegetation* is included in the Biological Technical Report (Appendix C).

documents prescribe using a three-parameter approach to identify wetlands. The three parameters needed to assign a site as a wetland include evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability or the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the regional supplement.

Psomas determined the limits of RWQCB jurisdiction in the field following the methods described for USACE jurisdiction, above. RWQCB shares USACE jurisdiction unless isolated conditions are present. If isolated waters are present, RWQCB takes jurisdiction using USACE's definition of the OHWM. In 2019, SWRCB adopted a new wetland definition, which includes areas with (1) continuous or recurrent saturation of the upper substrate of sufficient duration to cause anaerobic conditions and (2) vegetation dominated by hydrophytes or lacking vegetation (SWRCB 2019).

CDFW's jurisdiction was determined by measuring the distance between the top of the bank to the top of the bank of the water features on site or, if present, to the outer limit of riparian vegetation located within or immediately adjacent to the feature. CDFW jurisdiction within Irvine Lake extended to the top of the existing dam embankment.

The Jurisdictional Delineation is included as an appendix to the Biological Technical Report (Appendix C).

Special Status Plant Species

Psomas conducted the botanical surveys consistent with the protocols created by CDFW (2018); therefore, the surveys were floristic in nature. Surveys downstream of the dam were conducted on April 30, May 21, and June 4, 2020, by Psomas Senior Biologist Allison Rudalevige. Surveys upstream of the dam were conducted on March 24, 2022, by Ms. Rudalevige; on April 25, 26, and 28, 2022, by Ms. Rudalevige and Consulting Botanist Sandra Leatherman; on May 23 and 26 by Ms. Rudalevige and Psomas Biologist Erin Ruckman; and on September 13, 2022, by Ms. Rudalevige and Psomas Biologist Sarah Thomas. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. Inaccessible areas (e.g., steep cliffs), were observed remotely with binoculars.

Many annual and perennial herb species' germination capability are dependent on receiving a certain amount of rainfall in the winter and spring. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The region received approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches. Therefore, rainfall was considered within normal ranges and conditions should have been adequate for germination of most plant species. Additionally, reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive.

All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2024), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c) for special status species and the Jepson eFlora (Jepson Flora Project 2024) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software or with a handheld Garmin GPS unit. Data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species).

The results of the special status plant survey efforts are included as an appendix in the Biological Technical Report (Appendix C).

Quino Checkerspot Butterfly

Psomas conducted Quino checkerspot butterfly surveys following guidelines from the USFWS Survey Protocol (USFWS 2014) to maximize detection of adults during the flight season. Per the USFWS protocol, surveys consist of an initial site assessment to determine if the Project site contains areas recommended for Quino checkerspot butterfly surveys. The assessment was conducted by Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) on February 15 and 16, 2022. Per USFWS protocol, Psomas completed five weekly focused surveys beginning the third week of February and continuing into March.

Per the USFWS protocol, orchards, developed areas, or small in-fill parcels (plots smaller than one acre that are completely surrounded by urban development) largely dominated by non-native vegetation, active/in-use agricultural fields, closed-canopy forests or riparian areas, dense chaparral, and small openings (less than one acre) completely enclosed within dense chaparral, were considered unsuitable and designated as “excluded areas”. Areas outside of excluded areas, regardless of the presence/absence of host plants and nectar sources, were considered potential habitat areas.

All areas that were not excluded were surveyed for Quino checkerspot butterfly, regardless of host plant presence, absence, and/or density. The Quino checkerspot butterfly is generally associated with sage scrub, open chaparral, grasslands, and vernal pools. Within these communities, they are usually observed in open or sparsely vegetated areas (including trails and dirt roads), on hilltops, and on ridgelines.

The survey area contained approximately 308 acres of suitable habitats that could not be excluded per USFWS protocol; two days were required to complete each survey visit. Surveys were conducted once per week (weather permitting) on non-consecutive days during the peak of the flight season on February 18, 19, 25, 27; March 3, 4, 10, 11, 17, and 18, 2022. Surveys focused on likely breeding areas (host plant patches), feeding areas (nectaring plant patches), and topographical features conducive to detecting the Quino checkerspot butterfly (ridgelines, hilltops, rock outcrops, dirt roads, and open ground with clay soils).

The results of the Quino checkerspot surveys are included in an appendix of the Biological Technical Report (Appendix C).

Crotch’s Bumble Bee

In June 2023, the California Department of Fish and Wildlife (CDFW) issued survey guidelines for Candidate bumble bee species recommending at least three visual surveys conducted two to four weeks apart during the appropriate Colony Active Period (April to August for Crotch’s bumble bee) to ensure the highest probability of detecting the species (CDFW 2023). Surveys must be conducted at a rate of three acres per hour within optimal habitat by a qualified Biologist (i.e., one with appropriate permits and experience in the identification of bee species). Psomas Senior

Biologist Lindsay Messett (Scientific Collecting Permit [SCP]; 182810004-20009-001[5]) conducted all focused surveys for Crotch's bumble bee. The survey included all suitable foraging and potential nesting habitats for the Crotch's bumble bee in the survey area. Surveys were conducted on June 20 and 21; July 16 and 17; and August 5 and 6, 2024.

Ms. Messett conducted the surveys by walking meandering transects, slowly across the survey area, through all appropriate habitats, to obtain a 100 percent survey cover. The surveys were paced at approximately three acres per hour in optimal habitats but were more quickly paced in areas lacking available nectar sources. Ms. Messett scanned for bee activity on the ground and spent additional time at any flowering plants to look for foraging bees. Potential nest sites (e.g., forest edges, unmowed areas, and cavities such as mammal burrows) were inspected with binoculars for evidence of bumble bee use. If multiple exiting/entering bumble bees were observed at a cavity, further observation was made until nesting could be confirmed (e.g., multiple individuals entering the cavity).

Surveys were non-lethal (capture, photograph, release) and were conducted in accordance with the CDFW Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023) and authorizations in Ms. Messett's SCP and Memorandum of Understanding issued by CDFW. All bumble bees observed were captured using a butterfly net. Bees were carefully transferred to a clear, plastic vial and placed in a cooler with ice to chill. Once the bees were cooled, they were removed from the vial and photographed. Photographs focused on specific identifiable areas of the bees (i.e. the top of the abdomen, side of the thorax and abdomen, and the front and side views of the head). The bees were processed within 15 minutes of capture and were released within 100 feet of the capture site. Bumble bee species were identified by Ms. Messett using *Bumble Bees of North America: An Identification Guide* (Williams *et al.* 2014). Photographs of the bumble bees observed during the surveys were also provided to taxonomist Dr. Keng-Lou James Hung, PhD (University of Oklahoma) to confirm species identification.

The results of the Crotch's bumble bee surveys are included as an appendix of the Biological Technical Report (Appendix C).

Western Spadefoot

There is currently no standardized survey protocol in place for this species. Survey methods were based on the biology of the western spadefoot and survey protocols for other currently listed anurans (i.e., frogs and toads) to maximize the likelihood of detection.

Focused surveys for this species were conducted throughout the BSA. Three surveys were conducted; one in February, one in March, and one in April. Each of the surveys was conducted within three days following rain events. These surveys included diurnal and nocturnal components to search for the presence of egg masses, tadpoles, and adults. The diurnal portion of the survey focused on searches for the presence of egg masses and tadpoles. Nocturnal surveys focused on searches for active juveniles and calling adults. Flashlights and headlamps were used at night to search for and visually identify any toads detected. Because spadefoots can be sensitive to sounds and light, the Biologists stopped and remained still for extended periods to listen for calls.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for western spadefoot in the BSA. Mr. Aguayo and Ms. Messett

[5] Lindsay Messett's SCP includes a MOU to allow her to capture and handle Crotch's bumble bee according to the survey guidelines.

conducted focused surveys for the western spadefoot on February 14; March 13; and April 4, 2025, during favorable weather conditions conducive to good toad activity.

The focused survey report documenting the results of these surveys is in preparation. When available, the results of the western spadefoot surveys will be included in an appendix of the Biological Technical Report (Appendix C).

Arroyo Toad

USFWS survey protocol for the arroyo toad requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad (*Anaxyrus californicus*) egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population was documented, recorded with a GPS unit, and mapped on an aerial photograph. The number of individuals were noted on each subsequent visit, and data were collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the survey methodology described above. The 2020 survey area included all suitable habitat downstream of the dam along Santiago Creek, extending 0.62 mile (1 kilometer) downstream of the BSA, which included a tributary from Fremont Canyon. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on April 17 and 24; May 15 and 22; and June 12 and 19, 2020. The 2022 survey area included all suitable habitat along Santiago Creek upstream of the dam. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on March 25; April 1 and 8; May 27; and June 10 and 23, 2022.

Diurnal surveys were conducted from approximately 4:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles; breeding and/or calling adults in potentially suitable breeding locations along the creek; and foraging individuals in the adjacent riparian and upland areas. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour). Surveys were not scheduled on nights with a full or nearly full moon because arroyo toad activity is lower on these nights due to higher predation risk.

The results of the arroyo toad surveys are included in an appendix of the Biological Technical Report (Appendix C).

Southwestern Pond Turtle

Visual Surveys

There is currently no standardized USFWS protocol in place for the southwestern pond turtle; therefore, surveys generally followed the Visual Survey Protocol for the Southcoast Ecoregion

(USGS 2006a). Survey methods were focused on the detection of southwestern pond turtle adults and juveniles through visual observation; the visual surveys did not include dip netting or seining. Any southwestern pond turtles observed would have been documented and recorded using a GPS or iPad to map the location on an aerial photograph.

Psomas Senior Biologist Jonathan Aguayo conducted visual surveys across all potentially suitable habitats for the southwestern pond turtle within the BSA. He walked slowly up the stream channel, either in the water or immediately adjacent to the water, visually searching for pond turtles with and without binoculars, concentrating on pools, surface water, banks, and suitable basking sites within the BSA. He searched aquatic habitat with and without binoculars for the presence of basking or underwater pond turtles. He observed open pools or possible basking areas from a distance and then approached slowly and quietly to help prevent disturbing basking turtles. He listened for the splash of water, which could indicate possible unseen turtles entering the water. If a splash was heard, he spent additional time observing the area for a turtle to resurface. Visual surveys were performed on August 20 and 30, 2024, during weather conditions favorable for turtle activity.

Turtle Trapping

Trapping surveys follow the methodology outlined in the Western Pond Turtle Trapping Survey Protocol for the Southcoast Ecoregion (USGS 2006b). A five-day/four-night trapping program was conducted in August 2024. Nylon mesh hoop traps and floating basking traps were placed in suitable locations in Irvine Lake, baited with cans of sardines in oil to attract turtles. Traps were set near habitat features likely to be used by pond turtles (possible basking areas, areas with underwater refugia). The hoop traps measured 2.5 feet in diameter by 6 feet long with 1-inch square mesh and featured a one-way funnel entrance. Floating basking traps measured 20 inches wide by 28 inches long and 13 inches deep, with two 13-inch wings. Both hoop and basking traps were equipped with floats and securely fastened to immovable objects to prevent submersion to allow for captured turtles (and other animals) to surface for air.

Traps were left in place for a maximum of 24 hours before being checked by Biologists to retrieve captured turtles and other aquatic species (e.g. fish, frogs, invertebrates). General weather data (i.e., ambient air temperature, sky conditions, wind speed) and water temperature were recorded at the start and end of each trapping session. Two trapping sessions, one on the west side of Irvine Lake and another on the east side of Irvine Lake, were required to adequately cover Irvine Lake. As described above, Santiago Creek was surveyed visually because it was not deep enough for trap placement.

Mr. Aguayo (Scientific Collecting Permit [SCP] ID: S-190310010-20076-001) and Senior Biologist Lindsay Messett (SCP ID: S-182810004-20009-001) were the Principal Investigators for the trapping sessions, with assistance from Psomas Biologists Trevor Bristle, Jack Underwood, Cristina Juran, and Tyler Glaser. Both Mr. Aguayo and Ms. Messett are knowledgeable about the southwestern pond turtle and hold the necessary CDFW authorization to trap and handle the species. All traps were tagged with Mr. Aguayo's CDFW SCP number, under which the live trapping was conducted.

Trapping sessions were conducted from August 19–23, 2024, on the west side of Irvine Lake and from August 26–30, 2024, on the east side of Irvine Lake. Surveys were conducted during weather conditions favorable for turtle activity. A total of 24 hoop traps and 3 basking traps were set in Irvine Lake. Trap locations were selected based on suitable habitat with traps spaced 820 feet (i.e., 250 meters) apart. The number of traps set was proportionate to the overall size of the lake.

The results of the southwestern pond turtle surveys are included as an appendix of the Biological Technical Report (Appendix C).

Coastal California Gnatcatcher

USFWS survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6:00 AM and 12:00 PM, and no more than 100 acres of suitable habitat may be surveyed per visit.

Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) conducted all focused surveys for coastal California gnatcatcher. The 2020 survey area for the gnatcatcher surveys included all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, and disturbed floodplain sagebrush scrub) downstream of the dam and within a 500-foot buffer around the tentative impact footprint. The 2022 survey area for the gnatcatcher surveys includes all suitable habitat upstream of the dam in the BSA. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake). The 2020 surveys were conducted on April 30, May 27, and June 25, 2020. The 2022 surveys were conducted on March 25, April 4, and June 9, 2022.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [°F]), too hot (i.e., above 95°F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and “pishing” sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and “pishing” varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions.

The results of the coastal California gnatcatcher surveys are included as an appendix of the Biological Technical Report (Appendix C).

Least Bell’s Vireo/Southwestern Willow Flycatcher

USFWS protocol for the least Bell’s vireo (*Vireo bellii pusillus*) requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). The USFWS protocol for the southwestern willow flycatcher requires a total of five surveys, with the first survey conducted between May 15 and May 31; the second and third surveys between June 1 and June 24; and the fourth and fifth surveys between June 25 and July 17 (Sogge et al. 2010).

Psomas Senior Biologist Lindsay Messett conducted all 2020 focused surveys for least Bell’s vireo downstream of the dam. The 2020 survey area for the least Bell’s vireo surveys included all suitable habitat (i.e., southern willow scrub and mule fat scrub) downstream of the dam and within a 500-foot buffer north of the BSA along Santiago Creek. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake). Surveys were conducted on April 30, May 12 and 27, June 9, and 25, and July 6, 17, and 28, 2020.

Psomas Senior Biologist Jonathan Aguayo (USFWS Permit No. TE 96514A-3) conducted all focused surveys for least Bell’s vireo and southwestern willow flycatcher upstream of the dam. Because the survey area contained more than 80 acres of suitable habitat, 2 days were required

to cover the entire survey area for each of the 8 visits. Mr. Aguayo conducted focused surveys for the least Bell's vireo on April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Focused surveys for southwestern willow flycatcher were conducted on May 25 and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Per guidance issued from the USFWS, focused surveys for least Bell's vireo and southwestern willow flycatcher were not conducted concurrently. During the last five surveys, surveys were conducted for southwestern willow flycatcher first; surveys for least Bell's vireo followed.

Ms. Messett and Mr. Aguayo systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from any potentially territorial southwestern willow flycatchers. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos or southwestern willow flycatchers detected were recorded with a GPS unit (Garmin Vista) or an iPad. Because of the high density of least Bell's vireos in the survey area upstream of the dam, great care was taken in the field to verify that adjacent territories were occupied by distinct males. Although not required during a presence/absence survey, time was also taken to visually observe any individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions and during early morning hours when bird activity is at its peak. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird [*Molothrus ater*]).

The results of the least Bell's vireo/southwestern willow flycatcher surveys are included as an appendix to the Biological Technical Report (Appendix C).

Western Yellow-billed Cuckoo

The USFWS survey protocol for western yellow-billed cuckoo requires a minimum of four surveys be conducted in three time periods that span the peak of breeding activity for the western populations of this species: (1) one survey is required from June 15 to June 30 when migrating yellow-billed cuckoos are passing through but breeding birds are also arriving; (2) two surveys are required from July 1 to July 31 when individual cuckoos encountered are mostly breeders but are occasionally migrants, wandering individuals, or young of the year; and (3) one survey is required from August 1 to August 15 when most breeding yellow-billed cuckoos have finished breeding activities and are departing. Each survey needs to be conducted 12 to 15 days apart. Focused surveys were conducted by Lindsay Messett (TE-067064-5).

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats upstream of the dam. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake).

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. Per USFWS survey protocol for the species, Ms. Messett played recorded contact or "kowlp" calls of western yellow-billed cuckoo five times at one-minute intervals at each calling station (or point) established in the survey area. Compact speakers capable of broadcasting recorded bird calls in excess of 70 decibels were used during all surveys. Upon arriving at each calling point, Ms. Messett listened and watched for cuckoos for one minute prior

to playing the broadcast contact calls. Calling points were established approximately every 328 feet in riparian habitat that provided potentially suitable or marginally suitable habitat for the western yellow-billed cuckoo. All surveys were conducted under optimal weather conditions (i.e., between 55 degrees Fahrenheit [°F] and 95°F with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak.

The results of the western yellow-billed cuckoo surveys are included as an appendix to the Biological Technical Report (Appendix C).

4.3.3 EXISTING CONDITIONS

Physical Environmental Setting

The Project is generally located in the coastal foothills of eastern Orange County. Topographically, this region exhibits low-lying ridgelines and hills with interspersed relatively broad valley and canyon bottoms.

Within the eastern Orange County area, there are numerous designated open space areas. The largest areas in proximity to the BSA include the following: the 1,000-acre NCCP Reserve, Limestone Canyon Regional Park, Whiting Ranch Wilderness Park, Santiago Oaks Regional Park, Irvine Regional Park, and Cleveland National Forest. In addition to designated open space, other non-designated open space areas within the region include other undeveloped land in the foothills of Santiago Canyon.

Irvine Lake (named Santiago Creek Reservoir by the USGS, Exhibit 4.3-1) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east of the BSA include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the BSA in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the BSA. Elevations in the BSA range from approximately 657 to 996 feet above mean sea level (msl).

Vegetation Types

The following vegetation types occur in the BSA: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline (Exhibit 4.3-2; Table 4.3-1). Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas. Note that the number following each vegetation type name corresponds to the code in Gray and Bramlet (1992).

TABLE 4.3-1
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Coastal Sage Scrub			
Sagebrush Scrub	2.3.6	No	115.81
Disturbed Sagebrush Scrub	2.3.6	No	19.39
Sagebrush – Coyote Brush Scrub	2.3.12	No	10.59
Southern Cactus Scrub	2.4	Provisional[a]	17.48
Disturbed Southern Cactus Scrub	2.4	Yes	10.62
Disturbed Floodplain Sage Scrub	2.6	Yes	0.48
Subtotal Coastal Sage Scrub			*174.37*
Chaparral			
Toyon – Sumac Chaparral	3.12	No	29.91
Subtotal Chaparral			*29.91*
Grassland			
Annual Grassland	4.1	No	15.59
Ruderal	4.6	No	92.38
Subtotal Grassland			*107.97*
Riparian			
Riparian Herb	7.1	No	13.15
Southern Willow Scrub	7.2	Yes	0.43
Mulefat Scrub	7.3	No	1.50
Disturbed Mulefat Scrub	7.3	No	26.67
Southern Sycamore Riparian Woodland	7.4	Yes	20.48
Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest	7.4/7.5	Yes	5.46
Southern Black Willow Forest	7.7	Yes	83.61
Disturbed Southern Black Willow Forest	7.7	Yes	35.34
Southern Black Willow Forest/Riparian Herb	7.7/7.1	No[b]	26.01
Subtotal Riparian			*212.65*
Woodland			
Coast Live Oak Woodland	8.1	No	31.09
Western Sycamore	8.x	Yes	0.36
Subtotal Woodland			*31.45*
Cliff and Rock			
Cliff	10.0	No	1.62
Subtotal Cliff and Rock			*1.62*
Lakes, Reservoirs, and Basins			
Open Water	12.1	No	313.28
Fluctuating Shoreline	12.2	No	26.31
Vegetated Fluctuating Shoreline	12.2	No	45.13
Subtotal Lakes, Reservoirs, and Basins			*384.72*
Watercourses			
Perennial Stream	13.1	No	6.97
Subtotal Watercourses			*6.97*

TABLE 4.3-1
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Developed Areas			
Ornamental	15.5	No	20.77
Developed	15.6	No	20.98
Subtotal Developed Areas			*41.75*
Disturbed Areas			
Disturbed	16.1	No	25.42
Subtotal Disturbed Areas			*25.42*
Total			**1,016.83**

[a] Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2025b).
[b] This blended community would be characterized more as riparian herb than southern black willow forest; therefore, it would not be considered a sensitive community.

BSA: Biological Survey Area

Sagebrush Scrub (2.3.6)

Sagebrush scrub is distributed throughout the BSA on the slopes surrounding Irvine Lake. This vegetation type is dominated by relatively dense California sagebrush (*Artemisia californica*). Other native shrubs are also scattered throughout these areas and include leafy California buckwheat (*Eriogonum fasciculatum var. foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), and toyon (*Heteromeles arbutifolia*). The density of these co-occurring species varies across the BSA. Where present, openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*). Sparse amounts of scaly scale-broom (*Lepidospartum squamatum*) extend into this vegetation where it occurs along Santiago Creek downstream of the dam.

Disturbed Sagebrush Scrub (2.3.6)

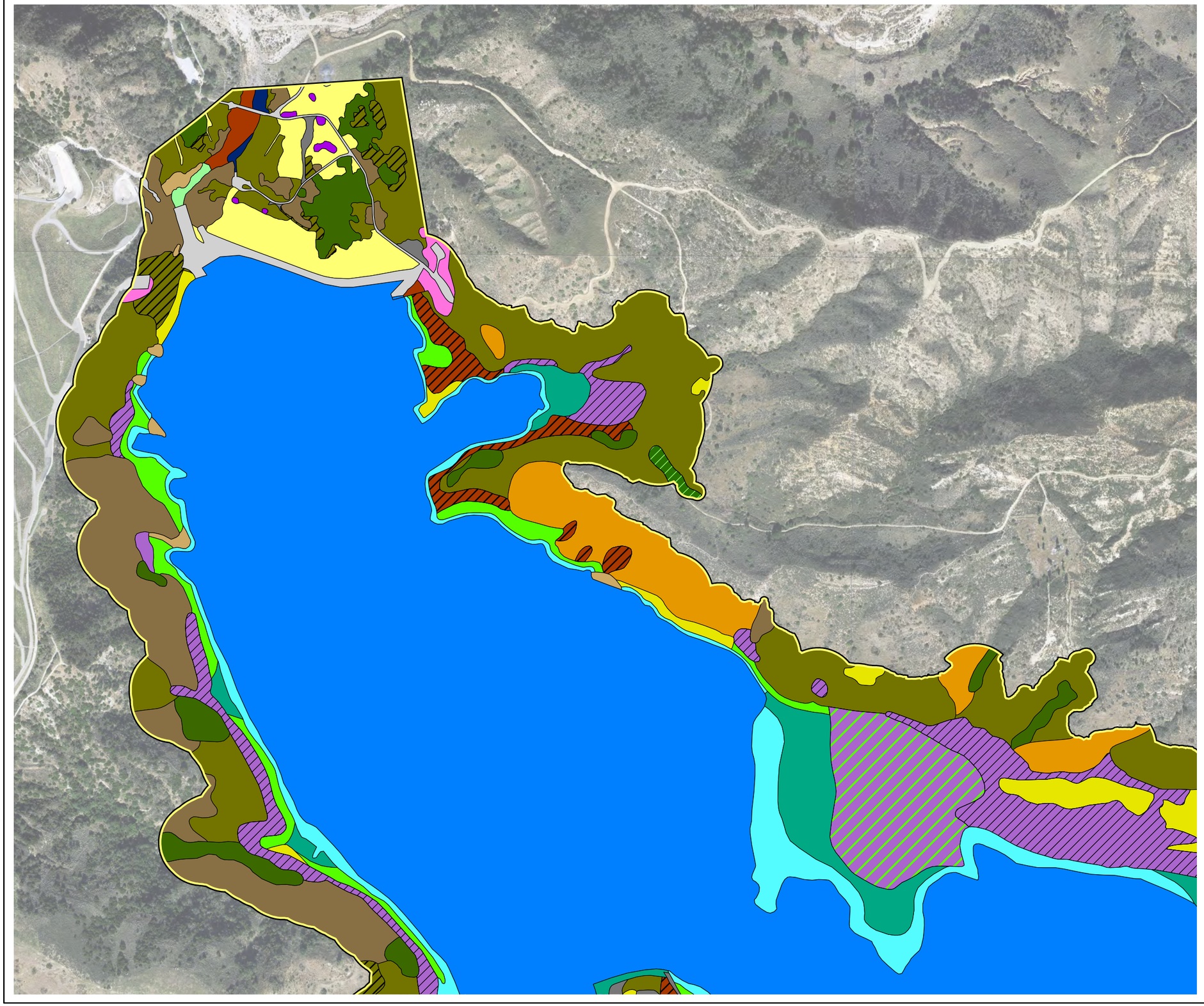
Disturbed sagebrush scrub is distributed downstream of the dam and along slopes in the southern portion of the BSA. It is similar in composition to sagebrush scrub but it has an open canopy and the spaces between the shrubs are degraded (disturbed) by the presence of non-native grasses and herbs such as bromes (*Bromus* spp.), oats (*Avena* spp.), grayish shortpod mustard (*Hirschfeldia incana*), and/or black mustard (*Brassica nigra*).

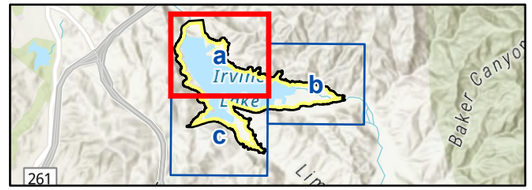
Sagebrush – Coyote Brush Scrub (2.3.12)

Sagebrush – coyote brush scrub is distributed on slopes in the southern portion of the BSA. This vegetation type is co-dominated by California sagebrush and coyote brush (*Baccharis pilularis* ssp. *consanguinea*) with lesser amounts of leafy California buckwheat, laurel sumac, lemonade berry, toyon, and white sage (*Salvia apiana*).

Southern Cactus Scrub (2.4)

Southern cactus scrub is distributed on slopes on the northern side of Irvine Lake. This vegetation type is characterized by approximately 20 percent cover of prickly-pear (either *Opuntia littoralis*





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

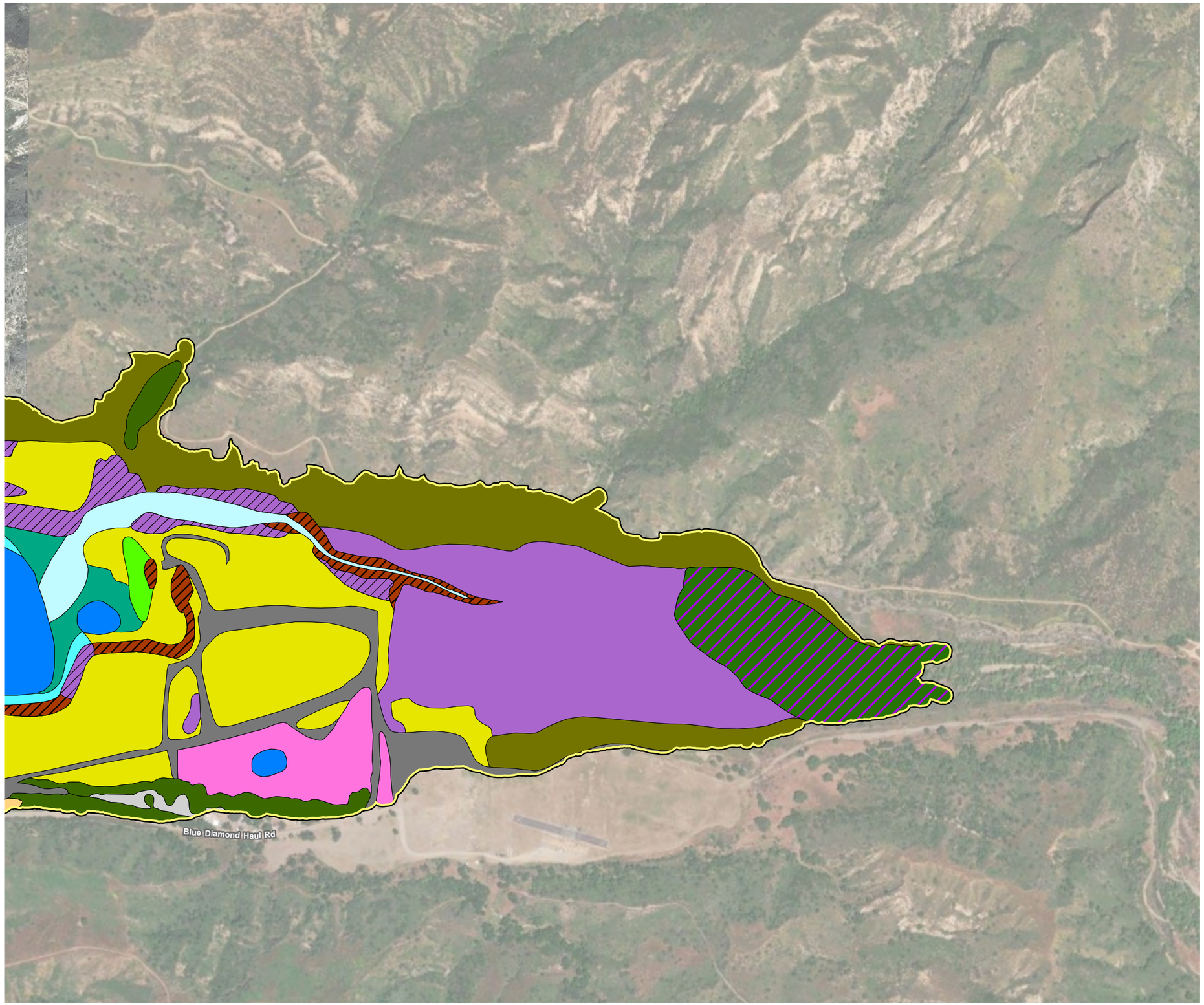
Biological Resources **Exhibit 4.3-2a**

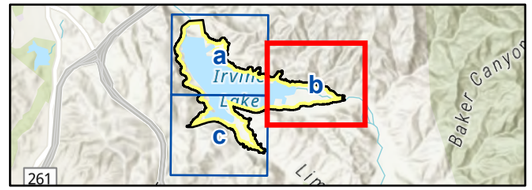
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIRex_BiologicalResources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

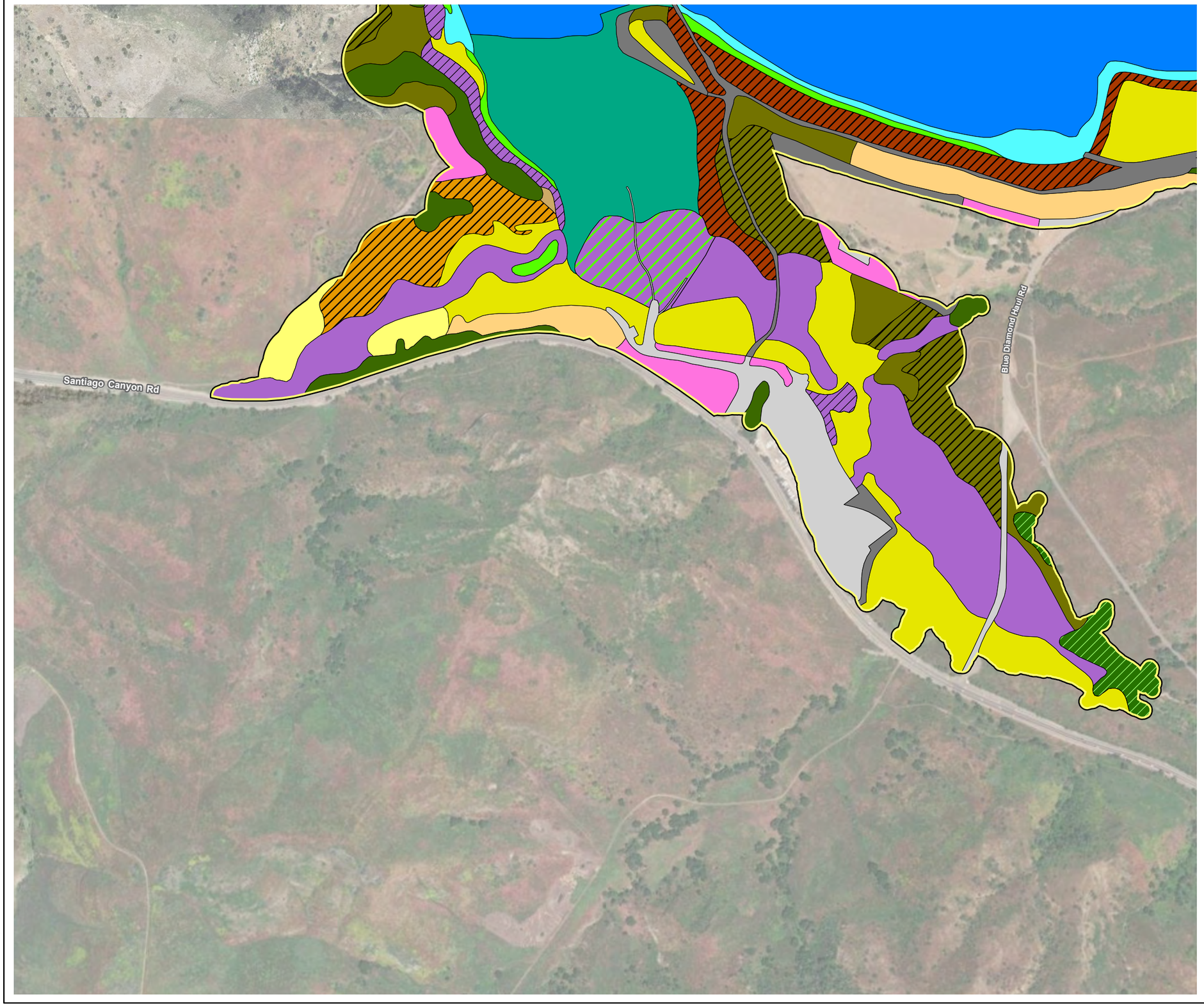
Biological Resources **Exhibit 4.3-2b**

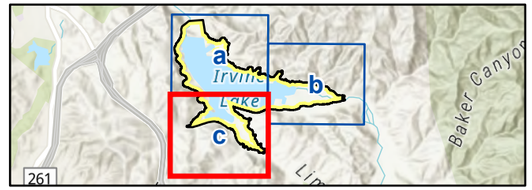
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_BiologicalResources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





- Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources **Exhibit 4.3-2c**

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIRex_BiologicalResources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_Biological_Resources

or *Opuntia x vaseyi*). These areas also contain California sagebrush, leafy California buckwheat, laurel sumac, and other sagebrush scrub species.

Disturbed Southern Cactus Scrub (2.4)

Disturbed southern cactus scrub is located in the southwestern portion of the BSA. This vegetation type is characterized by the presence of prickly-pear with other native shrubs such as California sagebrush and leafy California buckwheat. However, it is degraded (disturbed) by the presence of non-native grayish shortpod mustard and pepper tree (*Schinus molle*).

Disturbed Floodplain Sage Scrub (2.6)

Disturbed floodplain sage scrub occurs along the active floodplain/low terrace of Santiago Creek downstream of the dam. This vegetation type is characterized by the presence of scaly scale-broom along a rocky alluvial wash. As is typical of this vegetation type, shrub density is relatively low. Other species that co-occur include California sagebrush, California brickellbush (*Brickellia californica*), straw-colored cudweed (*Pseudognaphalium stramineum*), and chilicothe (*Marah macrocarpa*). This vegetation type is degraded (disturbed) by the presence of non-native fennel (*Foeniculum vulgare*) and non-native grasses.

Toyon – Sumac Chaparral (3.12)

Toyon – sumac chaparral is distributed downstream of the dam and on the slopes in the western portion of the BSA. The dominant shrub is laurel sumac; however, lemonade berry, toyon, blue elderberry (*Sambucus mexicana*), and coast live oak (*Quercus agrifolia*) co-occur in some areas. The patch on the east side of Santiago Creek downstream of the dam also contains Coulter's matilija poppy (*Romneya coulteri*), a special status plant species. This vegetation type intergrades with coastal sage scrub and annual brome grassland.

Annual Grassland (4.1)

Annual grassland is distributed primarily downstream of the dam but also occurs in small patches in the southwestern portion of the BSA. This vegetation type is dominated by non-native grasses, including red brome (*Bromus rubens*), ripgut grass (*Bromus diandrus*), slender wild oat (*Avena barbata*), wild oat (*Avena fatua*), and wall barley (*Hordeum murinum*). Other non-native species, such as grayish shortpod mustard, black mustard, and tocalote (*Centaurea melitensis*) are also present. Most areas contain scattered native species such as miner's-lettuce (*Claytonia perfoliata*), fascicled tarplant (*Deinandra fasciculata*), telegraph weed (*Heterotheca grandiflora*), turkey-mullein (*Croton setiger*), and fiddleneck (*Amsinckia* spp.). The slope up to the dam contains a greater cover of native species, including miniature lupine (*Lupinus bicolor*), common goldfields (*Lasthenia gracilis*), erect plantain, and valley popcorn flower (*Plagiobothrys canescens*). This slope may have been seeded with a native seed mix following a previous disturbance.

Ruderal (4.6)

Ruderal (weedy) vegetation occurs in broad, flat areas and slopes in the eastern and southern portions of the BSA and along small portions of the shoreline around Irvine Lake. This vegetation type is dominated by grayish shortpod mustard. The area adjacent to the west of the dam is a monoculture of common castor bean (*Ricinus communis*), a non-native species.

Riparian Herb (7.1)

Riparian herb is distributed just above the shoreline around Irvine Lake throughout the BSA. This vegetation type is dominated by cocklebur (*Xanthium strumarium*) with lesser amounts of white sweetclover (*Melilotus albus*), alkali-mallow (*Malvella leprosa*), and grayish shortpod mustard.

Southern Willow Scrub (7.2)

Southern willow scrub occurs in one location along Santiago Creek downstream of the dam. This vegetation type is dominated by arroyo willow (*Salix lasiolepis*) with scattered white alder (*Alnus rhombifolia*), western sycamore (*Platanus racemosa*), and Fremont cottonwood (*Populus fremontii* ssp. *fremontii*). The understory contains scattered mule fat (*Baccharis salicifolia* ssp. *salicifolia*), California sagebrush, flatsedge (*Cyperus* sp.), and non-native grasses. A depression in the streambed holds standing water surrounded by broad-leaved cattail (*Typha latifolia*).

Mulefat Scrub (7.3)

Mulefat scrub primarily occurs along the low flow channel of Santiago Creek downstream of the dam. It also occurs upstream of the dam in one patch adjacent to the east end of the dam structure. It is dominated by a varying cover of mule fat; scaly scale-broom also occurs. Downstream of the dam, this vegetation type includes some low cover of non-native fennel and mustards.

Disturbed Mulefat Scrub (7.3)

Disturbed mulefat scrub is distributed above the shoreline of Irvine Lake and extending upstream of the lake along the low-flow channel of Santiago Creek. This vegetation type is dominated by scattered mule fat; however, it is degraded (disturbed) by the presence of saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), and grayish shortpod mustard.

Southern Sycamore Riparian Woodland (7.4)

Southern sycamore riparian woodland is located in one location at the upstream end of Santiago Creek in the eastern portion of the BSA. This vegetation type consists of a closed riparian canopy dominated by western sycamore. Other species in the tree canopy include Goodding's black willow, arroyo willow, Fremont cottonwood, and coast live oak; a few scattered gum trees (*Eucalyptus* spp.) are also present. The understory and margins contain mule fat.

Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest (7.4/7.5)

Southern sycamore riparian woodland/coast live oak riparian forest is distributed in a few patches in the southeastern portion of the BSA and in one location north of Irvine Lake. This vegetation type is co-dominated by western sycamore and coast live oak trees in a savannah-like setting. The understory and area between trees are dominated by grayish shortpod mustard and tree tobacco (*Nicotiana glauca*).

Southern Black Willow Forest (7.7)

Southern black willow forest occurs along tributary drainages in the southern portion of the BSA, upstream of the lake along Santiago Creek, and in a few patches above the shoreline of Irvine Lake. This vegetation type is dominated by a tree canopy of Goodding's black willow (*Salix gooddingii*); mule fat is abundant in the understory, along the margins, and between the tree canopy.

Disturbed Southern Black Willow Forest (7.7)

Disturbed southern black willow forest is distributed above the shoreline of Irvine Lake and upstream of the lake along Santiago Creek. This vegetation type is characterized by the presence of Goodding's black willow and mule fat; however, it is degraded (disturbed) by the presence of non-native species such as saltcedar, giant reed, grayish shortpod mustard, and non-native grasses. In many areas, the tree canopy is sparse.

Southern Black Willow Forest/Riparian Herb (7.7/7.1)

Southern black willow forest/riparian herb is distributed in broad, flat areas near fluctuating shoreline and vegetated fluctuating shoreline near the upstream end of Irvine Lake and in the southern portion of the BSA. This vegetation type contains sparse Goodding's black willow scattered throughout an area dominated by cocklebur. Based on historic aerial images, these areas are inundated or partially inundated when the water level in the lake is higher.

Coast Live Oak Woodland (8.1)

Coast live oak woodland occurs scattered throughout the BSA. This vegetation type is dominated by coast live oak. In some areas, the understory consists of lemonade berry, toyon, laurel sumac, and California sagebrush while in other areas understory is primarily non-native grasses, miner's-lettuce, and chilicothe. At its margins, coast live oak intergrades with sagebrush scrub, toyon – sumac chaparral, and annual grassland.

Western Sycamore (8.x)

Western sycamore trees occur scattered throughout the central portion of the BSA downstream of the dam. Areas mapped as western sycamore consists of individual trees and small groups of western sycamore trees in a savannah-like setting. The understory consists of non-native grasses.

Cliff (10.0)

Cliffs occur on the western side of Santiago Creek downstream of the dam and along the slopes of Irvine Lake in the western portion of the BSA. This landcover consists of a steep, bare rock face with little to no vegetation.

Open Water (12.1)

Open water occurs in Irvine Lake. Areas mapped as open water were inundated at the time of the survey and unvegetated.

Fluctuating Shoreline (12.2)

Fluctuating shoreline is distributed along the margins of Irvine Lake above the waterline and where the water level has recently receded at the upstream end of the lake. These areas are submerged frequently enough that vegetation has not established. Based on historic aerial images, these areas are inundated or partially inundated when the water level in the lake is higher. These areas fluctuate between open water, unvegetated shoreline, and/or partially vegetated depending on water level.

Vegetated Fluctuating Shoreline (12.2)

Vegetated fluctuating shoreline is distributed along portions of Irvine Lake where the water level has receded long enough for vegetation to become established. These areas are dominated by the non-native swamp prickly grass (*Crypsis schoenoides*) with lesser amounts of flatsedge, seaside healiotrope (*Heliotropium curassavicum* var. *oculatum*), willow weed (*Persicaria lapathifolia*), alkali-mallow, and Bertero's burhead (*Echinodorus berteroi*). Based on historic aerial images, these areas are inundated or are partially inundated when the water level in the lake is higher.

Perennial Stream (13.1)

Perennial stream is located along Santiago Creek upstream of Irvine Lake. It includes a low flow channel and lower portions of the active floodplain; this area broadens as it discharges into Irvine Lake. The low flow channel was primarily unvegetated and flowing water was present at the time of the site visit. The upstream portion of the channel contains seedlings and low-growing vegetation, indicating that it is periodically scoured. Vegetation includes mule fat seedlings (approximately 6 inches high), marsh pulicaria (*Pulicaria paludosa*), white lamb cudweed (*Pseudognaphalium luteoalbum*), fringed willowherb (*Epilobium ciliatum*), willow weed, white sweetclover, annual beard grass (*Polypogon monspeliensis*), southern cattail (*Typha domingensis*), and broad-leaved cattail.

Ornamental (15.5)

Ornamental vegetation is primarily located in association with development and consists of species planted for landscaping purposes. This vegetation type consists of non-native tree species (i.e., pepper tree [*Schinus* sp.], European olive (*Olea europaea*), and gum tree [*Eucalyptus* spp.]), sometimes intermixed with planted native trees such as coast live oak, western sycamore, and Fremont cottonwood. In some areas, the understory is dominated by turf grass.

Developed (15.6)

Developed areas consist of an impermeable landcover and include the dam embankment, spillway channel, buildings, parking lots, and paved roads. These areas are unvegetated.

Disturbed (16.1)

Disturbed areas occur throughout the BSA and consist of bare ground (e.g., graded access roads). Note that graded areas overgrown with vegetation were mapped according to the vegetation. Smaller access roads were not mapped separately from the surrounding vegetation.

Wildlife

Vegetation in the BSA provides habitat for many wildlife species. Common wildlife species observed or expected to occur in the BSA are discussed below.

Fish

Irvine Lake is stocked with fish, including rainbow trout (*Oncorhynchus mykiss*), bass (*Morone* sp.), catfish (*Ictalurus* sp.), common carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis* sp.). Non-native fish are predators on native species; no native fish (with the exception of the stocked rainbow trout) are expected to occur in Irvine Lake.

Amphibians

Amphibians require moisture for at least a portion of their life cycle, and many require standing or flowing water for reproduction. Terrestrial species may or may not require standing water for reproduction; they survive in dry areas by aestivating (i.e., remaining beneath the soil in burrows or under logs and leaf litter and emerging only when temperatures are low and humidity is high). Many of these species' habitats are associated with water, and they emerge to breed once the rainy season begins. Soil moisture conditions can remain high throughout the year in some habitat types, depending on factors such as amount of vegetation cover, elevation, and slope/aspect.

Amphibian species observed in the BSA include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), and the non-native American bullfrog (*Lithobates catesbeianus*). Other amphibian species expected to occur include garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

Reptiles

Reptiles are well-adapted to life in arid habitats. They have several physiological adaptations that allow them to conserve water. Reptiles can also become dormant during weather extremes, allowing them to survive prolonged droughts and paucity of food (Ruben and Hillenius 2005). Reptilian diversity and abundance typically vary with vegetation type and character.

Common reptile species observed in the BSA include common side-blotched lizard (*Uta stansburiana*), western fence lizard (*Sceloporus occidentalis*). Other reptile species expected to occur include southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), northern three-lined boa [rosy boa] (*Lichanura orcutti*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

Birds

A variety of bird species are expected to be residents in the BSA, using the habitats throughout the year. Other species are present only during certain seasons. For example, the white-crowned sparrow (*Zonotrichia leucophrys*) is expected to occur in the BSA during the winter and migrate to the northern forests for breeding in the spring.

The following resident bird species were observed in the BSA: mallard (*Anas platyrhynchos*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), double-crested cormorant (*Phalacrocorax auritus*), snowy egret (*Egretta thula*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), California scrub jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Polioptila caerulea*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melozone crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*).

Migratory species observed in the BSA that are present during the nesting season include lesser nighthawk (*Chordeiles acutipennis*), barn swallow (*Hirundo rustica*), and black-headed grosbeak (*Pheucticus melanocephalus*). Other migratory species that would be expected to occur in the

spring/summer include black-chinned hummingbird (*Archilochus alexandri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), phainopepla (*Phainopepla nitens*), hooded oriole (*Icterus cucullatus*), and Bullock's oriole (*Icterus bullockii*). Wintering species observed or expected to occur in the BSA include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), Townsend's warbler (*Setophaga townsendi*), and white-crowned sparrow.

Raptors (birds of prey) observed or expected to occur in the BSA include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and American kestrel (*Falco sparverius*). The turkey vulture (*Cathartes aura*), a scavenger, was also observed. Each of these species also has potential to nest in the BSA.

Mammals

Small mammals observed in the BSA include Eastern fox squirrel (*Sciurus niger*), California ground squirrel (*Otospermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), mouse (*Peromyscus sp.*), and desert cottontail (*Sylvilagus audubonii*). Medium to large-sized mammals, or their sign, observed include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern mule deer (*Odocoileus hemionus*).

Bats occur throughout most of Southern California and may use any portion of the BSA as foraging habitat. Most of the bats that could potentially occur in the BSA are inactive during the winter and either hibernate or migrate, depending on the species. Bats may roost in cliffs or rocky outcroppings, crevices of structures, or large oak or sycamore trees in the BSA. Bat species that may occur in the BSA for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis californicus),* Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

Wildlife Movement

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic information (MacArthur and Wilson 1967; Soule 1987; Harris and Gallagher 1989; Bennett 1990). Corridors mitigate the effects of this fragmentation by (1) allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move in their home ranges in search of food, water, mates, and other necessary resources (Noss 1983; Farhig and Merriam 1985; Simberloff and Cox 1987; Harris and Gallagher 1989).

It is important to note that in a large, open space area with few or no man-made or naturally occurring physical constraints to wildlife movement, wildlife corridors (as defined above) may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and to provide a variety of travel routes (e.g., canyons, ridgelines, trails, riverbeds, and others), wildlife will use these "local" routes while searching for food, water, shelter, and mates and will not need to cross into other large, open space areas. Based on their size, location,

vegetative composition, and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water, and cover, particularly for small- and medium-sized animals. This is especially true if the travel route is within a larger open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles (such as roads and highways), the remaining landscape features or travel routes that connect the larger open space areas become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (e.g., man-made noise, lighting) that would generally hinder wildlife movement.

The BSA is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the BSA, wildlife movement is generally unconstrained in and around the BSA. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream of the BSA. The existing dam structure and associated reservoir may be a barrier to movement for amphibians, reptiles, and small mammals moving along the drainage; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes. Santiago Canyon Road to the south of the BSA may be a barrier to wildlife movement for small animals; however, small animals could use drainage structures under the road as wildlife crossings. The roadway would not be expected to be a barrier to movement for medium and large-sized mammals due to the relatively low level of traffic on the road; the medium and large-sized mammals would be expected to cross over the roadway when traffic is low.

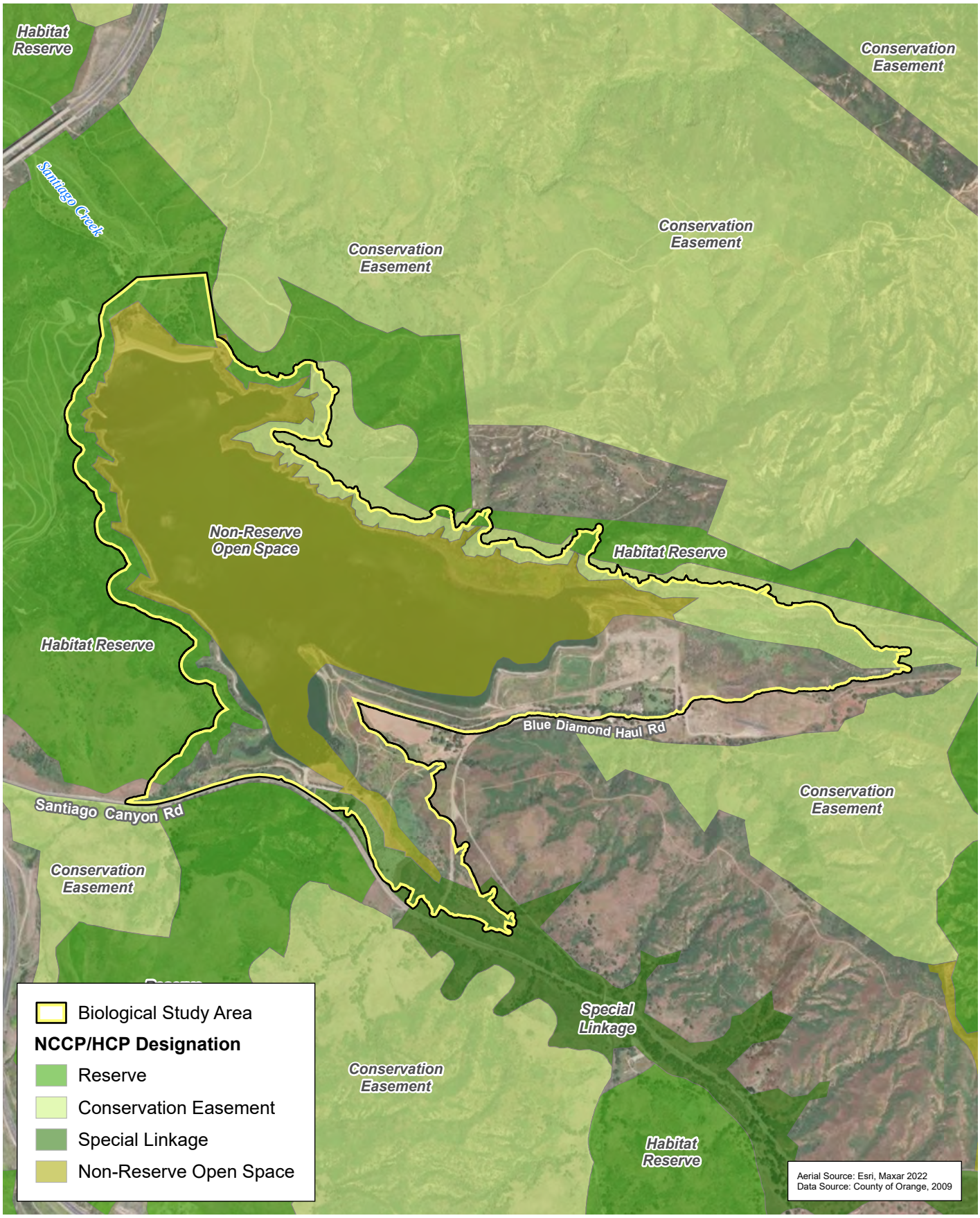
A NCCP “Special Linkage” area occurs in the southern portion of the BSA, extending southeast along Santiago Canyon Road (Exhibit 4.3-3). It connects Habitat Reserve areas to the west and north of Irvine Lake to Habitat Reserve areas south of Santiago Canyon Road (i.e., Limestone Canyon). Special Linkages include areas where proposed development or existing uses would provide either an opportunity to conserve habitat useful for biological connectivity or support target species while permitting compatible non-habitat uses. Special Linkages are not part of the Reserve System. Existing uses within the Special Linkage in the BSA include development associated with Irvine Lake and Santiago Canyon Road.

Special Status Biological Resources

Sensitive Natural Communities

Coastal sage scrub vegetation (i.e., sagebrush scrub, disturbed sagebrush scrub, sagebrush – coyote brush scrub, southern cactus scrub, disturbed southern cactus scrub and disturbed floodplain sage scrub) is considered a special status vegetation type in the Central–Coastal NCCP/HCP area because of its potential to support NCCP/HCP Covered Species. Additionally, southern cactus scrub and disturbed southern cactus scrub are considered sensitive natural communities by CDFW (2025b; Table 4.3-2).

Riparian vegetation types are often considered special status because they are often under the regulatory authority of the resource agencies (i.e., USACE, CDFW, and RWQCB); jurisdictional resources are discussed in the next section. Riparian vegetation types in the BSA include riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb. Other mapped areas that may be considered riparian and jurisdictional resources include open water, fluctuating shoreline, vegetated fluctuating shoreline, and perennial stream. Of these riparian vegetation types, southern willow scrub, southern black willow forest, and disturbed southern black willow forest are considered sensitive natural communities by CDFW (2025b; Table 4.3-2).



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_NCCP

Orange County Central/Coastal NCCP/HCP

Exhibit 4.3-3

Santiago Creek Dam Improvement Project

N W E S

0 1,000 2,000 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_NCCP.pdf

Sycamore and oak woodlands provide high quality habitat for wildlife. These trees are large enough to provide cavities for shelter (e.g., roosting) and breeding (e.g., cavity-nesting) for wildlife species. Downed wood provides important cover for amphibians, reptiles, and small to medium sized mammals; nest sites for cavity-nesting and ground-nesting birds; nutrients into the soil as they decompose; and favorable microhabitat for emerging seedlings (Tietje et al. 2005). Southern sycamore riparian woodland/coast live oak forest and western sycamore are considered sensitive natural communities by CDFW (2025b; Table 4.3-2). Coast live oak woodland is not considered a sensitive natural community but is generally considered of local concern because of the habitat value that it provides.

Toyon–sumac chaparral, annual grassland, ruderal, and ornamental are not considered sensitive natural communities by CDFW (2025b). Cliff, disturbed and developed are not given threat rankings because they are unvegetated landcovers.

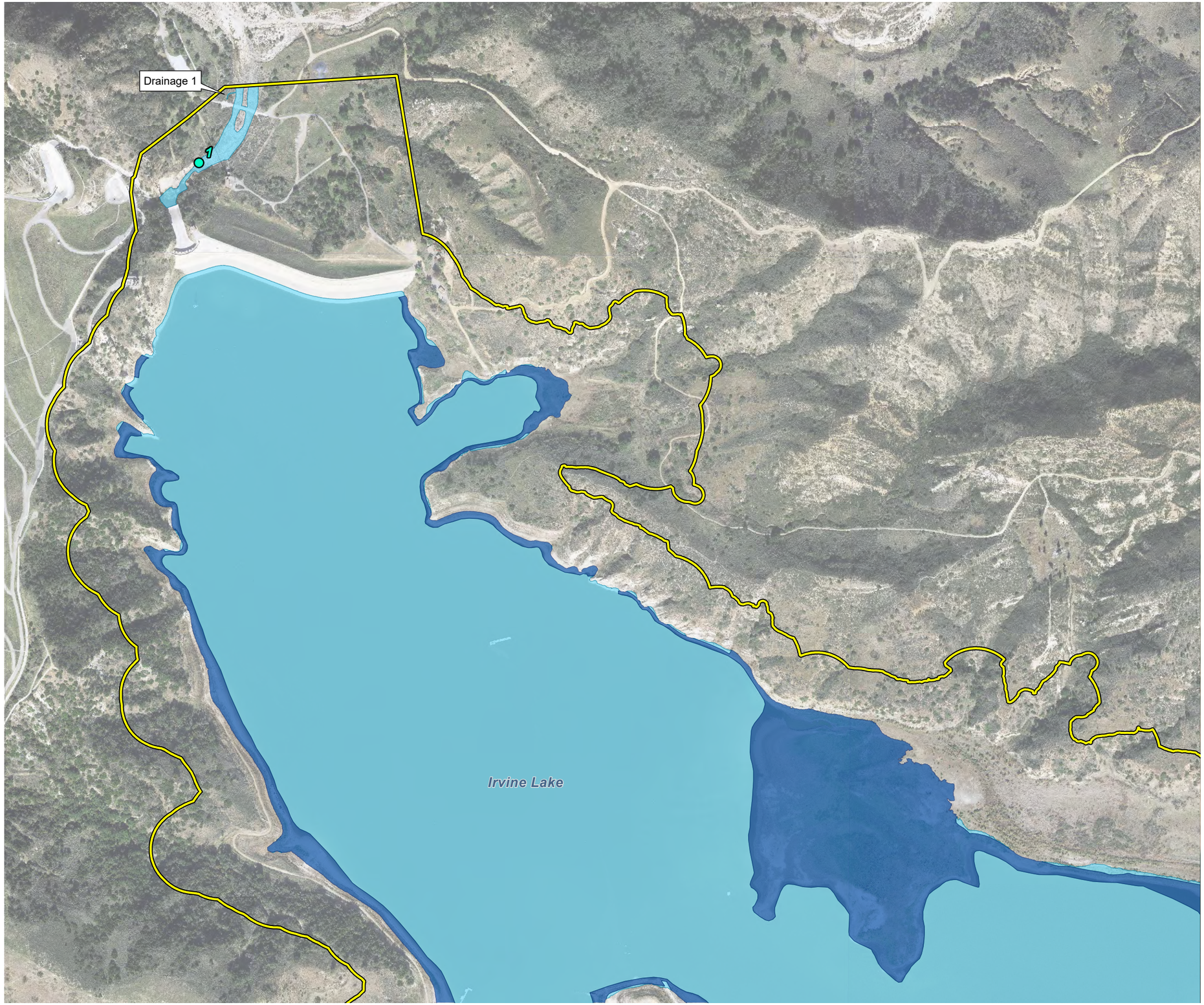
Jurisdictional Resources

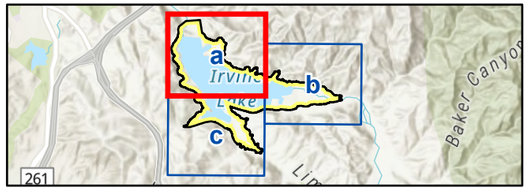
Seventeen potential jurisdictional features were mapped in the BSA: Irvine Lake, Santiago Creek, and 15 smaller drainages that discharge into either Irvine Lake or Santiago Creek. Based on an assessment of jurisdictional waters, a total of 428.476 acres of WOTUS under the regulatory authority of the USACE, 435.205 acres of waters of the State under the regulatory authority of the RWQCB, and 669.630 acres of waters under the regulatory authority of CDFW occurs in the BSA (Table 4.3-2, Exhibits 4.3-4, 4.3-5, and 4.3-6).

TABLE 4.3-2
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

	Jurisdiction (acres)						
	USACE WOTUS			RWQCB Waters of the State			CDFW Jurisdictional Resources
Feature	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Total
Irvine Lake	94.582	312.959	407.541	94.582	312.959	407.541	614.135
Santiago Creek	7.124	13.803	20.927	7.124	13.803	20.927	36.024
Drainage 1	—	0.008	0.008	—	0.008	0.008	0.027
Drainage 2	—	—	—	—	0.025	0.025	0.074
Drainage 3	—	—	—	—	0.071	0.071	0.168
Drainage 4	—	—	—	—	0.048	0.048	0.094
Drainage 5	—	—	—	—	0.144	0.144	0.359
Drainage 6	—	—	—	—	0.369	0.369	0.149
Drainage 7	—	—	—	—	0.100	0.100	0.148
Drainage 8	—	—	—	—	0.024	0.024	0.042
Drainage 9	—	—	—	—	0.066	0.066	1.237
Drainage 10	—	—	—	—	0.167	0.167	0.245
Drainage 11	—	—	—	—	0.114	0.114	0.318
Drainage 12	—	—	—	—	4.894	4.894	13.517
Drainage 13	—	—	—	—	0.039	0.039	0.114
Drainage 14	—	—	—	—	0.235	0.235	0.416
Drainage 15	—	—	—	—	0.433	0.433	2.563
Total	**101.706**	**326.770**	**428.476**	**101.706**	**333.499**	**435.205**	**669.630**

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

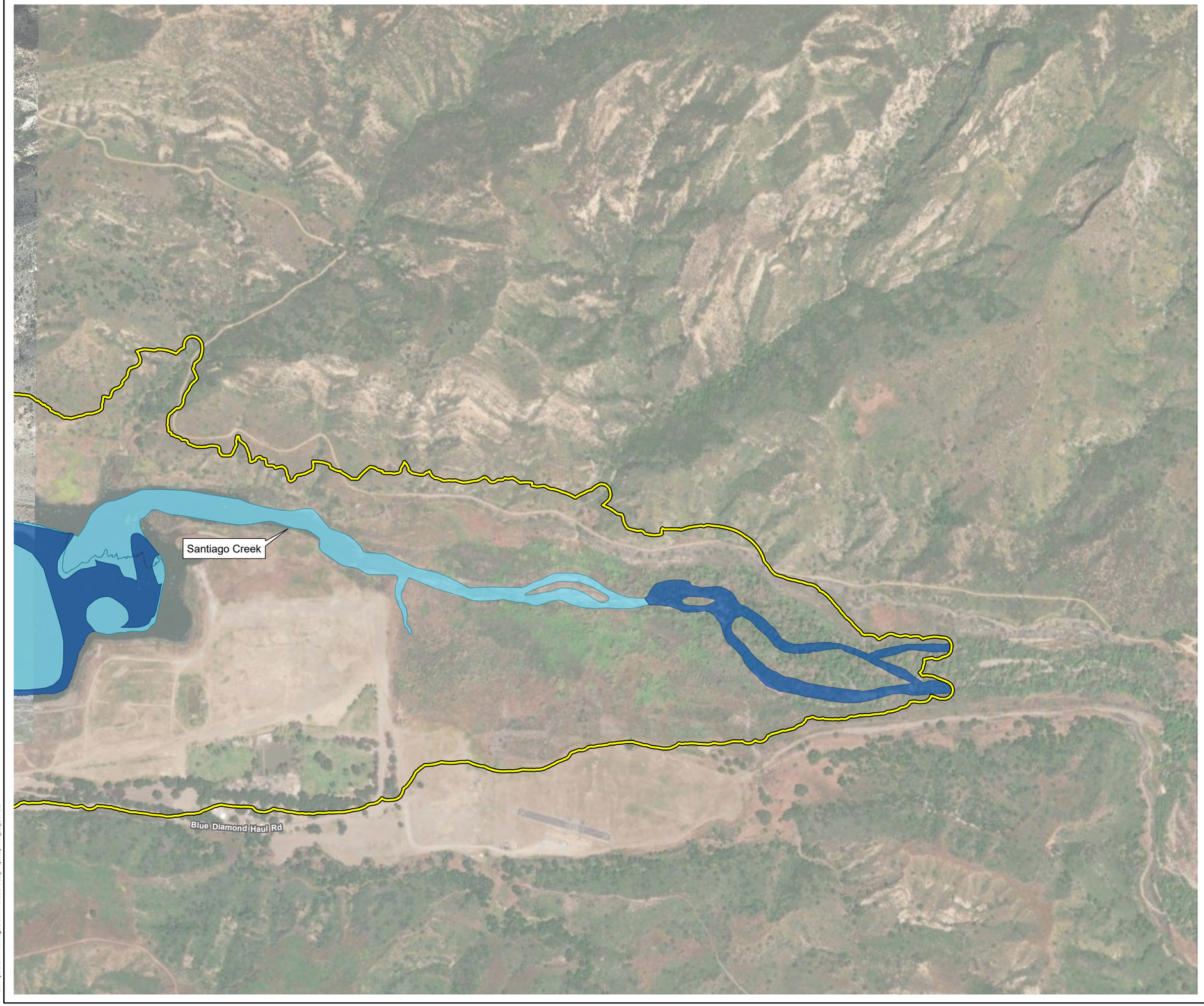
Exhibit 4.3–4a

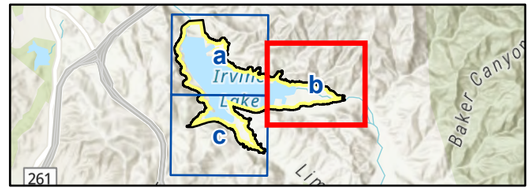
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 03/25/2025 PLO) R:\Projects\IRW_IRWD\3IRW010201\Graphics\EIR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

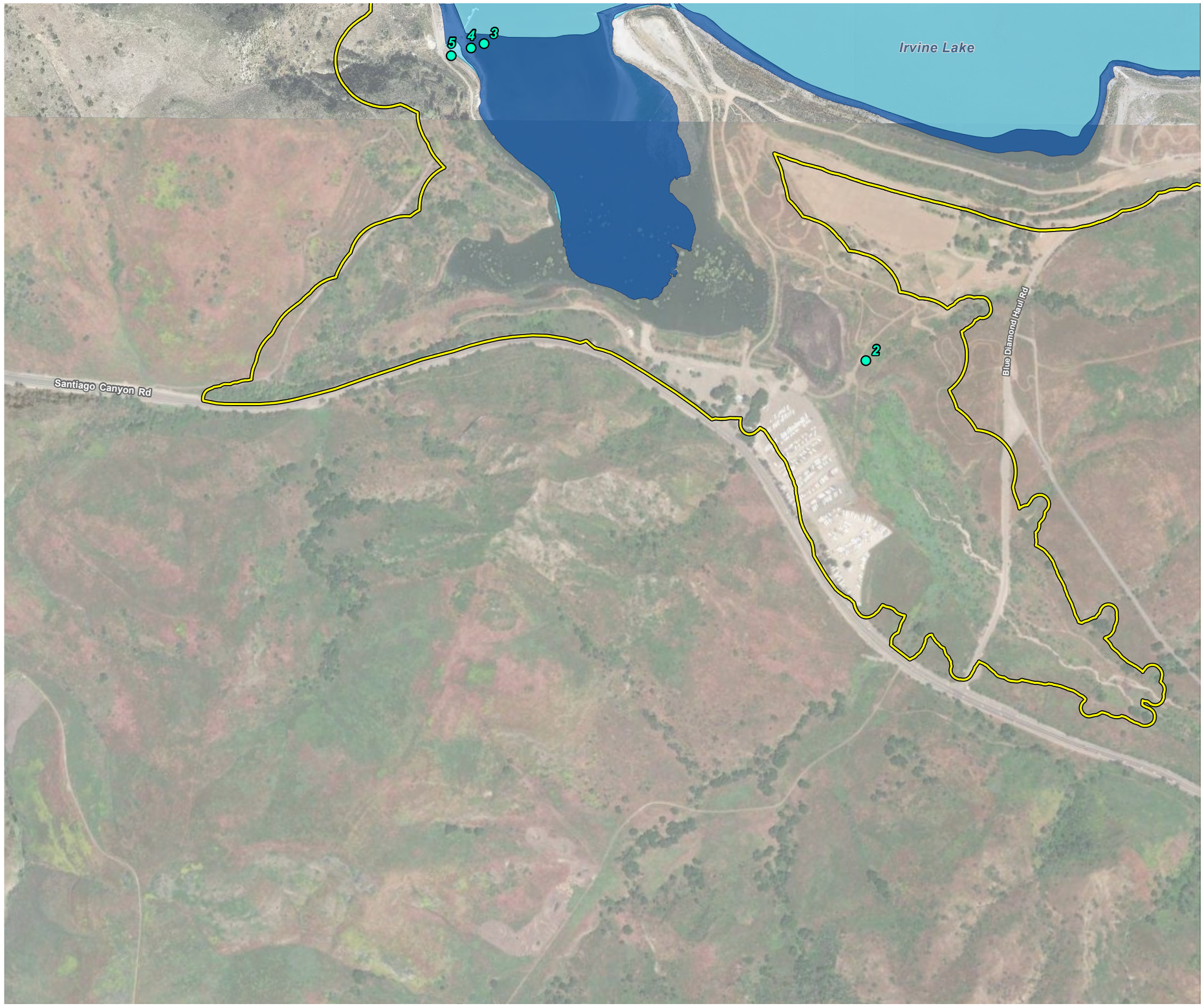
Exhibit 4.3–4b

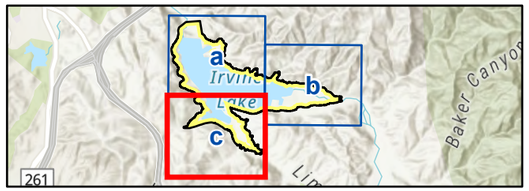
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 03/25/2025 PLO) R:\Projects\IRW_IRWD\3IRW010201\Graphics\EIR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

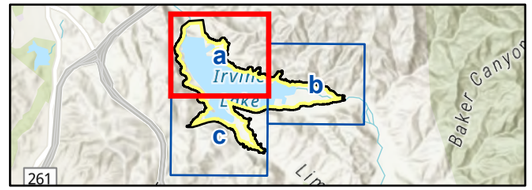
Exhibit 4.3–4c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 03/25/2025 PLO) R:\Projects\IRW_IRWD\3IRW010201\Graphics\EIR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE



Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

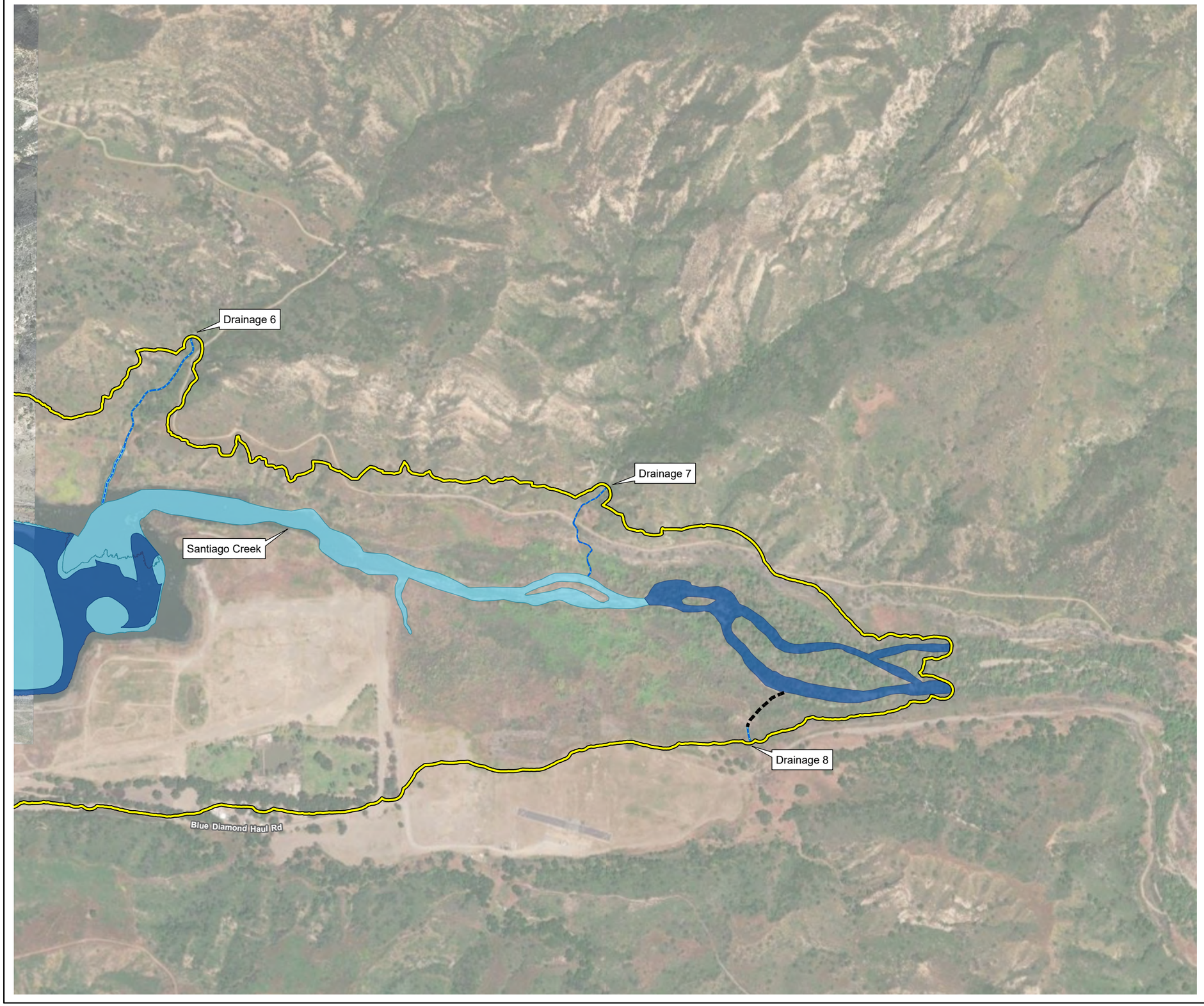
Exhibit 4.3–5a

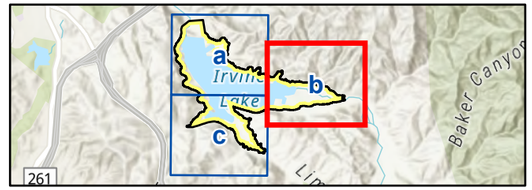
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

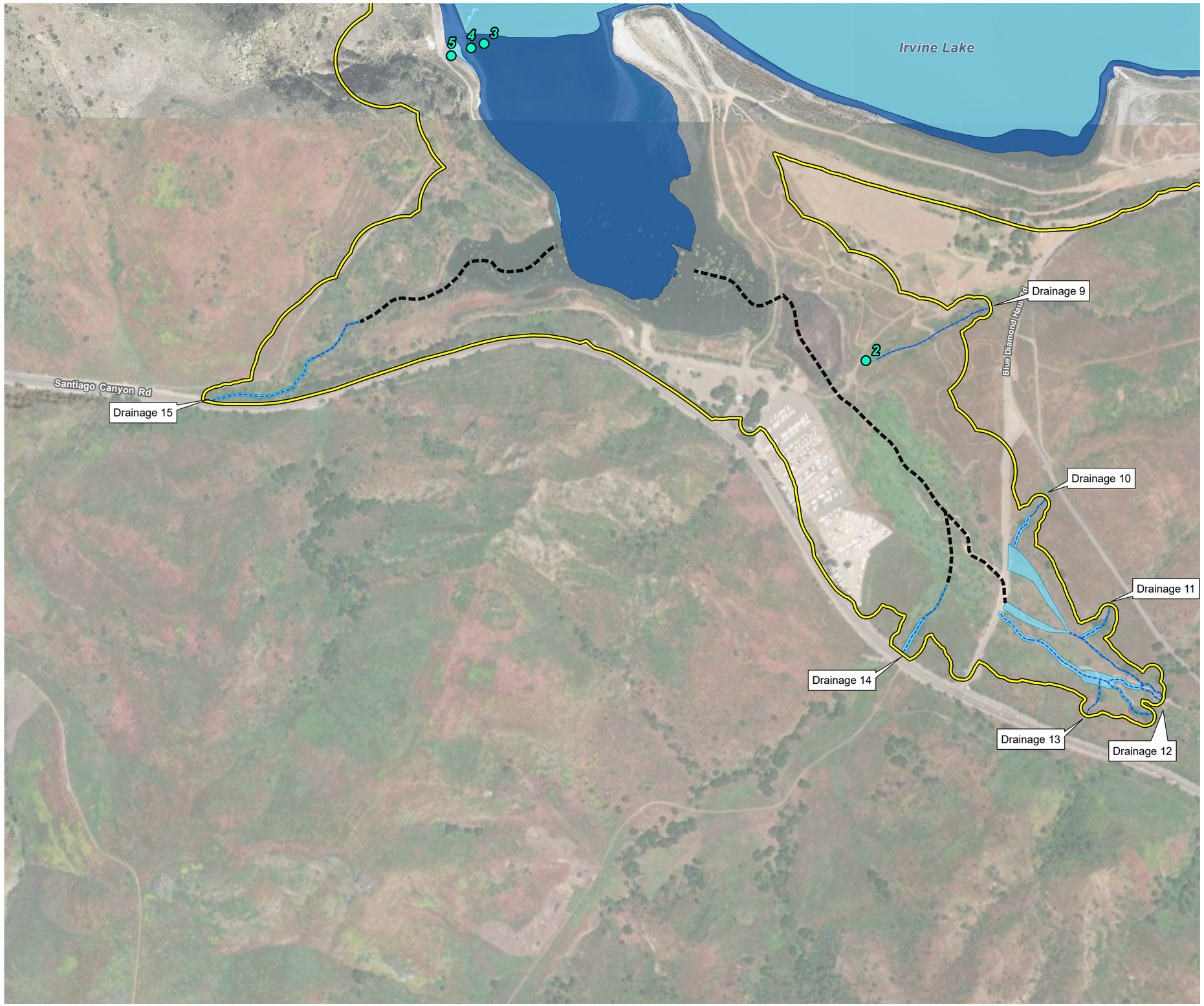
Exhibit 4.3-5b

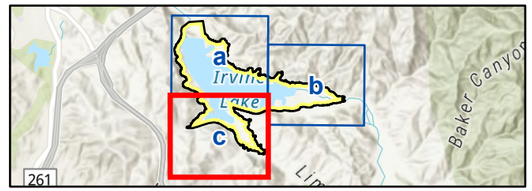
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

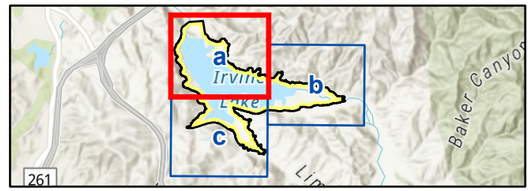
Exhibit 4.3–5c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\SCD_Project.aprx\ex_JD_RWQCB



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

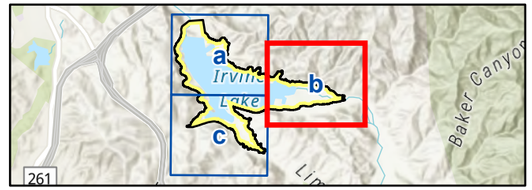
Exhibit 4.3-6a

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

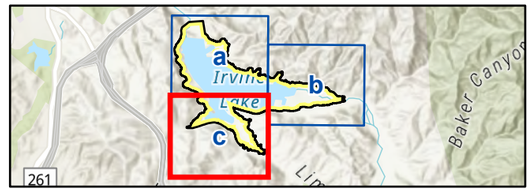
Exhibit 4.3-6b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

Exhibit 4.3-6c

Santiago Creek Dam Improvement Project

PSOMAS

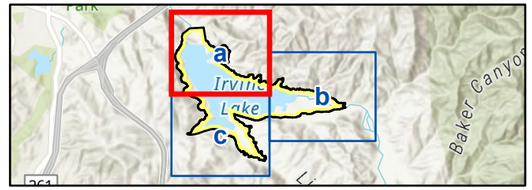
(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW

Sensitive Plant Species

Table 4.3-3 provides a summary of special status plant species reported to occur in the Project region (i.e., the USGS' Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles). This list includes species reported by the CNDDB and the CNPS, supplemented with species from the Project Biologist's experience that either occur nearby or could occur based on the presence of suitable habitat. The table includes information on the status, NCCP/HCP coverage, species habitat, and potential for occurrence. Note that these species are listed alphabetically according to their scientific name.

Focused surveys were conducted for all special status plant species with potential to occur in the BSA based on the presence of suitable habitat. Three special status plant species, intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*), and Coulter's matilija poppy, were observed downstream of the dam during the 2020 focused surveys (Exhibit 4.3-7; Psomas 2020d). Four special status plant species, Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily, mud nama (*Nama stenocarpa*), and Coulter's matilija poppy, were observed upstream of the dam during the 2022 focused surveys (Exhibit 4.3-7; Psomas 2022a). Higher status species that were observed in the BSA are discussed in more detail following the table; all species that were observed are discussed in more detail in the Biological Technical Report (Appendix C). The remaining species would not be expected to occur because the BSA lacks suitable habitat or because they were not observed during the focused surveys.



- Biological Study Area
- Arroyo Toad Survey Area

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Many-Stemmed Dudleya Population
- Mud Nama Population (mapped polygon)

Special Status Species

- American Peregrine Falcon
- American White Pelican
- Coastal Cactus Wren
- Coastal California Gnatcatcher
- Grasshopper Sparrow
- Least Bell's Vireo
- Southern California Rufous-Crowned Sparrow
- White-Tailed Kite
- Yellow-Breasted Chat
- Two-Striped Gartersnake

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

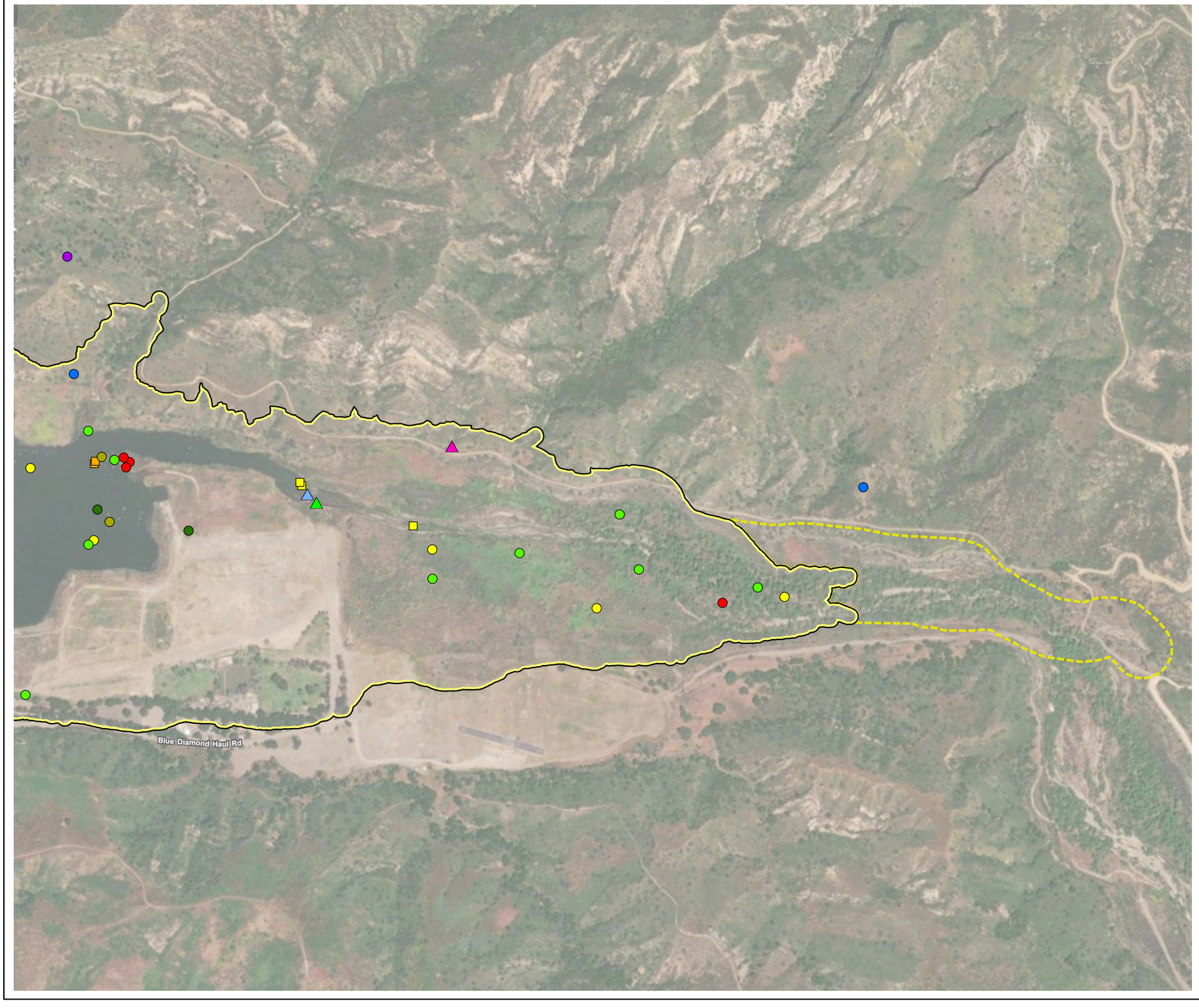
Exhibit 4.3-7a

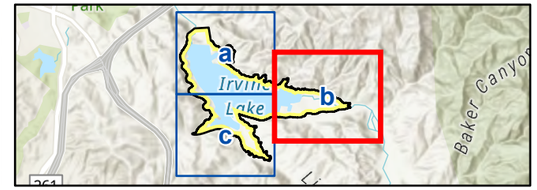
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_SS_Species





Biological Study Area

Arroyo Toad Survey Area

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Braunton's Milkvetch Population

Special Status Species

- Bald Eagle (Nest)
- Coastal Cactus Wren
- Grasshopper Sparrow
- Least Bell's Vireo
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat
- Belding's Orange-Throated Whiptail
- Two-Striped Gartersnake

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

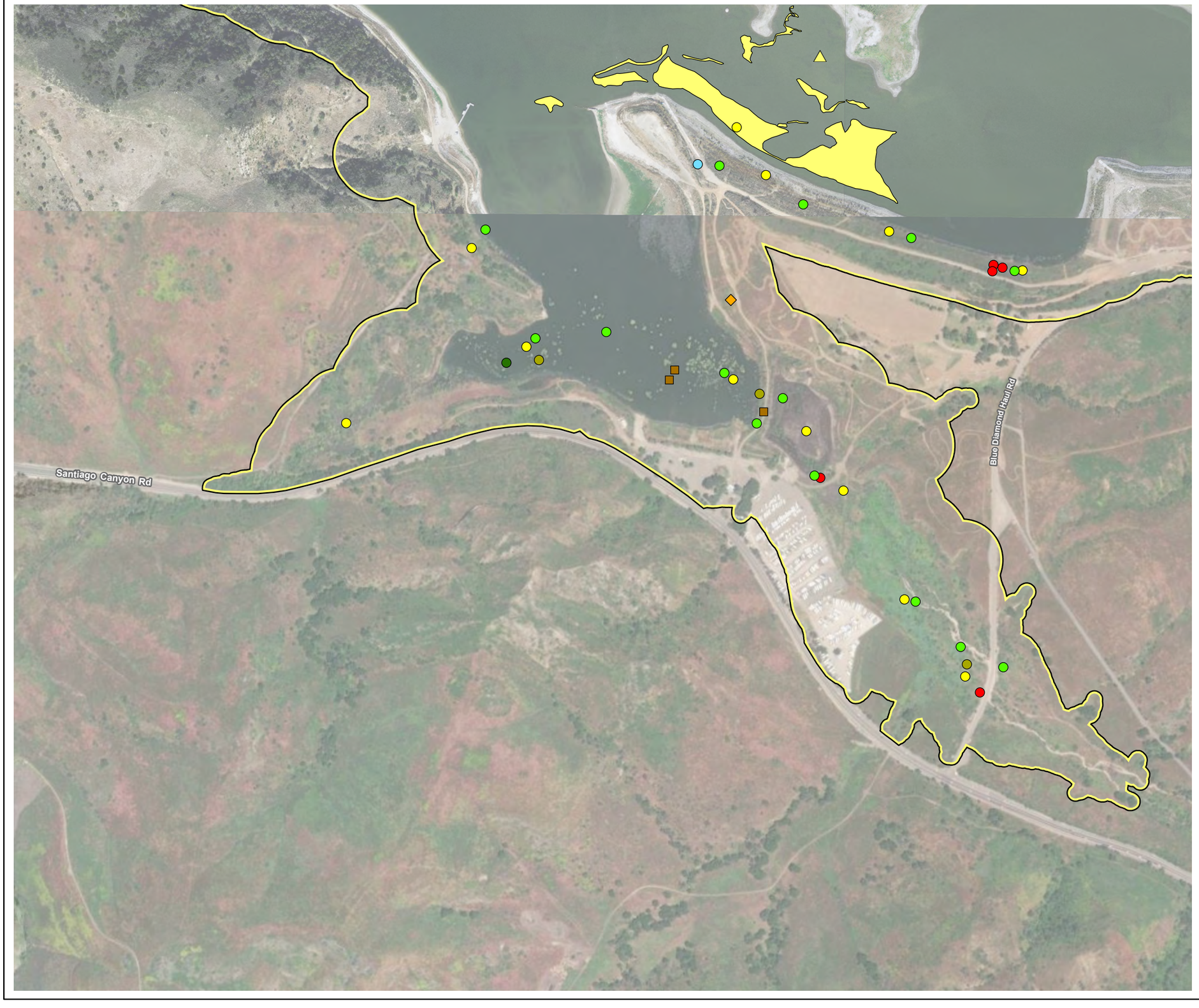
Exhibit 4.3-7b

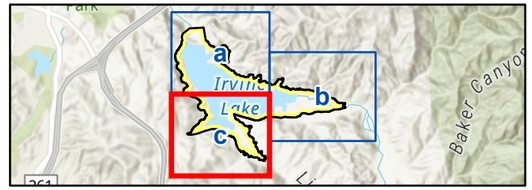
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_SS_Species





Biological Study Area

Special Status Plants

- Mud Nama Population (point location)
- Mud Nama Population (mapped polygon)

Special Status Species

- Crotch's Bumble Bee
- Coastal California Gnatcatcher
- Grasshopper Sparrow
- Least Bell's Vireo
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat
- Coastal Whiptail

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

Exhibit 4.3-7c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_SS_Species

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Abronia villosa var. *aurita*	chaparral sand-verbena	—	—	1B.1	No	Sandy areas in chaparral, coastal scrub, desert dunes.	Not expected to occur; not observed during focused surveys; suitable habitat.
Allium marvinii	Yucaipa onion	—	—	1B.2	No	Dry slopes and ridges in chaparral.	Not expected to occur; outside current known range.
Astragalus brauntonii	Braunton's milk-vetch	FE	—	1B.1	No	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland. Reported immediately north of the BSA in 2012 (CDFW 2025a).	**Observed in the survey area**
Atriplex coulteri	Coulter's saltbush	—	—	1B.2	No	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Atriplex pacifica	south coast saltscale	—	—	1B.2	No	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	—	—	1B.2	No	Alkaline soils in coastal bluff scrub, coastal scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Baccharis malibuensis	Malibu baccharis	—	—	1B.1	No	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland. Reported immediately north of the BSA in 2000 (CCH 2020).	Not expected to occur; not observed during focused surveys; suitable habitat.
Bahiopsis laciniata	San Diego County viguiera	—	—	4.3	No	Chaparral and coastal scrub	Not expected to occur; not observed during focused surveys; suitable habitat.
Brodiaea filifolia	thread-leaved brodiaea	FT	SE	1B.1	No	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.
Calandrinia breweri	Brewer's calandrinia	—	—	4.2	No	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Calochortus catalinae	Catalina mariposa lily	—	—	4.2	Covered	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat. Incidentally observed on access road outside survey area.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Calochortus plummerae	Plummer's mariposa-lily	—	—	4.2	No	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest.	Not expected to occur; not observed during focused surveys; suitable habitat.
Calochortus weedii var. *intermedius*	intermediate mariposa-lily	—	—	1B.2	Conditionally Covered	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland.	**Observed in the survey area.**
Camissoniopsis lewisii	Lewis' evening-primrose	—	—	3	No	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Centromadia parryi ssp. *australis*	southern tarplant	—	—	1B.1	No	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	—	SE	1B.1	No	Sandy soils in coastal scrub, valley and foothill grasslands. Historic (1902) occurrence within 0.5 mile of the BSA, but the BSA is outside the current known range of the species (CDFW 2025a).	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside current known range.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Chorizanthe polygonoides var. *longispina*	long-spined spineflower	—	—	1B.2	No	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools. BSA is at the edge of the current known range.	Not expected to occur; not observed during focused surveys; suitable habitat.
Convolvulus simulans	small-flowered morning-glory	—	—	4.2	No	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands. Reported just west of Irvine Lake in 2016 (CCH 2020).	Not expected to occur; not observed during focused surveys; suitable habitat.
Deinandra paniculata	paniculate tarplant	—	—	4.2	No	Usually vernally mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.
Diplacus clevelandii	Cleveland's bush monkeyflower	—	—	4.2	No	Disturbed areas and open borders of chaparral, cismontane woodland, and lower montane coniferous forest.	Not expected to occur; outside current known elevational range.
Dodecahema leptoceras	slender-horned spineflower	FE	SE	1B.1	No	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub.	Not expected to occur; outside current known range.
Dudleya cymosa ssp. *ovatifolia*	Santa Monica Mountains dudleya	FT	—	1B.1	Covered	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Dudleya multicaulis	many-stemmed dudleya	—	—	1B.2	No	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland. Reported in immediate vicinity of the BSA in 2008 (CDFW 2025a).	**Observed in the 2020 plant focused survey area.**
Eriastrum densifolium ssp. *sanctorum*	Santa Ana River woollystar	FE	SE	1B.1	No	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
Harpagonella palmeri	Palmer's grapplinghook	—	—	4.2	Covered	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	—	—	1A	No	Coastal and freshwater marshes and swamps.	Not expected to occur; not observed during focused surveys; presumed extinct; suitable habitat.
Hesperocyparis forbesii	Tecate cypress	—	—	1B.1	Covered	Clay or gabbro soils in closed-cone coniferous forest and chaparral.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.
Hesperocyparis goveniana	Gowen cypress	FT	—	1B.2	No	Closed-cone coniferous forest, mixed evergreen forest, chaparral, and coastal terraces. Perennial species observable year-round.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Hordeum intercedens	vernal barley	—	—	3.2	No	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools. Reported just south of Irvine Lake in 1998 (CCH 2020).	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Horkelia cuneata var. *puberula*	mesa horkelia	—	—	1B.1	No	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Juglans californica	Southern California black walnut	—	—	4.2	No	Chaparral, cismontane woodland, coastal scrub, and riparian woodland. Perennial species observable year-round.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.
Juncus acutus ssp. *leopoldii*	southwestern spiny rush	—	—	4.2	No	Moist, saline places including coastal dunes, marshes and swamps, and meadows and seeps. Perennial species observable year-round.	Not expected to occur; perennial species not observed during focused surveys; marginally suitable habitat.
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	—	—	1B.1	No	Usually on alkaline soils in coastal salt marsh, playas, vernal pools. Reported from oak woodland in 2008 (CCH 2020).	Not expected to occur; not observed during focused surveys; no suitable habitat.
Lepechinia cardiophylla	heart-leaved pitcher sage	—	—	1B.2	Covered	Closed-cone coniferous forest, chaparral, cismontane woodland.	Not expected to occur; outside current known elevational range.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Lepidium virginicum var. *robinsonii*	Robinson's pepper-grass	—	—	4.3	No	Dry soils in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Lilium humboldtii ssp. *ocellatum*	ocellated Humboldt lily	—	—	4.2	No	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Lycium californicum	California box-thorn	—	—	4.2	No	Coastal bluff scrub and coastal scrub. Perennial species observable year-round.	Not expected to occur; outside current known range.
Monardella hypoleuca ssp. *intermedia*	intermediate monardella	—	—	1B.3	No	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Nama stenocarpa	mud nama	—	—	2B.2	No	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps. BSA is at the edge of the current known range.	**Observed in the survey area.**
Nasturtium gambelii	Gambel's water cress	FE	ST	1B.1	No	Freshwater and brackish marshes at the martins of lakes and along streams; in or just above the water level.	Not expected to occur; not observed during focused surveys; suitable habitat.
Nolina cismontana	chaparral nolina	—	—	1B.2	No	Primarily sandstone and shale substrates in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Penstemon californicus	California beardtongue	—	—	1B.2	No	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland.	Not expected to occur; outside current known range.
Pentachaeta aurea ssp. *allenii*	Allen's pentachaeta	—	—	1B.1	No	Openings in coastal scrub and valley and foothill grasslands.	Not expected to occur; not observed during focused surveys; suitable habitat.
Phacelia hubbyi	Hubby's phacelia	—	—	4.2	No	Open gravelly or rocky slopes of chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Pickeringia montana var. *tomentosa*	woolly chaparral-pea	—	—	4.3	No	Gabbroic, granitic, or clay soil in chaparral.	Not expected to occur; no suitable habitat.
Pseudognaphalium leucocephalum	white rabbi-tobacco	—	—	2B.2	No	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral.	Not expected to occur; not observed during focused surveys; suitable habitat.
Rhinotropis [*Polygala*] *cornuta* var. *fishiae*	Fish's milkwort	—	—	4.3	No	Chaparral, cismontane woodland, riparian woodland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Romneya coulteri	Coulter's matilija poppy	—	—	4.2	Covered	Chaparral and coastal scrub, often in burns.	**Observed in the survey area.**

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Senecio aphanactis	chaparral ragwort	—	—	2B.2	No	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Sidalcea neomexicana	salt spring checkerbloom	—	—	2B.2	No	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Suaeda esteroa	estuary seablite	—	—	1B.2	No	Coastal salt marshes in clay, silt, and sand substrates.	Not expected to occur; no suitable habitat.
Suaeda taxifolia	woolly seablite	—	—	4.2	No	Coastal bluff scrub, coastal dunes, and salt marshes.	Not expected to occur; outside current known range; no suitable habitat.
Symphyotrichum defoliatum	San Bernardino aster	—	—	1B.2	No	Disturbed areas, vernally mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 4.3-3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/HCP Covered Species	Habitat*	Potential to Occur
Viguiera laciniata	San Diego County viguiera	—	—	4.3	No	Chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

CRPR: California Rare Plant Rank; NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan

LEGEND:

Federal Status

FE Endangered
FT Threatened

State Status

SE Endangered
ST Threatened

CRPR

1A Plants presumed extirpated in California and either rare or extinct elsewhere
1B Plants Rare, Threatened, or Endangered in California and elsewhere
2B Plants Rare, Threatened, or Endangered in California but more common elsewhere
3 Plants about which we need more information – A Review List
4 Plants of limited distribution – A Watch List

CRPR Threat Code Extensions

None Plants lacking any threat information
.1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)
.2 Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)
.3 Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)

Species that were observed on site are shown in **boldface type.**

* Sources include CDFW 2025a, CNPS 2025, and Jepson Flora Project 2024.

Braunton's Milkvetch

Braunton's milkvetch is a federally listed Endangered species and has a CRPR of 1B.1. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and August (CNPS 2025). This perennial herb occurs in chaparral, coastal scrub, and valley and foothill grassland at elevations between approximately 15 and 2,100 feet above msl (Jepson Flora Project 2024; CNPS 2025). It generally occurs after recent burns or in disturbed areas, usually in sandstone with carbonate layers (CNPS 2025). This species is known from the western portion of the Western Transverse Ranges, the San Gabriel Mountains, tentatively from the San Gabriel Mountains/South Coast, and the northern Peninsular Ranges (Jepson Flora Project 2024); it is known from a few canyons in Orange County (Allen and Roberts 2013).

One individual Braunton's milkvetch was observed in the 2022 survey area (Psomas 2022a; Exhibit 4.3-7). It was observed in the sandy channel of Santiago Creek, upstream of the lake. The species associated with the Braunton's milkvetch observed in the survey area include mule fat, cicuta-leaved phacelia (*Phacelia cicutaria*), and horseweed (*Erigeron canadensis*).

Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species[6] in the Central–Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2024; CNPS 2025). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2024). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2024).

One individual intermediate mariposa lily was observed in the 2020 focused survey area (Psomas 2020d, Exhibit 4.3-7). This individual was observed in the eastern portion of the 2020 focused survey area on a moderately steep, south facing slope in disturbed sagebrush scrub with Ceineba-rock outcrop complex soil. The species associated with the intermediate mariposa lily observed include California sagebrush, black mustard, coast morning glory (*Calystegia macrostegia*), and oats.

Four individual intermediate mariposa lilies were observed in the 2022 focused survey area and an additional individual was observed just outside the survey area (Psomas 2022a; Exhibit 4.3-7). The four individuals were observed in two populations in the northwestern portion of the 2022 survey area on moderately steep, southeast- to east-facing slopes in sagebrush scrub. The species associated with the intermediate mariposa lilies observed in the survey area include California sagebrush, black sage (*Salvia mellifera*), chilicothe, mule fat, California encelia (*Encelia californica*), and smilo grass (*Stipa miliacea* var. *miliacea*).

Many-stemmed Dudleya

Many-stemmed dudleya has a CRPR of 1B.2. It is not covered by the Central–Coastal NCCP/HCP. It typically blooms between April and June (Jepson Flora Project 2024; CNPS 2025). This perennial herb occurs on heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley, and foothill grassland at elevations between approximately 5 and 2,975 feet above msl (Roberts 2008; Jepson Flora Project 2024). This species is known from the South Coast (Jepson Flora Project 2024).

[6] The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations in the 2020 focused survey area (Psomas 2020d, Exhibit 4.3-7). Approximately 800 individuals were observed in the eastern portion of the 2020 focused survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the 2020 focused survey area. The majority of individuals (eastern location) were observed in disturbed sagebrush scrub with Ceineba-rock outcrop complex and pits soil. The smaller population (western location) was observed in toyon-sumac chaparral with Sorrento loam soil. The species associated with the many-stemmed dudleya included California sagebrush, California buckwheat, daggerleaf cottonrose (*Filago gallica*), white sage, splendid mariposa lily (*Calochortus splendens*), common goldfields (*Lasthenia gracillis*), osmadenia (*Osmadenia tenella*), and little California melica (*Melica imperfecta*).

Mud Nama

Mud nama has a CRPR of 2B.2. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and October (Jepson Flora Project 2024; CNPS 2025). This annual herb occurs in intermittently wet areas of marshes and swamps, including lake margins and riverbanks at elevations between approximately 15 and 1,640 feet above msl (Jepson Flora Project 2024; CNPS 2025). This species is known from the San Joaquin Valley, South Coast, southern Channel Islands, western Peninsular Ranges, and southeastern Sonoran Desert (Jepson Flora Project 2024). The CNDDB contains 22 records of this species in Imperial, Kings, Los Angeles, Orange, Riverside, and San Diego Counties. Of these, seven locations are reported from Orange County (i.e., Anaheim Marsh [historic occurrence, 1932], Laguna Lakes in Laguna Canyon, Emerald Canyon, Lambert Reservoir, Peters Canyon Channel, Fairview Park, and Ladera Ranch); all the records are over 25 years old. Of these records, the largest reported population was 30 individuals, most other records did not include a count or reported less than 10 individuals (CDFW 2025a).

Multiple populations of mud nama were observed in the southern portion of Irvine Lake in the 2022 focused survey area (Psomas 2022a; Exhibit 4.3-7). This area experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. The species associated with the mud nama observed in the survey area were primarily annual beard grass, white sweetclover, and sourclover (*Melilotus indicus*) with scattered saltcedar, alkali heliotrope, mule fat, flatsedge, everlasting (*Pseudognaphalium* sp.), water cress (*Nasturtium officinale*), and willow weed.

Individuals covered a large area and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama. This resulted in an average of 37.7 individuals per square foot. Therefore, a “high density” population was considered to have between 35 and 40 individuals per square foot. A “moderate density” population was considered to have between 20 and 25 individuals per square foot and a “low density” population was considered to have between 5 and 10 individuals per square foot. Based on these approximate population densities, the total number of individuals in the survey area was estimated using the square footage of each population. The total population was estimated to be between 3.5 and 5.5 million. This is the largest population currently known for this species.

Sensitive Wildlife Species

Table 4.3-4 provides a summary of special status wildlife species reported to occur in the Project region (i.e., the USGS' Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles). This list includes species reported by the CNDDB, supplemented with species from the Project Biologist's experience that either occur nearby or could occur based on the presence of suitable habitat. This table includes information on the status, NCCP/HCP coverage, species habitat, and potential for occurrence. Note that these species are listed taxonomically. Species observed in the BSA are discussed further below. Exhibit 4.3-7 shows the locations of special status species.

Of the 60 species reported from the Project region, 40 species have potential to occur in the BSA based on the presence of suitable habitat and the results of focused surveys. The remaining species would not be expected to occur because the BSA lacks suitable habitat or because they were not observed during the focused surveys. Sixteen special status wildlife species were observed during the 2020, 2022, and 2024 focused surveys; these species are discussed in more detail in the Biological Technical Report (Appendix C). Higher status species with potential to occur are discussed in more detail following the table. Two federally listed species (i.e., coastal California gnatcatcher and least Bell's vireo) and one federally Proposed Threatened species (i.e., monarch butterfly [*Danaus plexippus*; overwintering not expected]are known to occur in the BSA. Two State listed species (i.e., bald eagle and least Bell's vireo) and four State Candidate species (i.e., Crotch's bumble bee, white sturgeon [*Acipenser transmontanus*; only sterile individuals], burrowing owl [*Athene cunicularia*], and mountain lion) are known to occur or have potential to occur in the BSA.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Invertebrates						
Branchinecta sandiegonensis	San Diego fairy shrimp	FE	—	Conditionally Covered	Inhabits vernal pools and ephemeral depressions.	Not expected to occur; no suitable habitat.
Streptocephalus woottoni	Riverside fairy shrimp	FE	—	Conditionally Covered	Inhabits vernal pools and ephemeral depressions.	Not expected to occur; no suitable habitat.
Danaus plexippus (overwintering populations)	monarch butterfly	FPT	—	No	Overwintering sites consist of forested areas that provide protection from the elements and moderate temperatures, as well as nectar and clean water sources located nearby. Overwintering sites are within 1.5 miles of the Pacific Ocean at elevations of 200-300 feet above msl. Reproduction is dependent on the presence of milkweed (*Asclepias* sp.).	**Observed (individual foraging during spring); hostplant present**; not expected for overwintering because BSA is too far inland and is outside the known elevational range for overwintering.
Euphydryas editha quino	quino checkerspot butterfly	FE	CE	Conditionally Covered	Inhabits openings in chaparral and sage scrub and grasslands; erect plantain is one of the specific host plants where females lay eggs.	Not expected to occur; not observed during focused surveys; suitable habitat.
Bombus crotchii	Crotch's bumble bee	—	CE	No	Inhabits areas with appropriate food sources (e.g., *Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, and Boraginaceae*).	Observed; suitable habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Fish						
Acipenser transmontanus	white sturgeon	—	CT	No	Inhabits large rivers with deep waters (>12 feet deep) and swift currents; brackish and estuarine environments.	Sterile individuals known to be stocked in Irvine Lake by OC Parks; no suitable habitat and outside current known range of natural populations.
Oncorhynchus mykiss irideus pop. 10	steelhead – southern California DPS	FE	CE	No	Inhabits streams; can tolerate warmer water and more variable conditions.	Not expected to occur; no suitable habitat; outside current known range.
Rhinichthys gabrielino [*osculus* ssp. 8]	Santa Ana speckled dace	FPT	SSC	No	Inhabits permanently flowing streams, usually in shallow cobble and gravel riffles.	Not expected to occur; outside current known range[b].
Catostomus santaanae	Santa Ana sucker	FT	—	No	Inhabits coastal streams; prefer sand-rubble-boulder bottoms; cool, clear water; and algae.	Not expected to occur; outside current known range.
Amphibians						
Taricha torosa	Coast Range newt	—	SSC	No	Breeds in ponds, reservoirs, and slow-moving streams and lives in terrestrial habitats.	May occur; suitable habitat.
Spea hammondii	western spadefoot	FPT	SSC	Not Covered	Breeds in vernal pools in grassland habitats, but also hardwood woodlands.	Not expected to occur; not observed during focused surveys; suitable foraging habitat; limited suitable breeding potential in pools or along slow-moving portions of Santiago Creek.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Anaxyrus californicus	arroyo toad	FE	SSC	Conditionally Covered	Inhabits rivers with sandy banks, willows, cottonwoods, and sycamores. Not observed during surveys for NCCP/HCP but area not thoroughly surveyed (County of Orange 1996).	Not expected to occur; not observed during focused surveys; suitable habitat.
Reptiles						
Actinemys pallida [*Emys marmorata*]	southwestern [western] pond turtle	FPT	SSC	No	Inhabits marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation and basking sites and suitable upland habitat.	Not expected to occur; not observed during focused surveys; suitable habitat.
Phrynosoma blainvillii	coast horned lizard	—	SSC	Covered	Inhabits a wide variety of habitats with open areas for sunning, bushes for cover, and patches of loose soil for burial.	Expected to occur; suitable habitat.
Aspidoscelis hyperythra	orange-throated whiptail	—	WL	Covered	Inhabits coastal scrub, chaparral, and hardwood woodlands; prefers washes and other sandy areas with patches of brush and rocks.	**Observed in the survey area.**
Aspidoscelis tigris stejnegeri	coastal whiptail	—	SSC	Covered	Inhabits deserts and semi-arid areas with sparse vegetation and open areas, woodland, and riparian areas.	**Observed in the survey area.**
Anniella stebbinsi	southern California legless lizard	—	SSC	No	Inhabits a variety of habitats, generally in moist, loose soil.	May occur; suitable habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Arizona elegans occidentalis	California glossy snake	—	SSC	No	Inhabits a range of scrub and grassland habitats, often with loose or sandy soils.	May occur; suitable habitat.
Salvadora hexalepis virgultea	coast patch-nosed snake	—	SSC	No	Inhabits brushy or shrubby vegetation with small mammal burrows for refuge and overwintering sites.	May occur; suitable habitat.
Thamnophis hammondii	two-striped gartersnake	—	SSC	No	Found in or near permanent fresh water, often along streams with rocky beds and riparian growth.	**Observed in the survey area.**
Crotalus ruber	red-diamond rattlesnake	—	SSC	Covered	Inhabits rocky areas with dense vegetation in chaparral, woodland, grassland, and deserts.	Expected to occur; suitable habitat.
Birds						
Accipiter cooperii	Cooper's hawk	—	WL (nesting)	No	Forages in woodland. Nests in riparian growths of deciduous trees, such as canyon bottoms on river floodplains and in live oaks.	Expected to occur for foraging; may occur for nesting; suitable foraging and nesting habitat.
Buteo regalis	ferruginous hawk	—	WL (wintering)	No	Inhabits open grasslands, sagebrush flats, desert scrub, low foothills, and fringes of pinyon and juniper woodland.	May occur during migration and wintering; suitable habitat.
Elanus leucurus	white-tailed kite	—	FP (nesting)	No	Inhabits open grasslands, meadows, or marshes close to isolated, dense -topped trees for nesting and perching.	**Observed in the survey area.**

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Haliaeetus leucocephalus	bald eagle	Delisted	SE/FP (nesting & wintering)	No	Nests in large, old-growth trees with open branches near water. Forages along ocean shore, lake margins, and rivers.	**Observed (nesting) immediately adjacent to the survey area; observed foraging in the survey area.**
Aquila chrysaetos	golden eagle	—	WL/FP (nesting & wintering)	Conditionally Covered	Variety of open habitats (desert, grassland, shrubland, agriculture, streams) especially near mountains, hills, and cliffs.	May occur for foraging; not expected to occur for nesting; suitable foraging habitat; no suitable nesting habitat but potentially suitable nesting habitat adjacent.
Falco mexicanus	prairie falcon	—	WL (nesting)	Conditionally Covered	Variety of open habitats (desert, grassland, shrubland, agriculture, streams) especially near bluffs and cliffs that are used for nesting.	May occur for foraging; not expected to occur for nesting; suitable foraging habitat; no suitable nesting habitat but potentially suitable nesting habitat adjacent.
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	Covered	Nests in a scrape, depression, or ledge in an open site on cliffs, banks, dunes, and mounds near wetlands, lakes, rivers, or other water.	**Observed in the survey area.**
Coturnicops noveboracensis	yellow rail	—	SSC	No	Inhabits freshwater marshlands.	Not expected to occur; no suitable habitat.
Laterallus jamaicensis coturniculus	California black rail	—	ST/FP	No	Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.	Not expected to occur; no suitable habitat.
Rallus obsoletus levipes	light-footed Ridgway's rail	FE	SE/FP	No	Inhabits salt marshes with dense growth of pickleweed or cordgrass.	Not expected to occur; no suitable habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Sternula antillarum browni	California least tern	FE (nesting colony)	SE/FP (nesting colony)	No	Colonial breeder on bare or sparsely vegetated, flat substrates such as sand beaches, alkali flats, landfills, or paved areas along the coast.	Not expected to occur; no suitable habitat.
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FT (nesting)	SE (nesting)	No	Nests in riparian forests along broad, lower flood-bottoms of larger river systems with willows, often mixed with cottonwoods, with understory of blackberry, nettles, or wild grape.	Not expected to occur; not observed during focused surveys; suitable habitat.
Asio otus	long-eared owl	—	SSC (nesting)	No	Inhabits riparian bottomlands with tall willows and cottonwoods, also belts of live oak along stream courses.	May occur for foraging and nesting; suitable foraging and nesting habitat.
Athene cunicularia	burrowing owl	—	CT/E (burrow sites & some wintering sites)	No	Inhabits open, dry annual or perennial grasslands, deserts, and scrublands with low-growing vegetation; uses California ground squirrel burrows and similar openings for breeding.	Limited potential to occur; suitable habitat; limited numbers in the region.
Empidonax traillii extimus	southwestern willow flycatcher	FE (nesting)	SE (nesting)	Conditionally Covered	Inhabits riparian habitat along rivers, stream, and other wetlands with dense growths of willows, mule fat, etc., often with a scattered overstory of cottonwood.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Lanius ludovicianus	loggerhead shrike	—	SSC (nesting)	No	Inhabits grasslands and other dry, open habitats.	May occur; suitable habitat.
Vireo bellii pusillus	least Bell's vireo	FE (nesting)	SE (nesting)	Conditionally Covered	Inhabits riparian forest, riparian scrub, and riparian woodland, usually nesting in willows, mule fat, or mesquite.	**Observed in the survey area.**
Eremophila alpestris actia	California horned lark	—	WL	No	Inhabits short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow agricultural fields, and alkali flats.	May occur; suitable habitat.
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	—	SSC	Covered	Inhabits coastal sage scrub with tall prickly-pear cactus for nesting and roosting.	**Observed in the survey area.**
Polioptila californica californica	coastal California gnatcatcher	FT	SSC	Covered	Inhabits coastal sage scrub in arid washes, on mesas, and slopes.	**Observed in the survey area.**
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	—	WL	Covered	Inhabits coastal sage scrub and sparse mixed chaparral, frequently on relative steep, rocky hillsides with grass and forb patches.	**Observed in the survey area.**
Ammodramus savannarum	grasshopper sparrow	—	SSC (nesting)	No	Inhabits dense grasslands on rolling hills, lowland plains, and valleys and on hillsides on lower mountain slopes.	**Observed in the survey area.**
Passerculus sandwichensis beldingi	Belding's savannah sparrow	—	SE	No	Inhabits coastal salt marshes, nesting in pickleweed on and about the margins of tidal flats.	Not expected to occur; no suitable habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Icteria virens	yellow-breasted chat	—	SSC (nesting)	No	Inhabits riparian thickets of willow and other brushy tangles near watercourses; nests in low, dense riparian vegetation consisting of willows, blackberry, and wild grape.	**Observed in the survey area.**
Agelaius tricolor	tricolored blackbird	—	ST/SSC (nesting colony)	No	Inhabits freshwater marsh, swamps, and wetlands with open water and protected nesting substrate.	Not expected to occur; limited amount of suitable habitat.
Setophaga petechia	yellow warbler	—	SSC (nesting)	No	Inhabits riparian forest, riparian scrub, and riparian woodland, foraging and nesting in willow shrubs and thickets, cottonwoods, sycamores, ash, and alders.	**Observed in the survey area.**
Mammals						
Sorex ornatus salicornicus	southern California saltmarsh shrew	—	SSC	No	Inhabits coastal marshes with dense vegetation and woody debris for cover.	Not expected to occur; no suitable habitat.
Choeronycteris mexicana	Mexican long-tongued bat	—	SSC	No	Inhabits riparian scrub, pinyon and juniper woodland, and Sonoran thorn woodland; roosts in caves and in and around buildings.	Limited potential to occur for foraging and roosting; marginally suitable foraging and roosting habitat.
Antrozous pallidus	pallid bat	—	SSC	No	Inhabits deserts, grasslands, shrublands, woodlands, and forest, most commonly in open, dry habitats with rocky areas for roosting.	May occur for foraging and roosting; suitable foraging and roosting habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Nyctinomops femorosaccus	pocketed free-tailed bat	—	SSC	No	Inhabits pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. Roosts in crevices of cliffs and rocky outcroppings.	May occur for foraging and roosting; suitable foraging and roosting habitat.
Nyctinomops macrotis	big free-tailed bat	—	SSC	No	Rugged and rocky terrain; roosts in buildings, caves, rock crevices in cliffs, and rocky outcroppings.	May occur for foraging and roosting; suitable foraging and roosting habitat.
Lasiurus frantzii	western red bat	—	SSC	No	Riparian habitat near water. Roosts exclusively in trees, particularly sycamore, cottonwood, ash, and elderberry (*Sambucus* sp.).	May occur for foraging and roosting; suitable foraging and roosting habitat.
Lasiurus xanthinus	western yellow bat	—	SSC	No	Inhabits valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	May occur for foraging and roosting; suitable foraging and roosting habitat.
Eumops perotis californicus	western mastiff bat	—	SSC	No	Inhabits many open, semi-arid to arid habitats including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	May occur for foraging and roosting; suitable foraging and roosting habitat.

TABLE 4.3-4
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	—	SSC	No	Inhabits coastal scrub, chaparral, grasslands, and sagebrush, usually in association with rocks or coarse gravel.	May occur; suitable habitat.
Perognathus longimembris pacificus	Pacific pocket mouse	FE	SSC	Conditionally Covered	Inhabits coastal scrub with fine alluvial sands; only occurs within a few miles of the coast.	Not expected to occur; outside current known range.
Neotoma bryanti [*lepida*] *intermedia*	Bryant's San Diego desert woodrat	—	SSC	Covered	Inhabits coastal scrub with moderate to dense canopies, rock outcrops, rocky cliffs, and slopes.	May occur; suitable habitat.
Onychomys torridus ramona	southern grasshopper mouse	—	SSC	No	Inhabits desert areas, especially scrub habitats with friable soils for digging with low to moderate shrub cover.	Not expected to occur; outside current known range
Puma concolor	mountain lion–Southern California/Central Coast Evolutionary Significant Unit (ESU)	—	CE	No	Inhabits various habitats within foothill and mountain areas typically where deer can be found.	**Observed (tracks) in the survey area.**

NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan; BSA: Biological Study Area

LEGEND:

Federal (USFWS)
FE Endangered
FT Threatened
FPT Proposed Threatened

State (CDFW)
SE Endangered
ST Threatened
CE Candidate Endangered
FP Fully Protected
CT Candidate Threatened
CT/E Candidate Threatened or Endangered
SSC Species of Special Concern
WL Watch List
SA Special Animal

[a] Sources include CDFW 2025a and 2025d.
[b] CDFW is currently considering a translocation of Santa Ana speckled dace to Santiago Creek near its confluence with Black Star Canyon, about a mile upstream of Irvine Lake. Details are still being determined and are not yet available.

Monarch Butterfly

The monarch butterfly is proposed as a federally Threatened species by the USFWS; California overwintering sites would be protected by this status. Monarch butterflies lay their eggs on the obligate milkweed (*Asclepias* sp.). Multiple generations of monarchs are produced through the breeding season, with most adult butterflies living two to five weeks. Overwintering adults enter reproductive diapause and live for six to nine months (USFWS 2023). Each spring, monarchs leave overwintering sites and disperse across California and eventually migrate to all western states, searching for milkweed plants on which to lay their eggs. Several generations are produced throughout the spring, summer, and fall, with each generation spreading further across the landscape. The last generation then migrates all the way back to the overwintering grounds on the Pacific coast in the fall. Monarchs return to the same groves of trees each year (Xeres Society 2023). In the western U.S., monarchs overwinter at groves of trees along the Pacific Coast with a large concentration overwintering in California. Currently, the most common overwintering groves consist of non-native blue gum (*Eucalyptus* sp.), but they also use native Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), western sycamore, coast live oak, and redwood (*Sequoia sempervirens*) (USFWS 2024b). The majority of overwintering sites are found within 1.5 miles of the Pacific Ocean, which moderates temperatures, at lower elevations (i.e., 200 to 300 feet above msl) and situated on slopes oriented to the south, southwest, or west that provide the most solar radiation (Xeres Society 2016).

Along with the proposed listing, the USFWS is proposing 4,395 acres of Critical Habitat for this species to protect overwintering sites in Alameda, Marin, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, and Ventura Counties, California (USFWS 2024b). The BSA is not within proposed Critical Habitat for this species.

Monarch butterfly was recorded as an incidental observation during the Quino checkerspot butterfly surveys and its hostplant, milkweed, was noted during botanical surveys. Western sycamore and coast live oak woodlands are present in the BSA; however, the BSA is over 20 miles from the Pacific Ocean and the elevation of the BSA is too high (i.e., 657 to 996 feet above msl). Additionally, there are no known overwintering sites mapped in the BSA (Xeres Society 2023). Therefore, monarch butterfly is not expected to overwinter in the BSA.

Crotch's Bumblebee

The Crotch's bumble bee (*Bombus crotchii*) is proposed as a Candidate[7] to be State listed as Endangered. The Crotch's bumble bee is a ground nester and often makes its nest in abandoned mammal burrows and can be found in most native habitat types, although it prefers grassland and scrub habitats. It is primarily associated with plants from the following families: *Fabaceae, Apocynaceae, Asteraceae, Lamiaceae,* and *Boraginaceae* (Richardson 2017, Thorp et. al. 1983). Grassland and scrub habitat, as well as several plant species from these families are present; therefore, suitable habitat is present for this species. This species has been recently observed at multiple locations in the Project region. The most recent observations of this species were in 2020 in the Irvine Ranch Open Space along Santiago Creek in 2016 and in Trabuco Canyon in 2020 (CDFW 2025a).

Focused surveys were conducted in summer 2024; one male Crotch's bumble bee was observed foraging in a small patch of leafy California buckwheat, in the southern portion of the survey area (Exhibit 10). At the time of the focused surveys in the summer months, most plants were no longer flowering; floral resources were likely higher in the spring and early summer. The estimated percent cover of floral resources during the focused surveys was approximately 20 to 30 percent

[7] The CDFW treats Candidate species as if they are listed while they determine if they will be formally listed.

of the survey area during the June visit. During the focused surveys, the species in bloom consisted primarily of leafy California buckwheat, deerweed, short-podded mustard, and black mustard. Potential bumble bee nest sites and overwintering habitat included small rodent burrows and leaf litter.

White Sturgeon

White sturgeon is a Candidate to be listed as State Threatened. This species occurs in deep rivers (more than 12 feet deep) with swift flows. White Sturgeon can live in excess of 100 years, and historically grew to sizes of approximately 20 feet and 1,300 pounds (Moyle 2002). White Sturgeon are an anadromous fish native to California, where they primarily occur in San Francisco Bay and the Delta and spawn in the Sacramento and San Joaquin rivers and associated tributaries (CDFW 2024c). White sturgeon are not expected to occur in southern California streams, and therefore, are not expected to occur naturally in the BSA as it is outside the species' known range and does not provide suitable habitat. However, sterile individuals of white sturgeon are stocked in Irvine Lake by OC Parks (Hayes, pers. comm. 2023).

Santa Ana Speckled Dace

Santa Ana speckled dace (*Rhinichthys gabrielino* [*osculus* ssp. 8]) is proposed as a federally Threatened species by the USFWS. The Santa Ana speckled dace is a small freshwater fish that occurs in perennial streams and rivers. The species was historically found throughout the upper and middle reaches of the Los Angeles, San Gabriel, Santa Ana, and San Jacinto Rivers. Currently, Santa Ana speckled dace is restricted to the headwaters of those river systems, with limited connectivity for populations in the Santa Ana River and San Jacinto River. Santa Ana speckled dace inhabit a variety of stream habitats, with a preference for cool, moving water and gravel substrate that have aquatic invertebrates as a food source (USFWS 2024a). This species was reported from Modjeska Canyon near its confluence with Santiago Creek in 1999 (CDFW 2025a). The BSA is outside the current known range of the Santa Ana speckled dace. However, CDFW is currently considering translocating this species to a site along Santiago Creek near its confluence with Black Star Canyon, approximately 1.25 mile upstream of Irvine Lake (Pareti, pers. comm. 2024). If this species is translocated, the translocation success will be monitored by CDFW. Therefore, while this species is not currently expected to occur in the BSA, it could occur along Santiago Creek upstream of the lake in the future.

Bald Eagle

The bald eagle is a State-listed Endangered species, a California Fully Protected species, and is also protected by the Federal Bald Eagle Act. Through protection under the Endangered Species Act, bald eagle populations recovered through captive breeding programs, reintroduction efforts, the banning of DDT, and public education (USDA 2023). This species was delisted by the USFWS in 2007 and will be monitored for 20 years as part of the Post-Delisting Monitoring Plan for the species. This species requires large bodies of water or free-flowing rivers with abundant fish and adjacent snags or perches, and nests in large, old-growth trees or snags in remote stands near water (Zeiner et al. 1990). Bald eagles are usually found close to water because their diet is primarily made up of fish and waterfowl. When waterfowl migrate south for the winter, bald eagles follow and winter in southern California from November to March (USDA 2023). Most breeding territories are in northern California, but the eagles also nest in scattered locations in the central and southern Sierra Nevada mountains and foothills, in several locations from the Central Coast Range to inland southern California, and on Santa Catalina Island (CDFW 2024a). Breeding populations of bald eagles in southern California were extirpated in the 1950s until reintroduction efforts began on Catalina Island in the 1980s. Since 2003, several pairs of bald eagles have nested in southern California at Lake Hemet, Lake Skinner, Lake Matthews, and Big Bear Lake

(USDA 2023). CDFW tracks information on occupied territories for bald eagles in California; the location at Irvine Lake has been mapped as the only bald eagle nesting location in Orange County (CDFW 2024a).

An individual bald eagle was incidentally observed during vegetation mapping upstream of Santiago Creek Dam in fall 2020 and a nesting pair was observed during focused surveys in spring/summer 2022 (Exhibit 4.3-7). The pair nested in a pine tree in a canyon adjacent to the BSA. Suitable foraging and wintering habitat for this species is present throughout the BSA. While the ornamental trees within the BSA are not suitable because they are not mostly gum trees or too small for eagle nesting, suitable nesting habitat is adjacent to the BSA.

Least Bell's Vireo

Least Bell's vireo is a federal and state Endangered species. The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Cowbirds are nest parasites that lay their eggs in the nests of other birds and leave the host bird to raise their young, often to the detriment of the host's own young (USFWS 1998). With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) that generally nests in early-successional stages of riparian habitats. The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately three to six feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989).

A total of 29 least Bell's vireo locations were observed during the 2022 focused surveys upstream of the dam (Exhibit 4.3-7). A total of 27 locations consisted of territories occupied by breeding pairs, 1 location consisted of a territory occupied by an unpaired male, and 1 location consisted of a transient male. A territory is defined as a singing male observed or heard consistently in the same general location on multiple surveys (i.e., defending a territory). A transient male is one observed during only one survey. The territory points shown on Exhibit 4.3-7 represent either a nest location or the general area where least Bell's vireos were observed and/or detected most of the time. A total of 25 pairs were observed to have successfully nested; a total of 38 juveniles were observed during the 2022 focused surveys. The survey results include only the number of nestlings/fledglings that were visually or aurally confirmed; additional fledglings may have been undetected in the habitat. Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

On February 2, 1994, the USFWS published a final critical habitat for the least Bell's vireo, designating approximately 37,560 acres of land in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties, California (USFWS 1994). The Project site is not located in designated critical habitat for this species.

Coastal California Gnatcatcher

The coastal California gnatcatcher is a federally Threatened species and a California Species of Special Concern. It is a Covered species in the Central–Coastal NCCP/HCP. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a

resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

One California gnatcatcher territory was observed during the 2020 focused California gnatcatcher surveys downstream of Santiago Creek Dam (Exhibit 4.3-7). This territory included a breeding pair, which successfully fledged at least three chicks. No coastal California gnatcatchers were observed breeding upstream of the dam within the BSA during the 2022 focused surveys; however, one coastal California gnatcatcher was detected just outside the BSA (Exhibit 4.3-7). Additionally, four gnatcatcher locations were incidentally observed during vegetation mapping and the jurisdictional delineation upstream of Santiago Creek Dam (Exhibit 4.3-7). These four locations consisted of two individual juveniles, one male, and one unidentified individual. Suitable habitat for this species is present throughout the BSA. Coastal California gnatcatcher was also incidentally observed downstream of the dam during focused surveys conducted in summer 2024 (Exhibit 4.3-7).

USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This Revised Critical Habitat designates 197,303 acres in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The Project is not located within the designated Revised Critical Habitat for the coastal California gnatcatcher.

Mountain Lion

The mountain lion is currently a Candidate to be State listed as Threatened as an Evolutionary Significant Unit comprised of the following subpopulations: (1) Santa Ana Mountains; (2) Eastern Peninsular Ranges; (3) San Gabriel/San Bernardino Mountains; (4) Central Coast South (Santa Monica Mountains); (5) Central Coast North (Santa Cruz Mountains); and (6) Central Coast Central. CDFW is in the process of reviewing the petition for listing and evaluating available information (CDFW 2024b). CDFW status review report was expected in November 2021; as of June 2023, its status has not been updated (CDFW 2024b). The mountain lion occurs throughout most of California except for the Mojave and Colorado Deserts and the croplands of the Central Valley. Mountain lions occur in a variety of habitats, especially brushy habitats and riparian areas with interspersed irregular terrain, rocky outcrops, and tree/brush edges. Mountain lions use caves, natural cavities and thickets for cover. Mountain lions use habitat connections for movement among fragmented core habitat (Zeiner 1988). A major threat to this species is fragmentation of habitat by spread of human developments and associated roads. Estimates of effective population size highlight genetic isolation and raise significant concerns for viability in Southern California and the Central Coast (Center for Biological Diversity 2019).

Tracks of a mountain lion were observed during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam and during the 2022 focused surveys upstream of Santiago Creek Dam. Suitable habitat for this species is present throughout the BSA.

4.3.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in significant biological resources if it would:

Threshold 4.3-1 Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Threshold 4.3-2 Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?

Threshold 4.3-3 Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

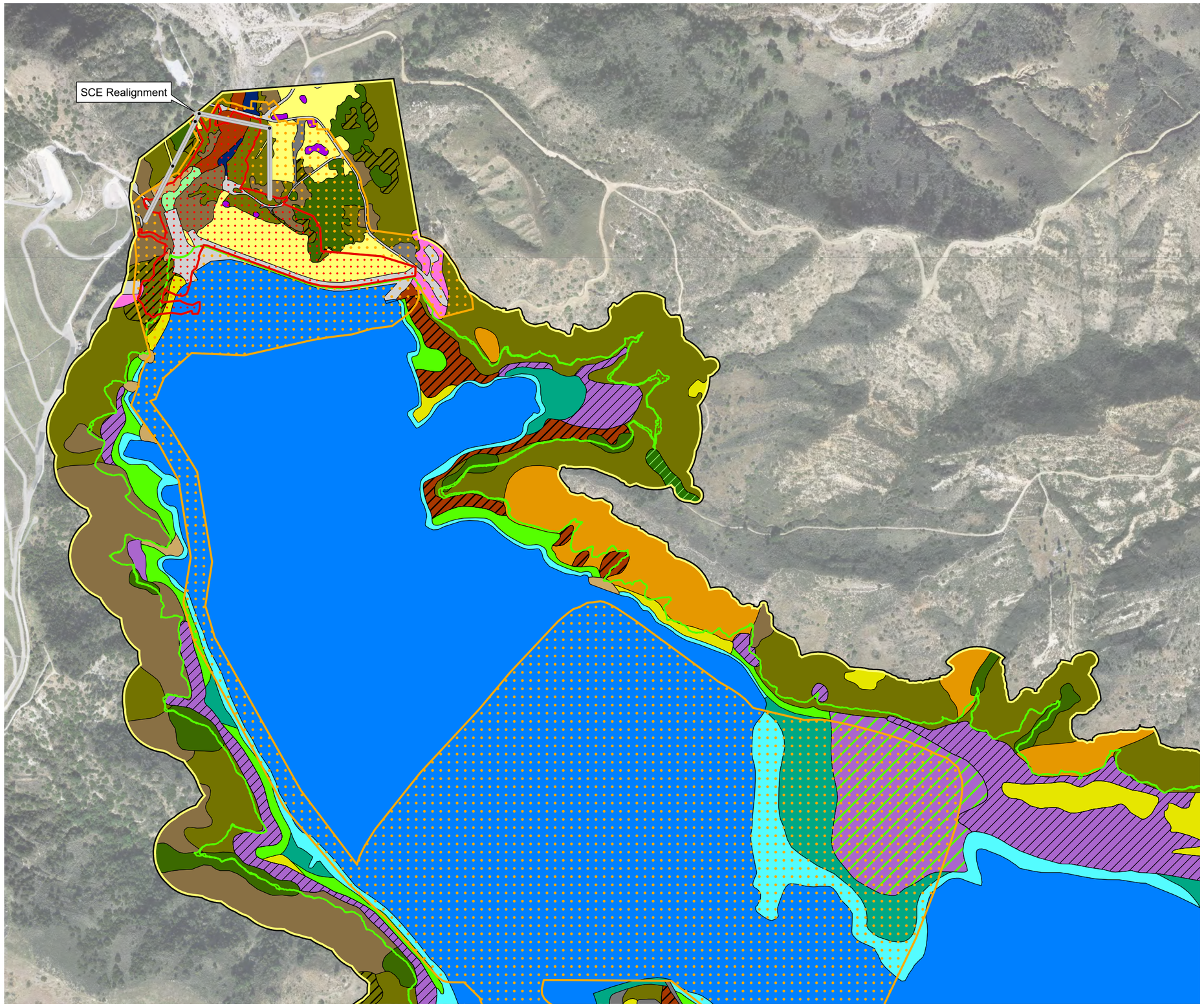
Threshold 4.3-4 Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

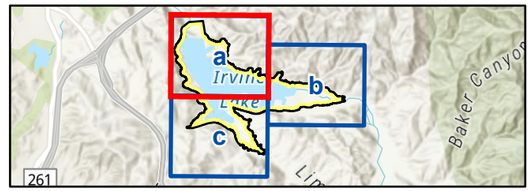
Threshold 4.3-5 Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Threshold 4.3-6 Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

4.3.5 IMPACT ANALYSIS

The actual and potential occurrence of biological resources in the BSA vicinity was correlated with the significance criteria described above to determine whether impacts from the Project on these resources would be significant. Vegetation types and other areas that would be impacted by the Project, SCE Realignment, and Additional Inundation Area are shown in Table 4.3-5 and Exhibit 4.3-8. It should be noted that within the SCE Realignment (outside the Project's permanent and temporary impact area), only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area. Special status species locations in relation to impact areas are shown in Exhibit 4.3-9.





Biological Study Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

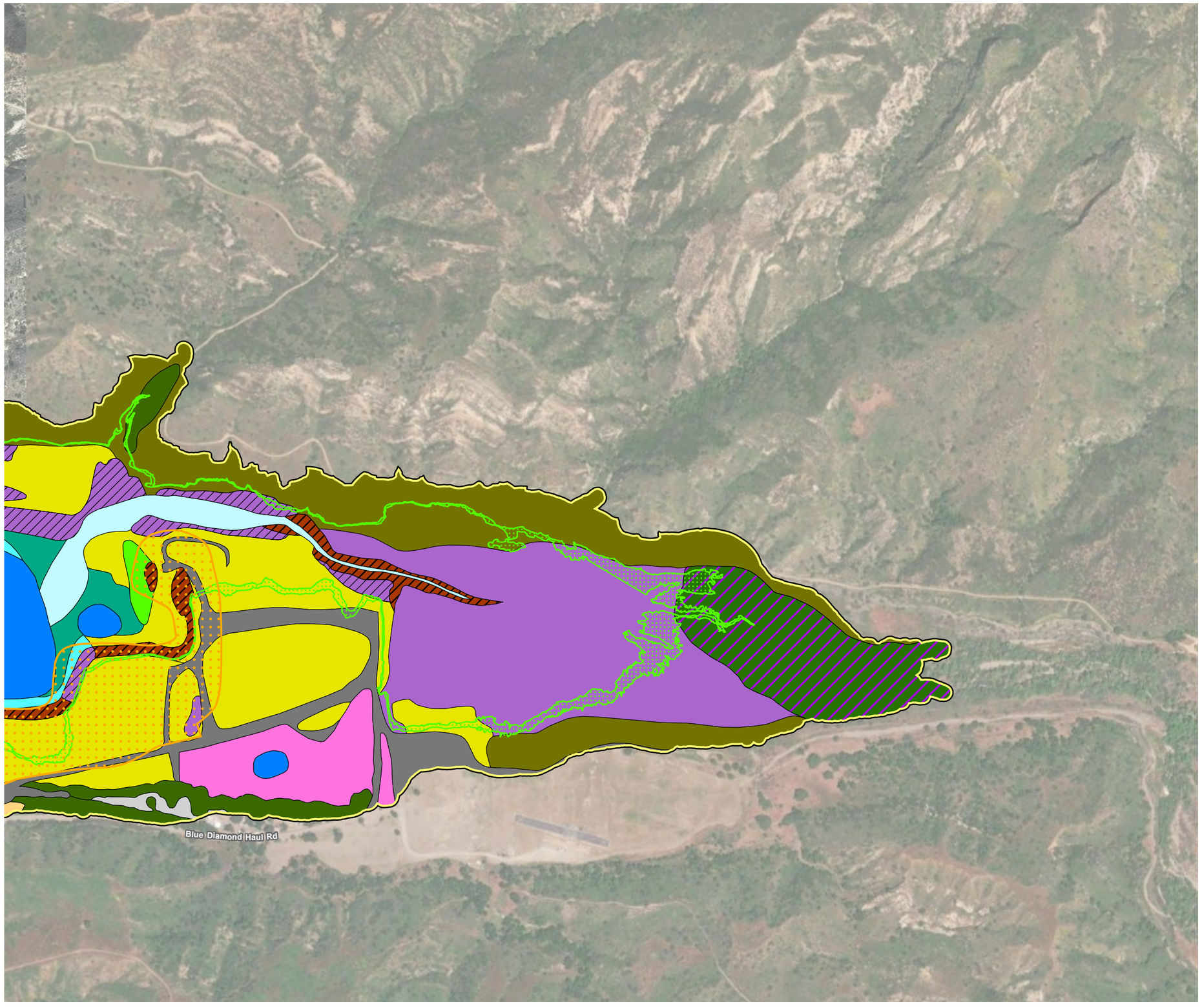
Exhibit 4.3-8a

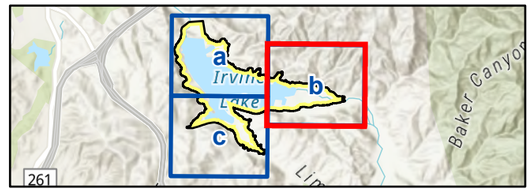
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Project_Impacts_Veg.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Veg_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Vegetation Types

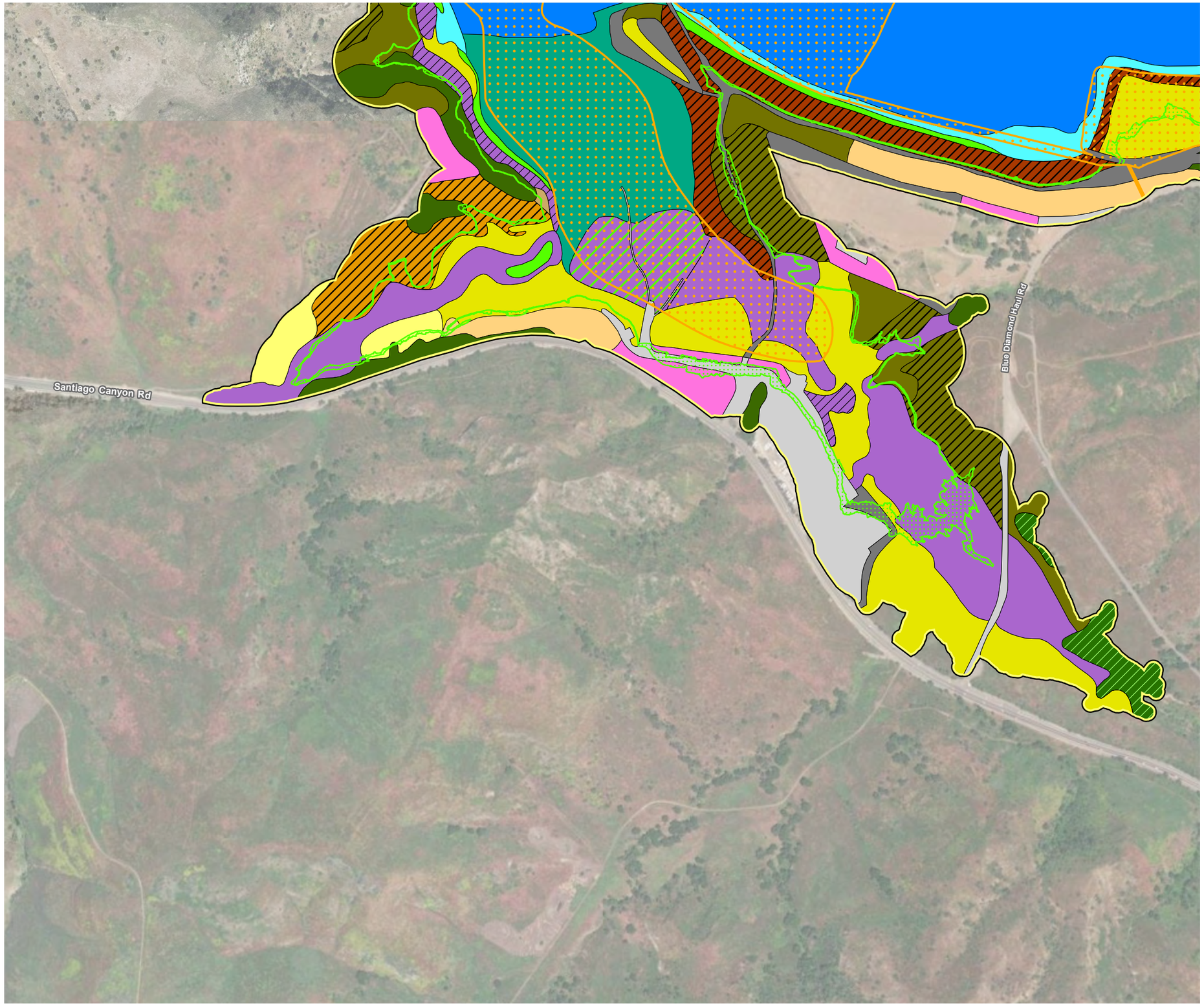
Exhibit 4.3-8b

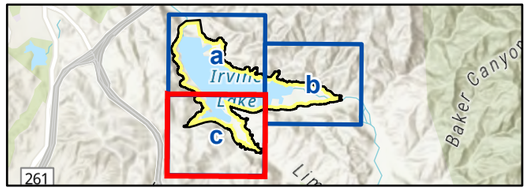
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Project_Impacts_Veg.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprxlex_Veg_Impacts





- Biological Study Area

Project Impacts

- Temporary Impacts*
- Additional Inundation Area

SCE Realignment

- Permanent Impacts
- Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

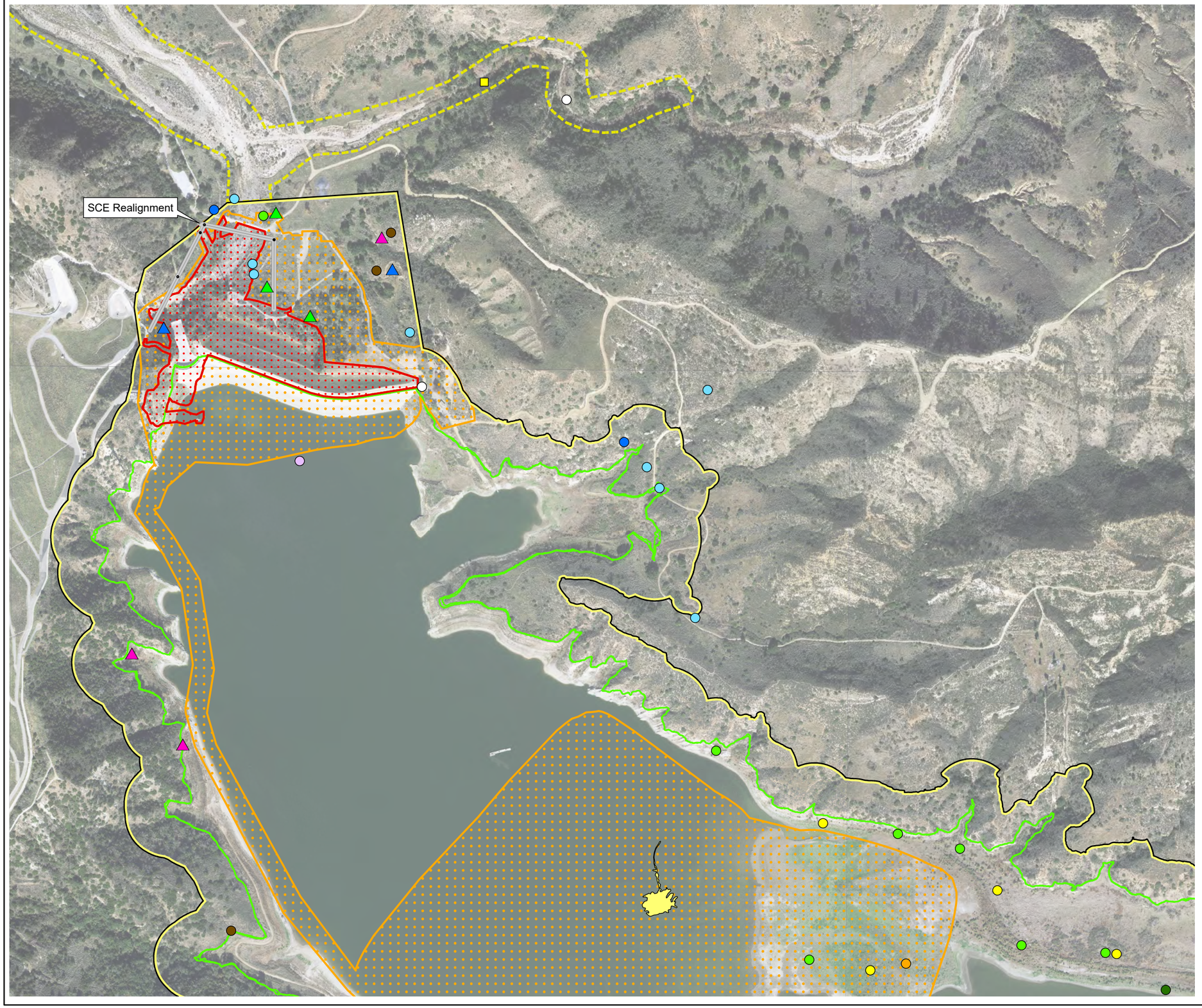
Exhibit 4.3-8c

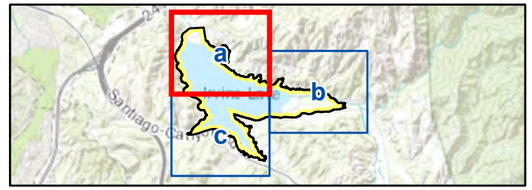
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Project_Impacts_Veg.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Veg_Impacts





- Biological Study Area
- Arroyo Toad Survey Area

Project Impacts

- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area

SCE Realignment

- Permanent Impacts
- Temporary Impacts**

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Many-Stemmed Dudleya Population
- Mud Nama Population (mapped polygon)

Special Status Species

- American Peregrine Falcon
- American White Pelican
- Coastal Cactus Wren
- Coastal California Gnatcatcher
- Grasshopper Sparrow
- Least Bell's Vireo
- Southern California Rufous-Crowned Sparrow
- White-Tailed Kite
- Yellow-Breasted Chat
- Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

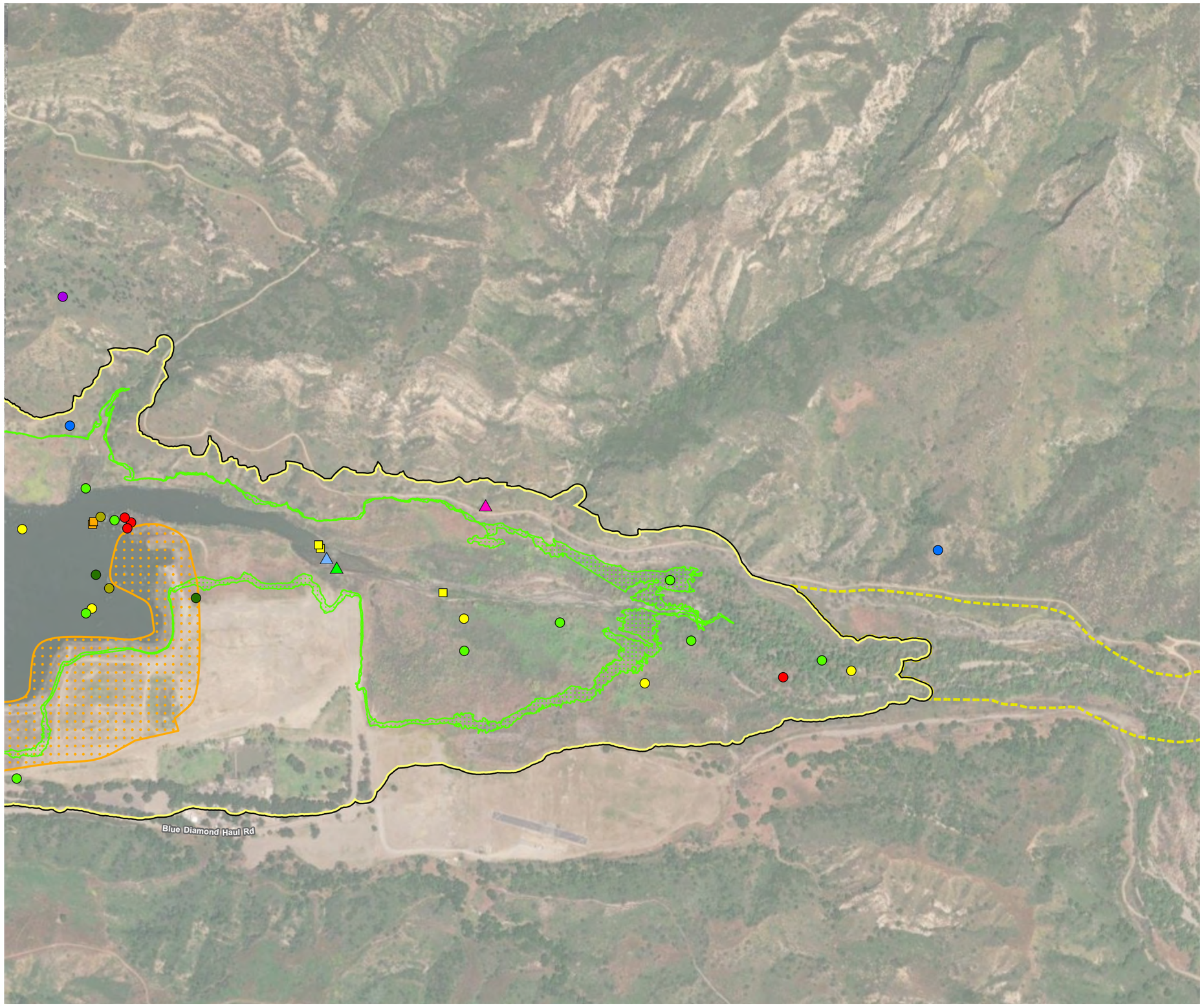
Project Impacts
Special Status Species **Exhibit 4.3-9a**

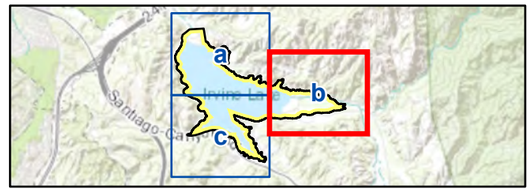
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\CD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Braunton's Milkvetch Population

Special Status Species
Bald Eagle (Nest)
Coastal Cactus Wren
Grasshopper Sparrow
Least Bell's Vireo
Willow Flycatcher (migrant)
Yellow Warbler
Yellow-Breasted Chat
Belding's Orange-Throated Whiptail
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

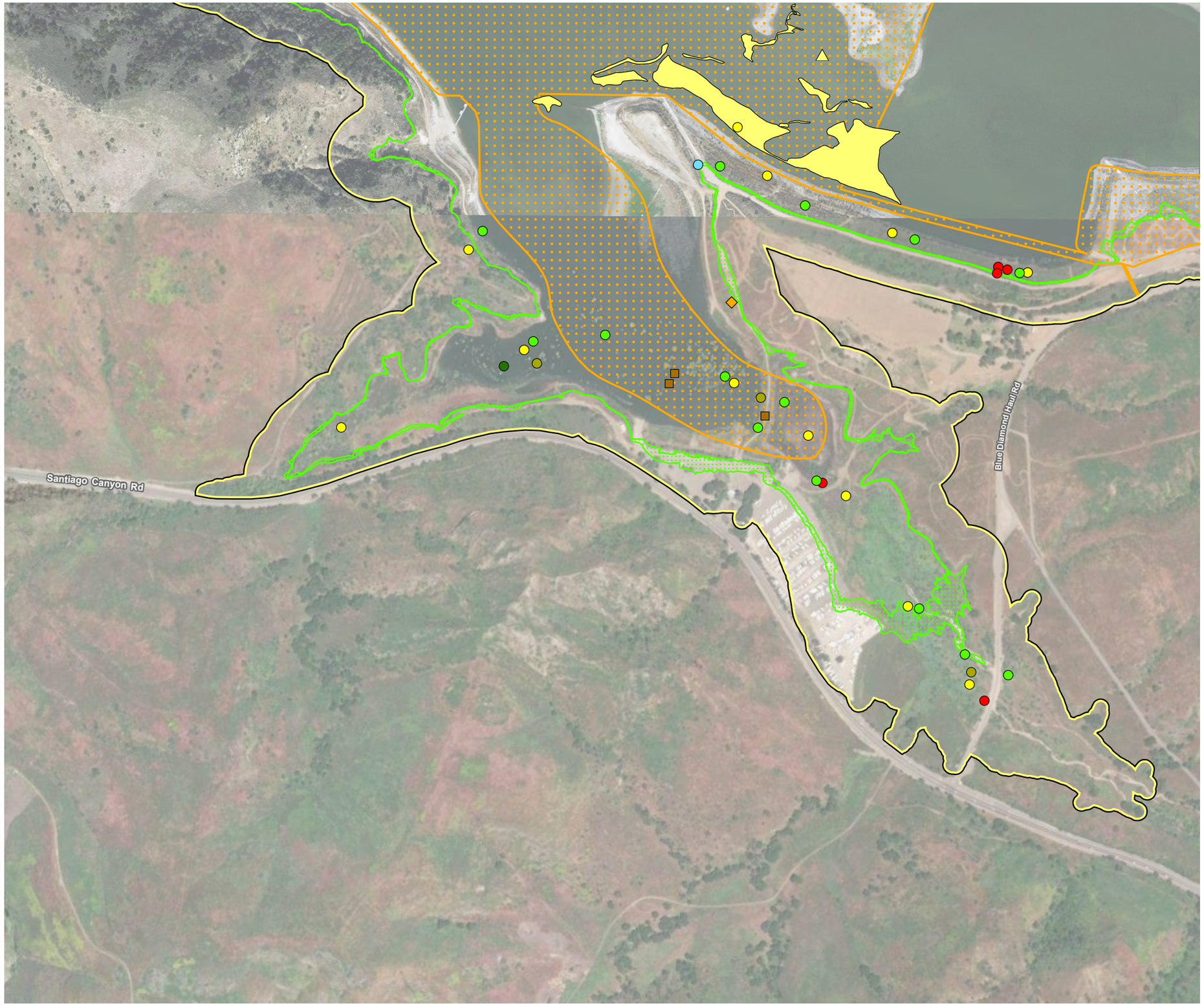
Project Impacts
Special Status Species **Exhibit 4.3-9b**

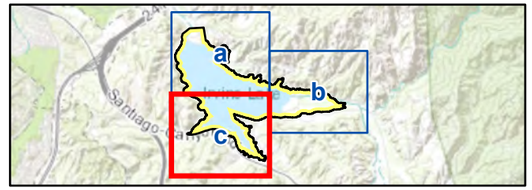
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Special Status Plants

Mud Nama Population (point location)

Mud Nama Population (mapped polygon)

Special Status Species

Crotch's Bumble Bee

Coastal California Gnatcatcher

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

Yellow Warbler

Yellow-Breasted Chat

Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

Exhibit 4.3-9c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_SS_Species_Impacts

TABLE 4.3-5
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	115.81	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	19.39	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.62	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		*174.37*	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	29.91	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		*29.91*	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	92.38	1.25	25.72	0.00	25.97	3.07
Subtotal Grassland		*107.97*	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		*212.65*	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

TABLE 4.3-5
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	31.09	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		*31.45*	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.62	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.62*	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	313.28	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.13	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		*384.72*	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	20.77	0.03	1.21	0.00	1.24	0.47
Developed	15.6	20.98	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		*41.75*	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	25.42	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		*25.42*	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**1,016.83**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in the Biological Technical Report (Appendix C).

[b] Within the SCE Realignment (outside of the Project's permanent and temporary impact area), only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

The following analysis addresses "direct" and "indirect" impacts. Direct impacts are those that involve the initial loss of habitat or individuals due to vegetation clearing and construction-related activities. Indirect impacts would be those related to impacts on the adjacent habitat due to construction activities (e.g., fugitive dust, noise) or operation of a project (e.g., human activity).

IRWD has prepared the *Project Manual for the Santiago Creek Dam Improvements Project No. 01813, Code 7975* (Project Manual) describing specifications related to construction of the Project (IRWD 2024). The Project Manual identifies standard Best Management Practices (BMPs) that would be implemented during construction of the Project; these BMPs are considered Project Design Features (PDF). Project impacts were evaluated assuming the following PDFs would be implemented:

PDF BIO-1 **Worker Environmental Awareness Program (WEAP) Training.** Prior to the initiation of construction activities, IRWD will retain a qualified Biologist (i.e., Biological Monitor) to provide a WEAP training for construction personnel to review the mitigation measures and permit requirements applicable to the construction phase. The Biological Monitor will require trained personnel to sign the WEAP Log to document that they have been trained and understand the mitigation measures and permit conditions. The Biological Monitor will repeat the WEAP training as-needed for new construction personnel.

PDF BIO-2 **Project Limits.** Prior to construction, the Project limits will be clearly staked by IRWD or IRWD's Contractor and verified by the Biological Monitor.

PDF BIO-3 **NCCP/HCP Construction Minimization Measures.** As required by the NCCP/HCP, IRWD will follow standard construction-related minimization measures. These include removal of coastal sage scrub outside the California gnatcatcher breeding season (i.e., February 15 to July 15); pre-construction surveys for coastal California gnatcatchers; identification of coastal sage scrub habitat areas for protection as Environmentally Sensitive Areas (ESAs); and biological monitoring during all clearing of coastal sage scrub.

PDF BIO-4 **Tree Protection.** To protect western sycamore and coast live oak trees adjacent to Project impact areas, protective fencing will be placed around all western sycamore and coast live oak trees located within 50 feet of the impact areas. The tree protection area will be 1.5 times the dripline of the tree. No stockpiling of materials will occur within the tree protection areas. Limbs of western sycamore and coast live oak trees can be pruned to allow construction equipment access. If large branches need to be removed or if more than 10 percent of the total canopy would be affected, pruning will be supervised by a Certified Arborist retained by IRWD.

PDF BIO-5 **Nesting Bird Protection.** To the extent practicable, vegetation clearing will be conducted during the non-breeding season (i.e., September 16 to January 31). If vegetation clearing will be initiated during the breeding season for nesting birds/raptors (i.e., February 1–September 15), the construction activity will be conducted in compliance with the conditions set forth in the Migratory Bird Treaty Act. IRWD will retain a qualified Biologist to conduct a pre-construction survey for nesting birds and/or raptors within three days prior to clearing of any vegetation or work near existing structures. The nesting bird survey area will include a buffer of 100 feet around the work area for nesting birds and a buffer of 500 feet around the work area for nesting raptors. If an active nest is found, the Biologist will determine the appropriate protective buffer depending on the sensitivity of the species and

the nature of the construction activity. The protective buffer will be 25–100 feet for nesting birds; 300–500 feet for special status bird species or nesting raptors; and 0.5 mile for golden eagle or prairie falcon. No work will be conducted in the protective buffer until a qualified Biologist determines that the nest is no longer active. The Biologist will map any nests found during survey efforts and their protective buffers and will provide the map to IRWD and the Contractor.

PDF BIO-6 **Speed Limit During Construction.** The speed limit on construction access roads will be no more than 20 miles per hour. Signage will be posted throughout the construction areas and at multiple locations along the access road between the dam and the staging area at the upstream end of the lake. "Wildlife crossing" signage will also be posted along the access road between the dam and the staging area at the upstream end of the lake. Signage will be verified by the Biological Monitor.

PDF BIO-7 **Night Lighting.** Night lighting will be directed away from adjacent habitat areas to the extent practicable. Shielding of night lighting during construction will be incorporated to ensure that ambient lighting is directed away from sensitive habitat areas. Appropriate shielding of night lighting will be verified by the Biological Monitor.

PDF BIO-8 **Prevent Spread of Invasive Species.** Weed seeds entering the construction area via vehicles will be minimized by requiring construction vehicles to be washed prior to delivery to the Project site. Track-clean or other methods of vehicle cleaning will be used by the construction contractor to prevent weed seeds from entering/exiting the Project site on vehicles. Wattles used for erosion control will be biodegradable and certified as weed-free. Seed mixes and/or hydroseed applied to temporarily disturbed areas will consist of native species local to the Project vicinity. IRWD will retain a qualified Biologist to review and approve the seed mix. Use of measures to prevent the spread of invasive species will be verified by the Biological Monitor.

PDF BIO-9 **Treatment of Invasive Species.** During active construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a monthly basis. If a target species is observed within 100 feet of the active construction area, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed.

For a period of two years following completion of construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a quarterly basis. If a target species is observed within 100 feet of the previously disturbed areas, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed.

Threshold 4.3-1

Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Special Status Plant Species

One individual Braunton's milkvetch (federally Endangered, CRPR 1B.1) was observed in the sandy channel of Santiago Creek, upstream of the lake. This location is outside of the impact footprint for the Project (Exhibit 4.3-9). Therefore, there would be no impact on this species and no mitigation would be required.

One individual intermediate mariposa lily (CRPR 1B.2) was observed downstream of the dam; this individual would be impacted by the Project (Exhibit 4.3-9). Five individual intermediate mariposa lilies were observed in three locations upstream of the dam. All of the intermediate mariposa lily locations observed upstream of the dam are located outside of the impact footprint of the Project (Exhibit 4.3-9). Intermediate mariposa lily is a Covered Species under the NCCP/HCP; impacts up to 20 individuals are covered. Therefore, no mitigation would be required. To further minimize the impact, intermediate mariposa lily has been included with **MM BIO-1A** and **BIO-1C**.

Approximately 810 many-stemmed dudleya (CRPR 1B.2) individuals were observed in 2 locations downstream of the dam. Approximately 800 individuals were observed in the eastern portion of the plant survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the plant survey area. The larger population of dudleya (800 individuals) is located outside of the impact footprint of the Project, but the smaller population (10 individuals) is located within the impact area (Exhibit 4.3-9). Although not formally listed under the federal or State Endangered Species Acts, many-stemmed dudleya is considered rare, threatened, or endangered within its range, and is fairly threatened in California (20–80 percent of its populations are threatened). However, the loss of 10 individuals of the 810 observed downstream of the dam represents 1.2 percent of the individuals observed; therefore, the loss of 10 individuals of many-stemmed dudleya downstream of the dam would be considered adverse but less than significant. To further minimize the impact, many-stemmed dudleya has been included with **MM BIO-1A** and **BIO-1C**.

Multiple populations of mud nama (CRPR 2B.2) were observed in the southern portion of Irvine Lake (Exhibit 4.3-9). This area experiences periodic inundation and was mapped as open water during vegetation mapping in 2020. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. Because the individuals covered a large area and the species is small in stature, the population size was estimated based on density and square footage of each mapped polygon. The total population was estimated to be between 3.5 and 5.5 million. Current Project design shows that the borrow areas would impact 7.08 acres (308,405 square feet) of the mapped mud nama, which is estimated to be 86 to 89 percent of the mud nama present in the BSA (3,063,453 to 4,589,250 individuals). This impact would be significant under CEQA Guidelines Section 15380. Once IRWD receives the results of the 2025 geotechnical investigations, Project Engineers would further refine the impact boundary to avoid and minimize impacts on mud nama to the extent feasible; IRWD is committed to avoiding at least 50 percent of the mud nama population (as mapped in 2022). Implementation of Mitigation Measures (MM) BIO-1A and BIO-1B would require pre-construction surveys by a qualified Botanist to flag the boundary of the population and to make recommendations for avoiding impacts to the extent

feasible. With implementation of **MM BIO-1A** through **BIO-1C**, which requires the avoidance of at least 50 percent of the mud nama populations (as mapped in 2022) and compensatory mitigation, impacts on mud nama would be considered less than significant.

Approximately 46 Coulter's matilija poppy (CRPR 4.2) clones were observed in 3 populations downstream of the dam, and one individual was observed along Santiago Creek upstream of the lake. These populations are all located within the temporary impact footprint of the Project (Exhibit 4.3-9). Coulter's matilija poppy is a Covered Species in the NCCP/HCP; therefore, no mitigation would be required. To further minimize the impact, Counter's matilija poppy has been included with **MM BIO-1A** and **BIO-1C**.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation may temporarily affect two of the intermediate mariposa lily locations on the northwestern side of Irvine Lake and the mud nama located within the lakebed (Exhibit 4.3-9). The intermediate mariposa lily populations are already located at the outer edge of the existing inundation footprint of the lake. The additional inundation would be expected to be similar in duration to the current inundation of the lake edges; therefore, the effect of the additional inundation would be expected to be less than significant for the few intermediate mariposa lily locations affected. Suitable habitat for mud nama consists of areas that are intermittently inundated; the mud nama locations are in areas that are regularly inundated. Additional inundation would either have no effect or would be considered a beneficial impact for this species. Overall, impacts on special status plant species as a result of the additional inundation would be considered less than significant and no mitigation would be required.

Special Status Wildlife Species

Invertebrates

Focused surveys for Crotch's bumble bee were conducted throughout the BSA in summer 2024; one Crotch's bumble bee individual was observed (Psomas 2024a). Suitable habitat for this species is present throughout the BSA. A total of 52.66 acres (12.95 acres permanent; 39.58 acres temporary; 0.13 acre within the SCE realignment) of suitable habitat (i.e., coastal sage scrub, chaparral, grassland, woodland, and ornamental) for the Crotch's bumble bee would be removed to construct the Project (Table 4.3-5). This species is a Candidate for State listing; therefore, impacts on this species would be considered significant. **MM BIO-2** would require pre-construction surveys for Crotch's bumble bee, avoidance of active nest burrows during construction, and consultation with CDFW to obtain an Incidental Take Permit.

Monarch butterfly, a federally proposed Threatened species, was recorded as an incidental observation during the spring 2022 Quino checkerspot butterfly surveys and its hostplant, milkweed, was noted during spring botanical surveys. Monarch butterfly is not expected to overwinter in the BSA because the BSA is too far inland; therefore, the Project is not expected to impact an overwintering site and no mitigation would be required.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would temporarily impact 7.74 acres of suitable habitat for Crotch's bumble bee (i.e., coastal sage scrub, chaparral, grassland, woodland, and ornamental) (Table 4.3-5). If the

area where Crotch's bumble bees forage was inundated, it is assumed that they would forage on higher ground, and once the water subsided, foraging habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on foraging and no mitigation would be required.

Fish

White sturgeon is stocked in Irvine Lake by OC Parks. The Project would dewater the lake prior to construction for a period of up to four years. Dewatering the lake would result in the loss of all non-native fish, including the white sturgeon. White sturgeon stocked in the lake are sterile individuals and isolated from naturally occurring populations; therefore, the loss of these individuals would not affect the viability of the species since these individuals are not reproducing and were intended to be taken by angling. Therefore, the impact on white sturgeon would be considered less than significant and no mitigation would be required.

Santa Ana speckled dace does not currently occur in Santiago Creek and/or Irvine Lake. Therefore, there would be no impact on this species and no mitigation would be required.

If CDFW implements a translocation of Santa Ana speckled dace to an area along Santiago Creek upstream of Irvine Lake, the translocated individuals may or may not be successful (i.e., survive and reproduce). Following the translocation, CDFW would monitor the translocated individuals to determine whether they become an established self-sustaining population. If the translocated individuals are successful in maintaining their population, they could move downstream along Santiago Creek to the upstream (eastern) end of the BSA prior to the initiation of the Project. Santa Ana speckled dace would not be expected to enter Irvine Lake as their preferred habitat is streams; they do not occur in lakes (except at the confluence with the stream). However, while the lake is dewatered, a portion of the flow could act as a stream, which the dace could then occupy temporarily until the lake is refilled. Project intake pipelines for dewatering and bypass pipelines around the work area would all include fish screens. The potential that the Project would impact translocated Santa Ana speckled dace is considered low because: (1) the translocated dace may not survive until the Project begins; (2) the translocated dace may not move downstream into the lake area where the Project construction would be occurring; (3) the Project bypass pipelines and dewatering pipelines would include fish screens; and (4) the area where active construction would be occurring would be dry. Therefore, the potential impact on translocated Santa Ana speckled dace is considered less than significant, and no mitigation would be required.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would increase the amount of habitat available for fish species. Therefore, the additional inundation would be considered a beneficial effect, and no mitigation would be required.

Amphibians

Focused surveys for the arroyo toad were conducted downstream of the dam in spring 2020 and upstream of Irvine Lake in 2022; no arroyo toads were observed (Psomas 2020a, 2022c). Therefore, there would be no impact on this species and no mitigation would be required.

Focused surveys for the western spadefoot toad were conducted throughout the BSA in spring 2025; no western spadefoot toads were observed (Psomas 2025 [in preparation]). Therefore, there would be no impact on this species and no mitigation would be required.

Coast Range newt has potential to occur in the BSA. The Project would not impact breeding habitat for this species (i.e., stream habitat with sufficient water). However, this species use the upland habitats for foraging and aestivation. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 4.3-5). Although not formally covered, Coast Range newt also benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for Coast Range newt in the region, and because there would be no impact on breeding locations, impacts on this species would be considered adverse but less than significant; no mitigation would be required.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would temporarily impact 16.94 acres of suitable habitat for special status amphibian species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) (Table 4.3-5). Amphibians can occur in aquatic or upland habitat; therefore, the additional inundation is not expected to affect them. Therefore, the additional inundation would be considered less than significant, and no mitigation would be required.

Reptiles

Focused surveys for southwestern pond turtle were conducted throughout the BSA in summer 2024; no southwestern pond turtles were observed (Psomas 2024b). Therefore, there would be no impact on this species and no mitigation would be required.

Two-striped garter snake is known to occur in riparian and open water habitats along Santiago Creek both upstream and downstream of the dam (Psomas 2020a, 2022c). A total of 220.26 acres (1.78 acres permanent; 218.48 acres temporary) of suitable riparian, fluctuating shoreline, vegetated fluctuating shoreline, and open water habitat for this species would be removed to construct the Project (Table 4.3-5). Although not formally covered by the NCCP/HCP, two-striped garter snake benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on this species would be considered adverse but less than significant, and no mitigation would be required.

Orange-throated whiptail and coastal whiptail were incidentally observed along Santiago Creek during focused surveys (Psomas 2022c). Additionally, coast horned lizard, southern California legless lizard, California glossy snake, coast patch-nosed snake, and red diamond rattlesnake have potential to occur in habitats throughout the BSA. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 4.3-5). Of these species, coast horned lizard, orange-throated whiptail, coastal whiptail, and red diamond rattlesnake are Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, southern California legless lizard, California glossy snake, and coast patch-nosed snake also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat

loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would temporarily impact up to 16.94 acres of habitat for special status reptile species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) in the additional inundation area (Table 4.3-5). If the area were inundated, there would be no effect on two-striped garter snake, which could use the open water habitat. It is assumed that the other special status reptiles would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status reptiles and no mitigation would be required.

Birds

The federally Threatened coastal California gnatcatcher is known to occur throughout the coastal sage scrub habitats in the BSA. One pair of gnatcatchers successfully nested downstream of Santiago Creek Dam and multiple coastal California gnatcatchers were observed in habitat around Irvine Lake, upstream of the dam (Exhibit 4.3-9; Psomas 2020b, 2022d, 2024a). Therefore, coastal California gnatcatcher presence should be assumed throughout coastal sage scrub habitats in the BSA. A total of 8.41 acres (3.95 acres permanent; 4.39 acres temporary; 0.13 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub) would be removed to construct the Project (Table 4.3-5). Additionally, during construction, this species would be disturbed by construction noise for up to 20 hours per day (including night work) periodically the breeding season for approximately four years. During construction, jackhammering and concrete crushing would occur during demolition of the existing spillway and drilling into bedrock would occur to construct the new spillway. In the absence of noise minimization measures, all coastal sage scrub within 500 feet of construction activities would be indirectly affected by construction noise[8], with the most noise-intensive effects on coastal sage scrub occurring downstream of the dam. Any impact on coastal California gnatcatcher would be considered significant. This species is a Covered Species under the NCCP/HCP; therefore, take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Additionally, the NCCP/HCP requires standard construction minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species (**PDF BIO-3**). Implementation of **MM BIO-3** would ensure that IRWD's take is accounted for according to the NCCP/HCP.

The federally and state Endangered least Bell's vireo is known to occur in riparian habitats along Santiago Creek and the upstream edges of Irvine Lake (Exhibit 4.3-9; Psomas 2022e). Least Bell's vireo was absent downstream of the dam during the 2020 focused surveys (Psomas 2020c); but was incidentally observed downstream of the dam during the 2024 focused surveys for Crotch's bumble bee (Psomas 2024a); riparian habitat downstream of the dam is not as well-developed. Therefore, least Bell's vireo presence should be assumed throughout riparian habitats at the upper end of Irvine Lake and along Santiago Creek upstream of the lake; least Bell's vireo has potential to occur in riparian habitats downstream of the dam. A total of 36.73 acres (1.45 acres permanent, 35.28 acres temporary) of suitable riparian habitat for the least Bell's vireo would be removed to construct the Project (Table 4.3-5). Additionally, during construction, this

[8] A detailed analysis of noise impacts on these sensitive habitat areas will be included in the Noise section of the Environmental Impact Report.

species would be disturbed by construction noise for up to 20 hours per day (including night work) periodically during the breeding season for approximately four years. During construction, concrete crushing would occur in the staging area at the upstream end of Irvine Lake. If least Bell's vireo occurred downstream of the dam, they would also be subject to jackhammering, concrete crushing, and drilling into bedrock to demolish/construct the new spillway, as described above for coastal California gnatcatcher. In the absence of noise minimization measures, all riparian habitat within 500 feet of construction would be indirectly affected by construction noise[9]. Any impact on least Bell's vireo would be considered significant. The least Bell's vireo is a Conditionally Covered Species under the NCCP/HCP. **MM BIO-4** would ensure that riparian habitat impacted by the Project would be replaced at no less than a 1:1 ratio. **MM BIO-5** would require removal of riparian habitat outside the nesting season, implementation of appropriate noise minimization measures, and consultation with USFWS and CDFW.

The coastal cactus wren and Southern California rufous-crowned sparrow were observed in coastal sage scrub habitats and grasshopper sparrow was observed in grassland habitats in the BSA (Exhibit 4.3-9; Psomas 2020b, 2022d, 2022e). Additionally, loggerhead shrike and California horned lark have potential to occur in upland habitats throughout the BSA. A total of 47.85 acres (12.39 acres permanent; 35.38 acres temporary; 0.08 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, and grassland) would be removed to construct the Project (Table 4.3-5). Of these species, coastal cactus wren and Southern California rufous-crowned sparrow are Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, loggerhead shrike, California horned lark, and grasshopper sparrow also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

The yellow-breasted chat and yellow warbler were observed in riparian habitats in the BSA (Exhibit 4.3-9; Psomas 2022d, 2022e). A total of 36.73 acres (1.45 acres permanent; 35.28 acre temporary) of suitable habitat for these species (i.e., riparian) would be removed to construct the Project (Table 4.3-5). Although not formally covered by the NCCP/HCP, these species also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

A pair of bald eagles, State Endangered and Fully Protected, was incidentally observed nesting in a canyon adjacent to the BSA during focused surveys conducted around Irvine Lake in 2022 (Exhibit 4.3-9, Psomas 2022d, 2022e). CDFW included the location on a map of breeding territories (1990 to 2016); therefore, this location has been known since at least 2016. The 2022 nesting location was over 1,200 feet (0.22 mile) from the borrow site/staging area, which is the closest Project activity[10] and approximately 1.25 miles from Santiago Creek Dam, where construction would be concentrated. Therefore, the nest would not be expected to be directly or indirectly impacted by the construction activities or noise. However, the entire lake would be temporarily dewatered (312.11 acres of open water) and construction would affect a total of 183.53 acres within the lake (0.33 acre permanent; 183.20 acres temporary) that provide suitable foraging habitat for this species (i.e., open water, fluctuating shoreline, and vegetated fluctuating shoreline) to construct the Project (Table 4.3-5). During construction, the lake would be dewatered and fish would no longer be an available food source for this breeding pair. Waterfowl may also

[9] A detailed analysis of noise impacts on these sensitive habitat areas will be included in the Noise section of the Environmental Impact Report.

[10] The Federal Bald Eagle Act states that a permit to impact the nest would be needed if construction would be within 660 feet of an active nest.

be reduced in numbers once the lake is drained, although they may still be present upstream and downstream of the impact area. Throughout the winter storm season, when the lake is functioning for flood control, open water may be available for a limited time following storms but would be kept in a dewatered condition throughout the construction period and fish would not be stocked. When the lake holds limited water following storms, it could be used by waterfowl. The temporary loss of the lake habitat over four years of construction may cause the bald eagles to leave Irvine Lake for the duration of construction. However, they (or a new pair) would be expected to reoccupy the lake following completion of the Project once the lake is restocked with fish. This impact would be considered significant. **MM BIO-6** would require consultation with USFWS and CDFW to determine the appropriate monitoring strategy during construction.

White-tailed kite and American peregrine falcon were observed in the BSA during surveys. In addition, Cooper's hawk, ferruginous hawk (during winter and migration), golden eagle, prairie falcon, long-eared owl, and burrowing owl have potential to occur in the BSA for foraging. A total of 137.98 acres (14.73 acres permanent; 123.11 acres temporary; 0.14 acre within the SCE realignment) of suitable foraging habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, cliff, fluctuating shoreline, vegetated fluctuating shoreline, ornamental, and disturbed) would be removed to construct the Project (Table 4.3-5). However, during construction, the lake would be dewatered and an additional 128.58 acres of lake bottom (areas currently mapped as open water outside of the impact areas) would be temporarily available as foraging habitat for these species, though these areas may provide limited prey since there would not be any vegetation cover. The permanent loss of 14.73 acres of foraging habitat for these raptors would cumulatively contribute to the ongoing regional loss of foraging habitat for these species. Of these species, American peregrine falcon is a Covered Species, while golden eagle and prairie falcon are Conditionally Covered, by the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, Cooper's hawk, ferruginous hawk, white-tailed kite, long-eared owl, and burrowing owl also benefit from habitats conserved in the Reserve System. Therefore, this impact would be considered adverse but less than significant because a substantial amount of foraging habitat for these species is available immediately adjacent to the Project in the Reserve System.

The Cooper's hawk, white-tailed kite, golden eagle, prairie falcon, American peregrine falcon, long-eared owl, and burrowing owl also have potential to nest within or adjacent to the BSA. Impacts on any active raptor nest (common or special status species) would be considered a violation of the MBTA and Sections 3503, 3503.5, and 3513 of the *California Fish and Game Code*. Additionally, these species could be disturbed by noise adjacent to construction areas. Standard pre-construction surveys and nesting bird protection would be implemented to ensure consistency with the MBTA and *California Fish and Game Code* (**PDF BIO-5**). Therefore, impacts on nesting raptors would be less than significant assuming compliance with regulatory requirements.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would temporarily impact up to 17.41 acres of foraging and nesting habitat for special status bird species (i.e., coastal sage scrub, chaparral, grassland, woodland, cliff, and ornamental) in the additional inundation area (Table 4.3-5). If the area were inundated, it is assumed that special status birds would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status birds and no mitigation would be required.

The additional inundation areas would be expected to be inundated during the storm season, which is generally outside the peak bird breeding season (although there is some overlap in early spring). The inundation would be associated with natural storm events, which could lead to a natural loss of nests early in the spring. The potential inundation of nests is expected to be extremely limited because (1) it would only affect species nesting within two feet in elevation above the current maximum water line; (2) it would only affect species nesting in February and March; and (3) it would only occur approximately once every several years. Therefore, the effect on nesting birds would be expected to be less than significant and no mitigation would be required.

Mammals

Mountain lions are known to occur throughout the vicinity of the BSA and mountain lion sign (i.e., tracks) were observed downstream of Santiago Creek Dam during focused surveys. A total of 88.71 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 4.3-5). The mountain lion is proposed for State listing due to fragmentation of habitat that isolates populations. Although the Project would permanently impact 14.67 acres of habitat downstream of the dam along Santiago Creek, it would be in the same location as the existing dam structure; it would not create a new barrier to movement. Additionally, there is extensive habitat in the Reserve System immediately surrounding the Project site that would be available for use by mountain lion. Although mountain lion may avoid the dam area and borrow site/staging area during construction that occurs at night, it would be expected to move along the edge of the Project, using habitat not impacted by the Project, during construction. Therefore, the Project would not be expected to interfere with movement by mountain lions. It is possible that mountain lions may choose to move along the roads despite the construction, which would increase the potential for wildlife strikes along the roadways at night. Speed limits and wildlife crossing signage would be posted along access roads (**PDF BIO-6**). Therefore, the impact on mountain lions would be less than significant.

Northwestern San Diego pocket mouse and San Diego desert woodrat may occur in the BSA. A total of 51.94 acres (13.22 acres permanent; 38.58 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, woodland, and cliff) would be removed to construct the Project (Table 4.3-5). Additionally, vibration from construction could cause the collapse of pocket mouse burrows in the adjacent habitat as well as cause woodrats to flee their middens. Individuals could also potentially move through the construction area and be hit by construction vehicles. San Diego desert woodrat is a Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, northwestern San Diego pocket mouse also benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than signific/ant, and no mitigation would be required.

Six special status bat species have potential to forage in the BSA: pallid bat, pocketed free-tailed bat, big free-tailed bat, western red bat, western yellow bat, and western mastiff bat. A total of 137.98 acres (14.73 acres permanent; 123.11 acres temporary; 0.14 acres within the SCE realignment) of suitable foraging habitat for these species would be removed to construct the Project (Table 4.3-5). Many bat species prefer to forage over water. During construction, Irvine Lake (312.11 acres) would be dewatered and the creek would be routed around the construction area. Although this could create lower quality foraging habitat during construction, it is expected that open water (i.e., preferred foraging habitat) would be available upstream and/or downstream of the work areas during construction. These impacts would be considered adverse but less than significant because a substantial amount of foraging habitat for these species would continue to

be available immediately adjacent to the Project in the Reserve System throughout the Project. Following completion of the Project, open water would again be available within Irvine Lake. Therefore, no mitigation would be required for the loss of bat foraging habitat.

Pallid bat, pocketed free-tailed bat, big free-tailed bat, western red bat, western yellow bat, and western mastiff bat also have potential to roost in the BSA. Bats may roost in the rocky outcroppings along Santiago Creek, in crevices of structures (e.g., dam structure, spillway and outlet tower, and dam keeper's house), or in large oak or sycamore trees in the BSA. A total of 3.57 acre (0.53 acre permanent; 2.99 acres temporary; 0.05 acre within the SCE realignment) of suitable tree roosting habitat would be removed to construct the Project (Table 4.3-5). This impact would be considered adverse but less than significant because a substantial amount of tree roosting habitat would continue to be available immediately adjacent to the Project in the Reserve System during the Project. A total of 0.52 acre (0.30 permanent; 0.21 acre temporary; 0.01 acre within the SCE realignment) of suitable cliff roosting habitat would be removed to construct the Project (Table 4.3-5). Additionally, during the project, a portion of the dam, spillway, outlet tower structure, and dam keeper's house that may be used by bats that roost in crevices would not be available for roosting. Construction activities could directly impact roosting individuals. Impacts on a maternal roost (i.e., where breeding occurs) or a communal roost would be considered to meet the requirements of CEQA Guidelines Section 15380. **MM BIO-7** would require pre-construction surveys and bat exclusion.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would also temporarily impact up to 16.94 acres of habitat for special status mammals (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) in the additional inundation area (Table 4.3-5). This may increase the amount of preferred foraging habitat (i.e., open water) for bat species. If the area were inundated, it is assumed that terrestrial mammals would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status mammals and no mitigation would be required.

Indirect Impacts

Noise

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase substantially over present levels during construction of the Project due to construction vehicles, demolition of the existing spillway, concrete crushing, and drilling into bedrock to secure the new spillway and dam embankment. A detailed noise analysis has been prepared for the Project. During construction, temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. These impacts are considered adverse, but not significant for most wildlife species, because the Project would not impact a substantial population of these species. Noise from construction activities may cause birds adjacent to the work area to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Construction activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Noise impacts would be considered significant for the coastal California gnatcatcher, least Bell's vireo, and other nesting

raptors. With the implementation of **PDF BIO-3** and **MM BIO-5**, indirect noise impacts on the coastal California gnatcatcher and least Bell's vireo would be considered less than significant. With implementation of standard pre-construction surveys and nesting bird protection to ensure consistency with the MBTA and *California Fish and Game Code* (**PDF BIO-5**), indirect impacts on nesting birds and raptors would be reduced to less than significant.

Night Lighting

Night lighting may impact the behavioral patterns of nocturnal and crepuscular (i.e., active at dawn and dusk) wildlife adjacent to night lighting. Of greatest concern is the effect on small, ground-dwelling animals that use the darkness to hide from predators and bats, owls, and mountain lion, which are specialized night foragers. Following the Project, the spillway and outlet tower would not include night lighting; therefore, there would be no impact due to night lighting during operation of the Project. However, construction activities would include regular night work; therefore, night lighting during construction could negatively impact nocturnal and crepuscular wildlife species within the BSA as well as in the surrounding adjacent open space. The Project Manual includes specifications to minimize night lighting on sensitive habitat areas (**PDF BIO-7**).

Human Activity

During construction, there would be an increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to construction areas. Human disturbance could disrupt normal foraging and breeding behavior of wildlife adjacent to construction areas, diminishing the value of the habitat. With implementation of standard construction minimization measures (**PDF BIO-3**), **MM BIO-5**, standard pre-construction surveys and nesting bird protections (**PDF BIO-5**), and specifications to ensure night lighting is minimized near sensitive habitat (**PDF BIO-7**), indirect impacts due to human activity would be reduced to less than significant. Additionally, a WEAP training would be implemented to ensure that construction personnel are trained on the environmental sensitivity of the area (**PDF BIO-1**).

The Project is not expected to increase human activity during operation. Therefore, there would be no long-term impact and no mitigation would be required.

Increased Wildfire Risk

Fires are a natural part of the landscape in California; however, with the changing weather patterns brought by climate change, the fire season is coming earlier and ending later than in the past (USFS 2018). In the last five years (October 2019 - October 2023), there have been 6,884 wildfires that have burned 1,570,571 acres in California (CalFire 2023). Drought or extended periods of low rainfall can dry out fuel, increasing its risk of burning. Periods of high rainfall decrease fire risk because there is more moisture in the vegetation; however, years of high rainfall increase the fuel load with growth of vegetation and weeds. In the Project region, Santa Ana wind conditions also increase the risk of fire with dry, gusty winds (CalFire 2023). According to the National Park Service, approximately 85 percent of wildfires are caused by humas. Human-caused wildfires are due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson (NPS 2022). The location of the Project is an important factor in understanding the extent of wildfire risk and how much potential for damage there is if a fire starts. Risk is higher when there are hot temperatures, low humidity, and high winds (i.e., "red flag warning" weather conditions). Risk is also higher near dry, ignitable vegetation (e.g., coastal sage scrub, chaparral, grassland, and ruderal), and hills or mountainous topography (Lordson 2020). Public Resources Code Sections 4427, 4428, 4431, and 4442 prohibit the use of combustion engines near forest, brush, or grass at any time of year

when ground litter or vegetation would sustain the spread of fire. A detailed wildfire analysis has been prepared for the Project and is included in Section 4.17, Wildfire.

During construction, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. If not contained quickly, the fire could spread through adjacent habitat areas, damaging the NCCP/HCP Reserve. The loss of habitat may affect listed species (e.g., coastal California gnatcatcher). All construction personnel would be trained on the environmental sensitivity of the area prior to construction (**PDF BIO-1**) and the Biological Monitor would be present during vegetation clearing (**PDF BIO-3**). Therefore, the increased fire risk would be considered less than significant.

Impact Conclusion: *The Project has potential to impact special status plant and wildlife species. Significant or potentially significant impacts were identified for mud nama, Crotch's bumble bee, coastal California gnatcatcher, least Bell's vireo, bald eagle, and roosting bats. Additionally, wildlife using habitat adjacent to the Project could be indirectly impacted by construction noise, night lighting during construction, dust, and invasive plant species. Assuming implementation of **PDF BIO-1** through **PDF BIO-9** and with implementation of **MM BIO-1** through **MM BIO-7** these impacts would be reduced to less than significant and the potential impacts on special status species would be less than significant, pursuant to Threshold 4.3-1.*

Threshold 4.3-2

Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?

Coastal Sage Scrub

A total of 8.41 acres (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment) of coastal sage scrub vegetation would be removed to construct the Project (Table 4.3-5, Exhibit 4.3-8). Coastal sage scrub vegetation types that would be impacted include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, and disturbed floodplain sage scrub. The NCCP/HCP protects coastal sage scrub in the Central–Coastal Subregion because it provides habitat for Covered Species. Additionally, disturbed floodplain sage scrub is considered a sensitive natural community by CDFW.

The Project would also temporarily impact up to 3.36 acres of sage scrub vegetation types in the additional inundation area (Exhibit 4.3-8); inundation effects are discussed further below. Coastal sage scrub in the additional inundation area includes sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, southern cactus scrub, and disturbed southern cactus scrub. The NCCP/HCP protects coastal sage scrub in the Central–Coastal Subregion because it provides habitat for Covered Species. Additionally, southern cactus scrub and disturbed southern cactus scrub are considered sensitive natural communities by CDFW.

Per Section 5.11 of the NCCP/HCP, infrastructure is an existing use that is allowed within the Reserve. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Additionally, the NCCP/HCP requires avoidance and minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species. Implementation of **MM BIO-3** would ensure that IRWD's take is accounted for according to the NCCP/HCP.

Riparian

A total of 36.73 acres (1.45 acre permanent; 35.28 acres temporary) of riparian vegetation would be removed to construct the Project (Table 4.3-5, Exhibit 4.3-8). Riparian vegetation types that would be impacted include riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb. Impacts on riparian vegetation types are considered significant because federal and State resource agencies (i.e., USACE, CDFW, and RWQCB) have given these vegetation types special status due to their high biological value; jurisdictional areas are discussed below under Threshold 4.3-3. Riparian vegetation types also provide potential habitat for federal and State-listed species. Additionally, southern willow scrub, southern black willow forest, disturbed southern black willow riparian forest, and southern black willow riparian forest/riparian herb are also considered sensitive natural communities by CDFW.

The Project would also temporarily impact up to 9.66 acres of riparian vegetation types in the additional inundation area (Exhibit 4.3-8); inundation effects are discussed further below. Riparian vegetation types in the additional inundation area include disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, and disturbed southern black willow forest. As described above, these vegetation types have been given special status due to their high biological value and potential to support federal and State-listed species. Additionally, southern sycamore riparian woodland, southern black willow forest, and disturbed southern black willow forest are considered sensitive natural communities by CDFW.

Implementation of **MM BIO-4** would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of riparian vegetation types.

Woodland

A total of 3.57 acre (0.53 acre permanent; 2.99 acres temporary; 0.05 acre within the SCE realignment) of woodland vegetation would be removed to construct the Project (Table 4.3-5, Exhibit 4.3-8). This may include trimming of trees along access roads. Woodland vegetation types that would be impacted include coast live oak woodland and western sycamore. Western sycamore is considered a sensitive vegetation community by CDFW.

The Project would also temporarily impact up to 0.50 acre of woodland vegetation types in the additional inundation area (Exhibit 4.3-8); inundation effects are discussed further below. Woodland vegetation in the additional inundation area is coast live oak woodland. Coast live oak woodland is not considered a sensitive natural community by CDFW. Impacts on coast live oak woodland would be considered less than significant; therefore, no mitigation would be required for the vegetation community. However, portions of the woodland are within jurisdictional areas (see Threshold 4.3-3 below).

Implementation of **MM BIO-4** would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of woodland vegetation types. Implementation of **MM BIO-8** would ensure that any western sycamore removed would be replaced. Standard tree protection measures to fence coast live oak and western sycamores within or near the work area would also be implemented (**PDF BIO-4**).

Indirect Impacts

Increased Inundation

Lake level depends on rainfall of the season, intensity of storm events, and rate of releases. Following the Project, dam operations would not substantially change; the way that water would be held in the reservoir throughout the year would be expected to be the same as the existing conditions. The Project would raise the spillway height by six feet, which is two feet above the current maximum water storage elevation with flashboards installed. Thus, the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as "additional inundation area") would be infrequently inundated for a period of up to approximately 45 days (Exhibit 4.3-8). In the last 20 years, Irvine Lake has been at the maximum capacity of 795.9 four times. Approximately the same frequency would be expected following implementation of the Project, but it would depend on frequency and intensity of storms and operations of the lake.

When the lake is at the maximum elevation, a narrow strip of riparian vegetation would be inundated infrequently (9.66 acres of riparian; Exhibit 4.3-8; Table 4.3-5). These areas are dominated by mule fat and willows, which have a high to very high tolerance to inundation, assuming shoots (i.e., trunks, stems, leaves) are not fully submerged (Glentz et al. 2006, Tallent-Halsell and Walker 2002, Francis et al. 2005, Good et al. 1992). Glentz et al. (2006) found that willows can withstand a flooding duration for as much as 40% of the growing season (spring/summer); the BSA receives most rainfall outside the growing season in the winter and early spring when willows are dormant. Therefore, the infrequent additional inundation is not expected to affect the riparian vegetation that currently exists around the lake. While the OHWM may change after raising the spillway, creating some additional jurisdiction, riparian vegetation and hydric soils are not expected to be created where they do not currently occur based on the infrequency of the additional inundation. Jurisdictional areas within Irvine Lake, Santiago Creek, and Drainages 4, 5, 6, 7, 9, 12, and 15 fall within the additional inundation area (see Threshold 4.3-3 below).

When the lake is at the maximum elevation, a narrow strip of upland vegetation would be inundated infrequently (3.36 acres coastal sage scrub, 0.18 acre chaparral, and 0.50 acre of coast live oak woodland; Exhibit 4.3-8, Table 4.3-5). Species in these habitat types are not adapted to wet conditions and could be affected by extended inundation (i.e., longer than one week). Normally, shrub and tree roots get air from pore spaces in the soil, but when soils are inundated, air spaces are filled with water and roots experience anaerobic conditions. This can result in a delay in leafing out, branch dieback, smaller than normal leaves, or wilted leaves. Once the inundation has subsided, shrubs and trees should resume normal growth and their growth may catch up by spring or summer. However, if a flooded shrub/tree does not resume normal growth, the roots may have been damaged by the inundation (Cregg 2013). The infrequent additional inundation affects two feet in elevation, which may be several feet wide in flat areas, but less than a foot on steeper slopes. The upland habitat types within the additional inundation areas are mostly located on slopes, which means a narrower area of upland vegetation would be affected around most of the lake (Exhibit 4.3-8). Therefore, if a shrub/tree is affected, it would be expected to only affect a few shrubs or a small portion of the roots and associated canopy of trees. Potential effects on chaparral due to infrequent additional inundation would be considered adverse but less than significant in relation to the total amount of chaparral vegetation available in the Project region. Coastal sage scrub and oak woodlands are Covered Habitats under the NCCP/HCP; upland habitats have been conserved in the Reserve System. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Implementation of **MM BIO-3** would ensure that IRWD's take is accounted for according to the NCCP/HCP.

When the lake is at the maximum elevation, a narrow strip of nonnative vegetation would be inundated infrequently (3.23 acres grassland [annual grassland, ruderal] and 0.47 acres of ornamental; Exhibit 4.3-8, Table 4.3-5). Like the upland vegetation, these vegetation types may be adversely affected by the infrequent additional inundation, however, these vegetation types are considered of low biological value. Therefore, inundation effects on this vegetation would be considered less than significant and no mitigation would be required.

Although infrequent additional inundation would not directly remove vegetation from the BSA, habitat within the inundation area would be unavailable to most wildlife during the infrequent inundation. If infrequent additional inundation occurred during the breeding season, it could flood burrows and nests causing them to fail. However, it is anticipated that most inundation events would occur during the storm season (i.e., October 1 to April 15), which is outside the peak breeding season for most wildlife. Following each inundation event, the habitat would again be available for use with areas along the periphery becoming available most quickly. Although infrequent additional inundation effects would be considered adverse, they would affect a limited amount of habitat (17.41 acres) compared to the amount of habitat available in the Project region. Therefore, inundation effects would be considered adverse but less than significant.

Dewatering of the Lake

During the Project, the lake would be dewatered for a period of up to four years. When a lake is dewatered, water is not available to seep through the ground to recharge the underground aquifer and the water table under and around the edge of the lake may drop. If this occurs, it could affect the riparian vegetation around the edge of the lake. However, during the winter storm season, precipitation is expected to recharge or partially recharge the underground aquifer/water table. The water table can also recharge through the areas surrounding the lake that are outside the dewatered area, including through several drainages flowing into the lake and sheet flow from the southeastern and eastern sides of the lake. The majority of riparian scrub/woodland vegetation occurs at the upstream end of the lake, upstream of the work area, where recharge would still be occurring naturally (since it is upstream of the area that would be dewatered). Considering both precipitation and recharge from surrounding areas, lowering of the water table is not expected to substantially affect riparian scrub/woodland vegetation around the edges of the lake. Therefore, this impact is considered adverse but less than significant, and no mitigation would be required.

Increased Dust

Grading activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of construction of the Project on the native vegetation in the immediate vicinity of the construction area is considered adverse but less than significant because it would not substantially reduce plant populations in the region. Additionally, it is assumed that a water truck would be used to reduce dust during construction as required for air quality requirements. Therefore, no mitigation would be required.

No increased dust would be expected during operation of the Project. Therefore, there would be no long-term impact and no mitigation would be required.

Invasive Exotic Plant Species

No landscaping is anticipated as part of the Project. Therefore, there would be no effect on adjacent habitats due to the planting of non-native, invasive plant species.

Construction activities create disturbance, which in turn provides a place for non-native weedy species to spread. Additionally, construction equipment can introduce non-native weed seeds to the area if equipment is not properly cleaned. Weeds from the construction may then spread to adjacent habitat areas (including adjacent Reserve areas), which would degrade habitat quality for native species. In addition to the negative effects on habitat quality, non-native weeds can also increase the potential for large fires to spread. The Project Manual includes specifications for the use of BMPs to prevent the spread of weed seeds and requires the use of a native seed mix for hydroseeding areas disturbed by construction activities (**PDF BIO-8**). Invasive species observed during construction would be treated during and following construction (**PDF BIO-9**). Therefore, impacts as a results of invasive exotic plant species would be considered less than significant.

Impact Conclusion: *The Project would impact coastal sage scrub, riparian, and woodland habitats. The additional inundation during implementation of the Project would also affect a limited amount of these habitats. With implementation of **MM BIO-3**, **MM BIO-4**, and **MM BIO-8** these impacts would be less than significant. Therefore, the potential impact on riparian habitats and sensitive natural communities would be less than significant, pursuant to Threshold 4.3-2.*

Threshold 4.3-3

Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

USACE

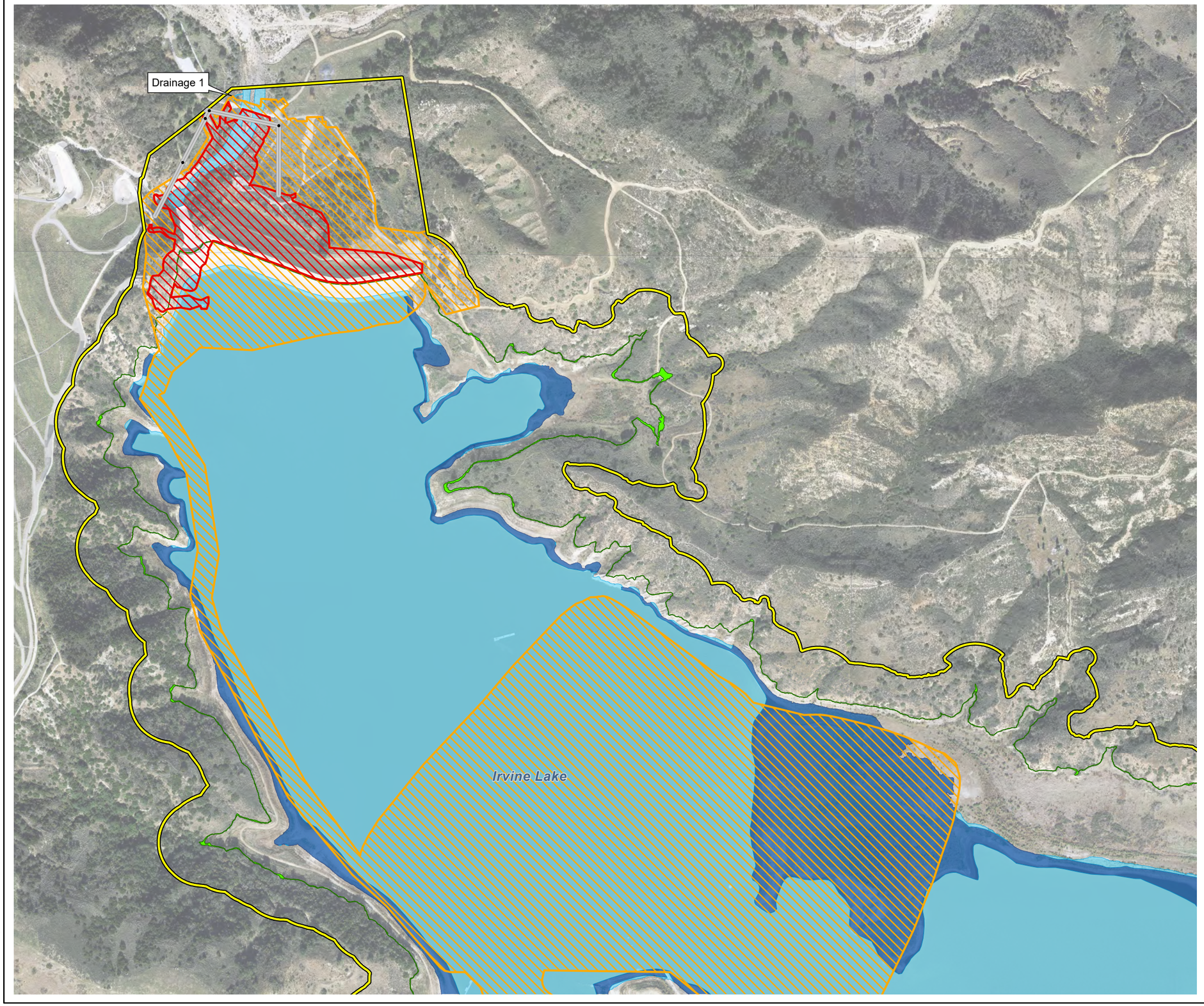
A total of 203.570 acres of WOTUS under the regulatory authority of the USACE would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) (Table 4.3-6; Exhibit 4.3-10). This represents impacts to WOTUS in Irvine Lake, Santiago Creek, and Drainage 1. There would be no impact on USACE jurisdiction for the SCE Realignment. Implementation of **MM BIO-4** would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of WOTUS under the jurisdiction of USACE.

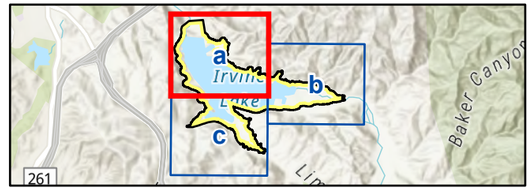
Additional Inundation

The Project would impact an additional 0.673 acre of WOTUS (0.673 acre wetland) with the additional inundation area (Table 4.3-6; Exhibit 4.3-10). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM; additional inundation of areas under the jurisdiction of USACE would be considered less than significant.

RWQCB

A total of 203.641 acres of waters of the State under the regulatory authority of the RWQCB would be impacted to construct the Project (wetland: 0.000 acres permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary) (Table 4.3-6; Exhibit 4.3-11). This represents impacts to waters of the State in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. There would be no impact on RWQCB jurisdiction for the SCE Realignment. Implementation of **MM BIO-4** would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

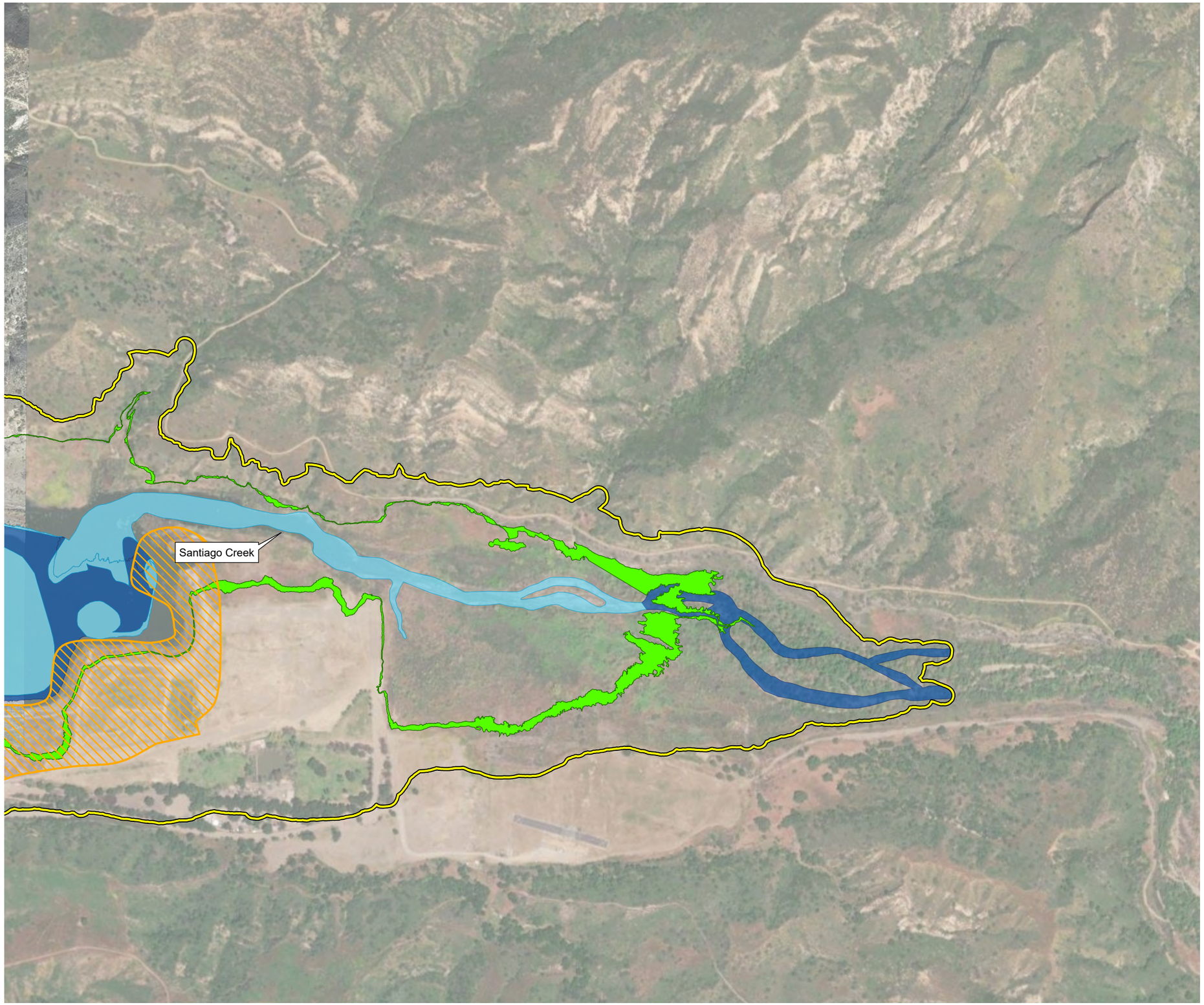
Project Impacts
USACE Waters of the United States Exhibit 4.3-10a

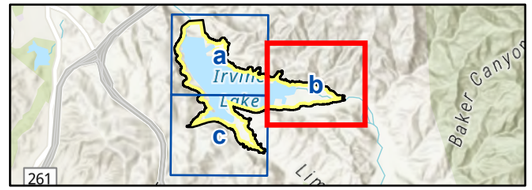
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_USACE_Impacts.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

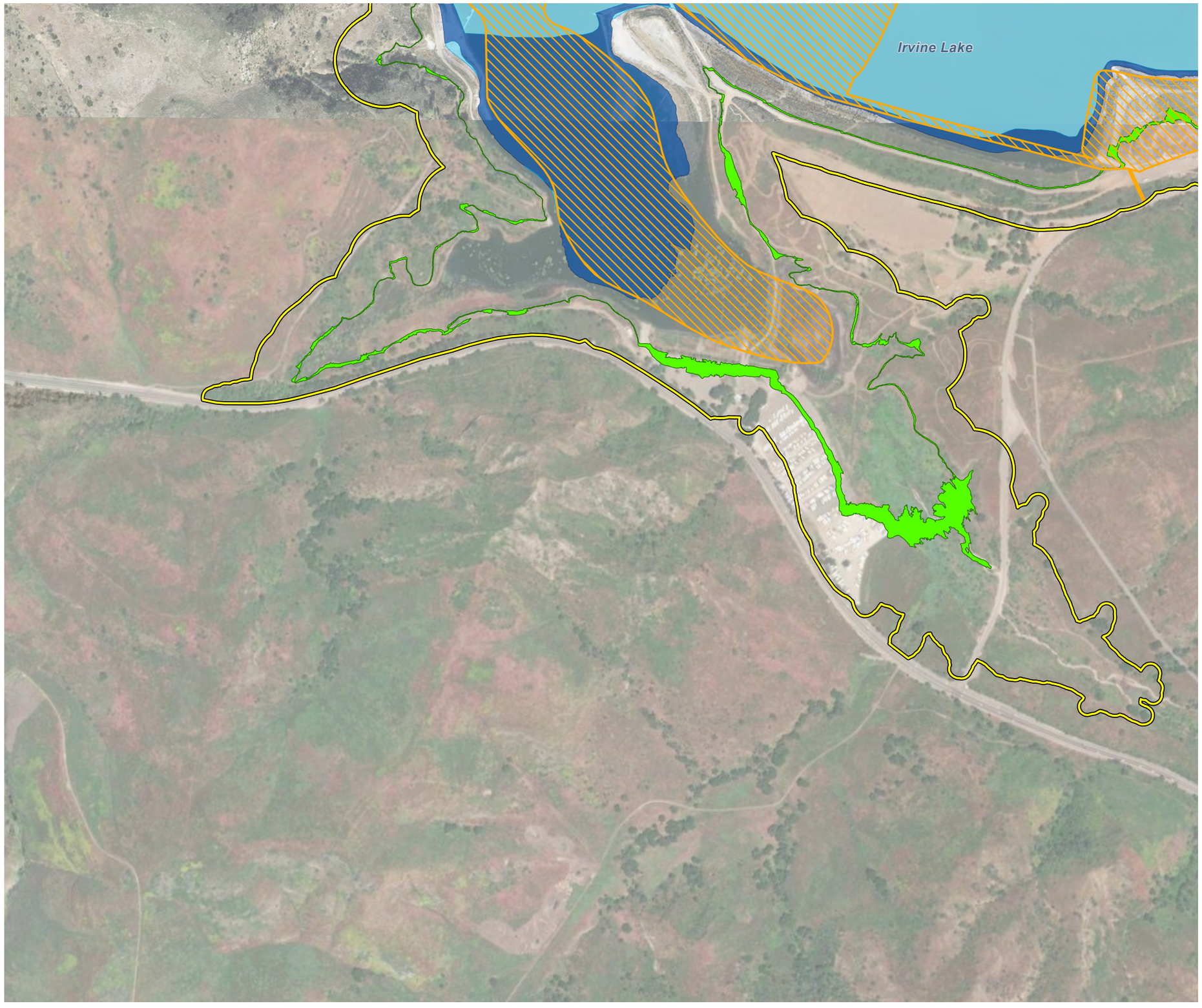
Project Impacts
USACE Waters of the United States **Exhibit 4.3-10b**

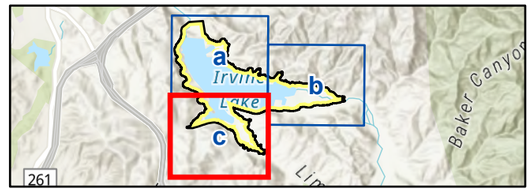
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

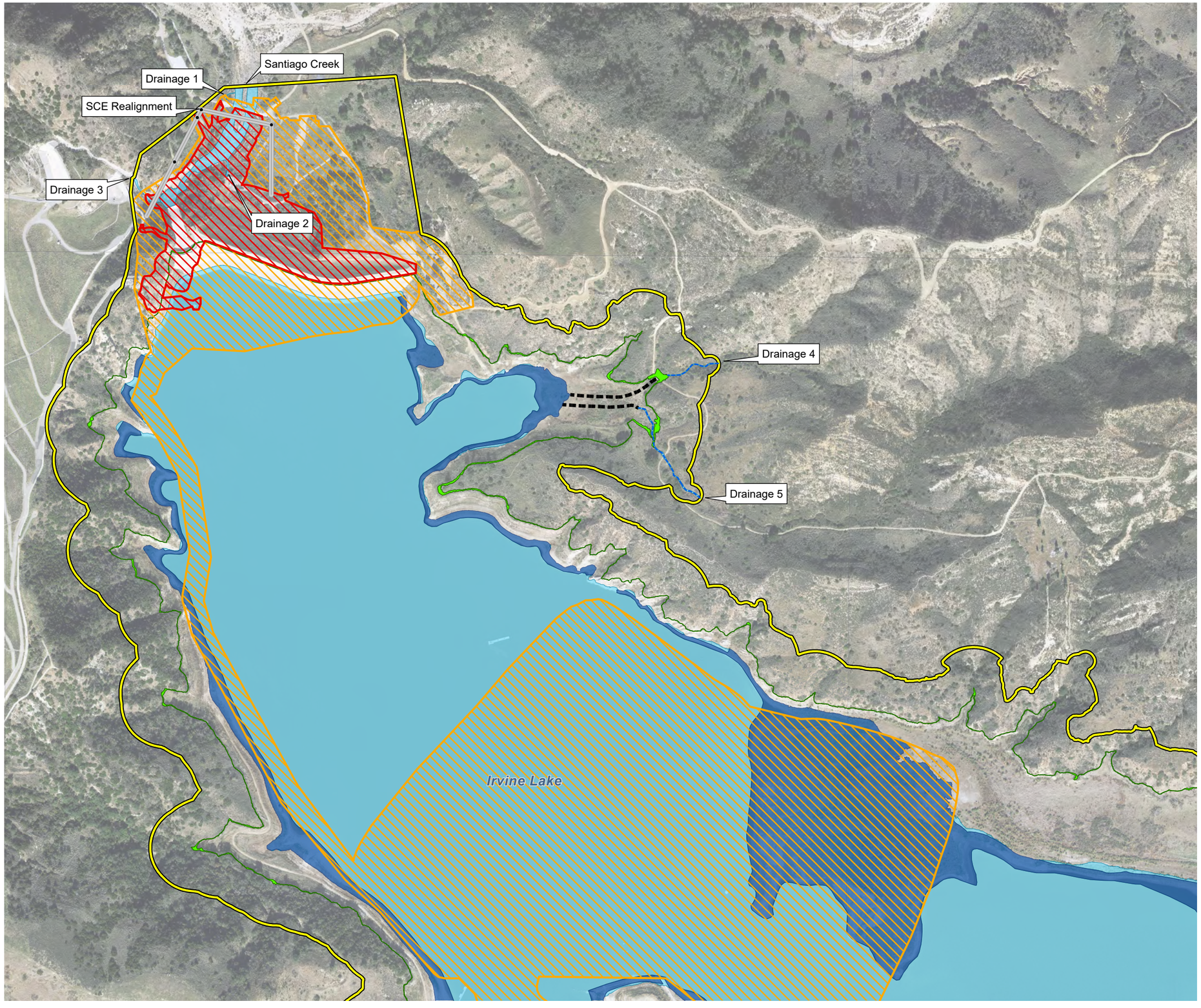
Project Impacts
USACE Waters of the United States Exhibit 4.3–10c

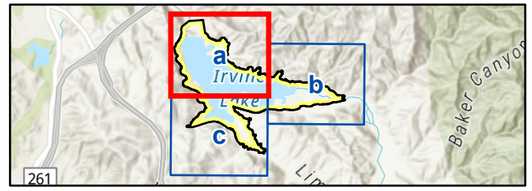
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

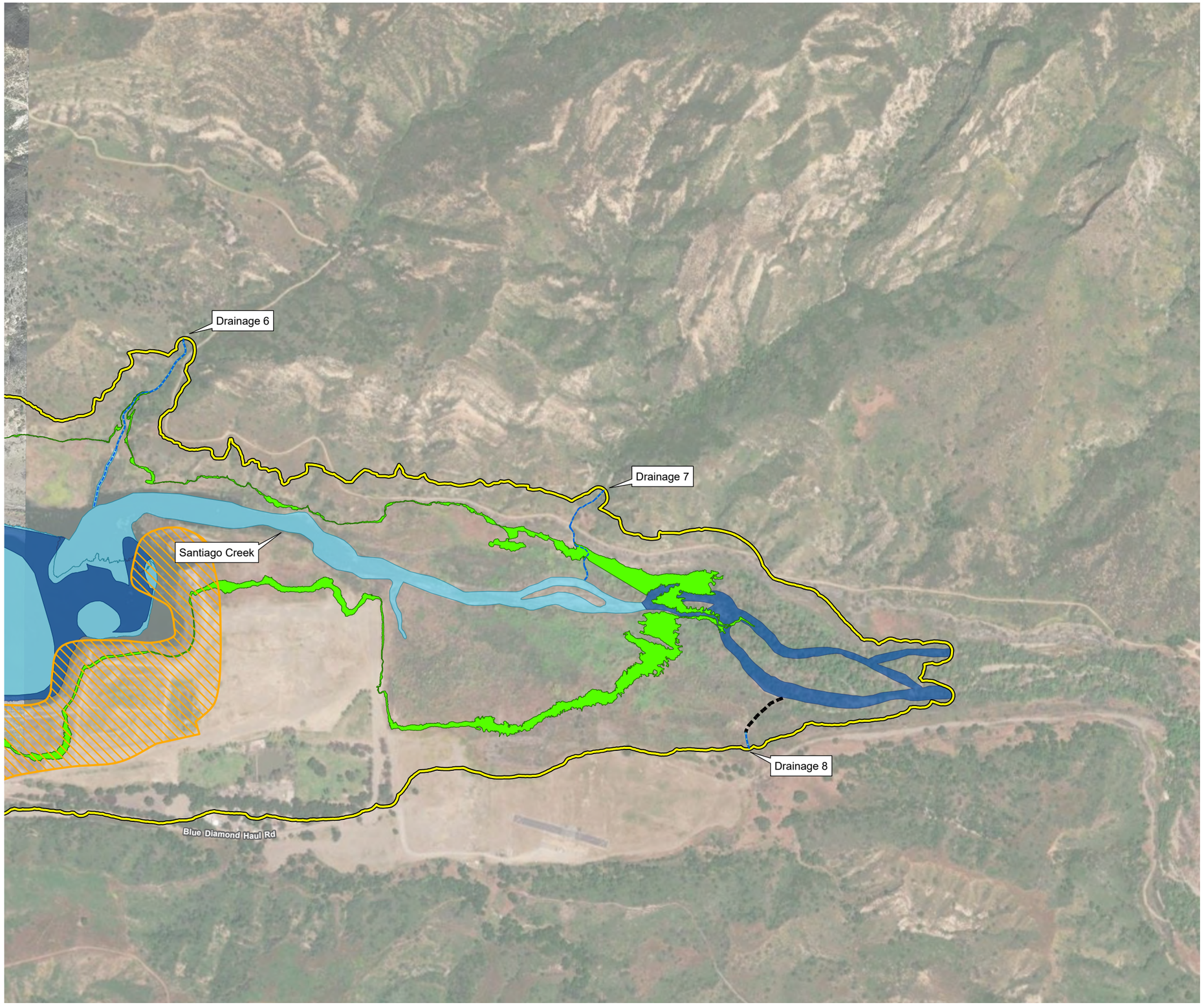
Exhibit 4.3–11a

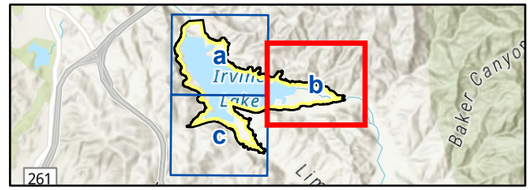
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprvlex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

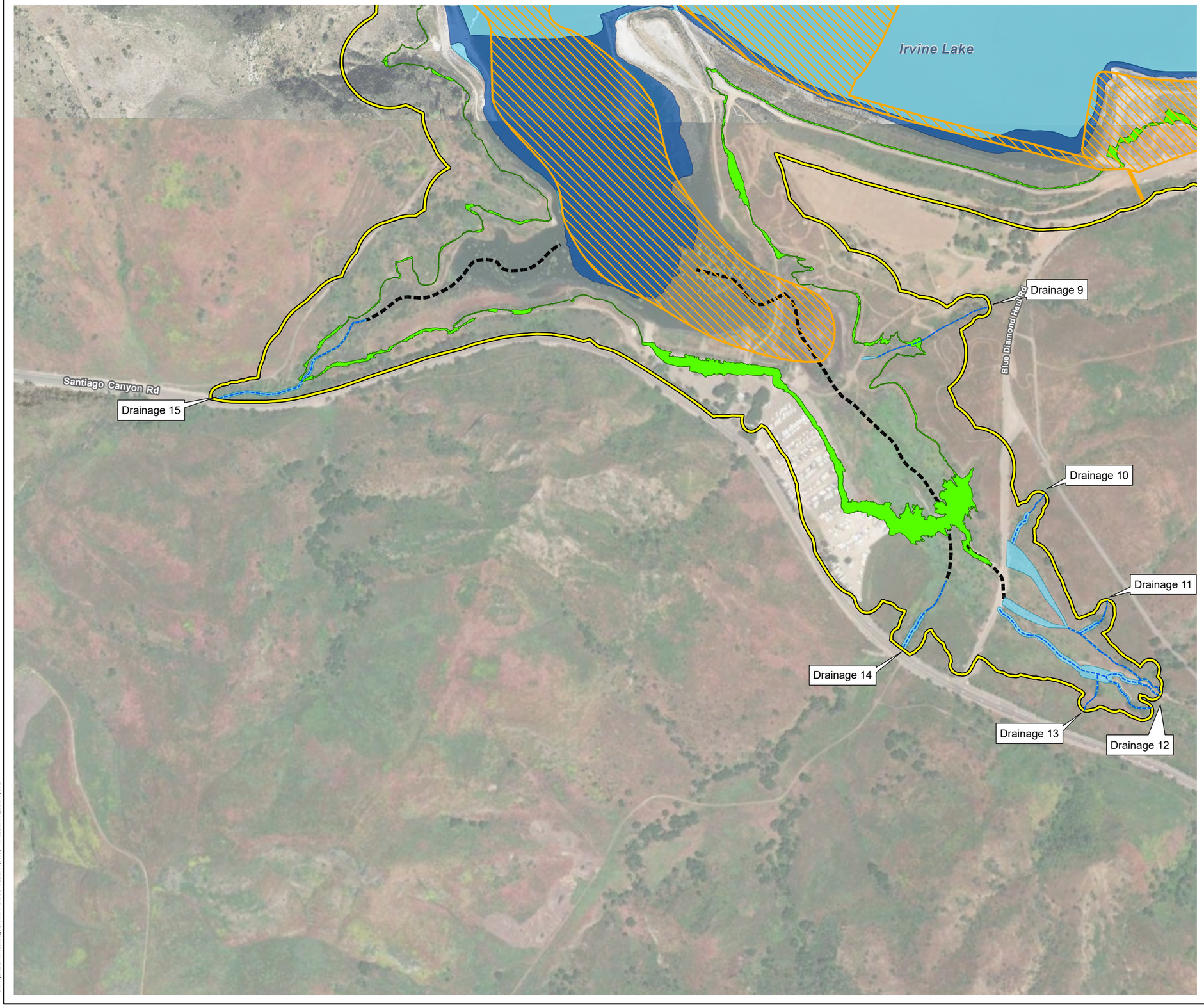
Exhibit 4.3-11b

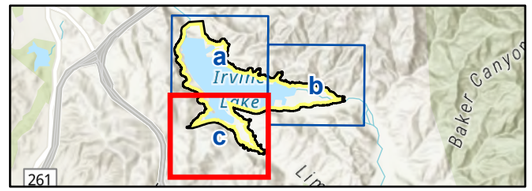
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

Exhibit 4.3–11c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 PLO) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project aprvlex_JD_RWQCB_Impacts

preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of waters of the State under the jurisdiction of RWQCB.

Additional Inundation

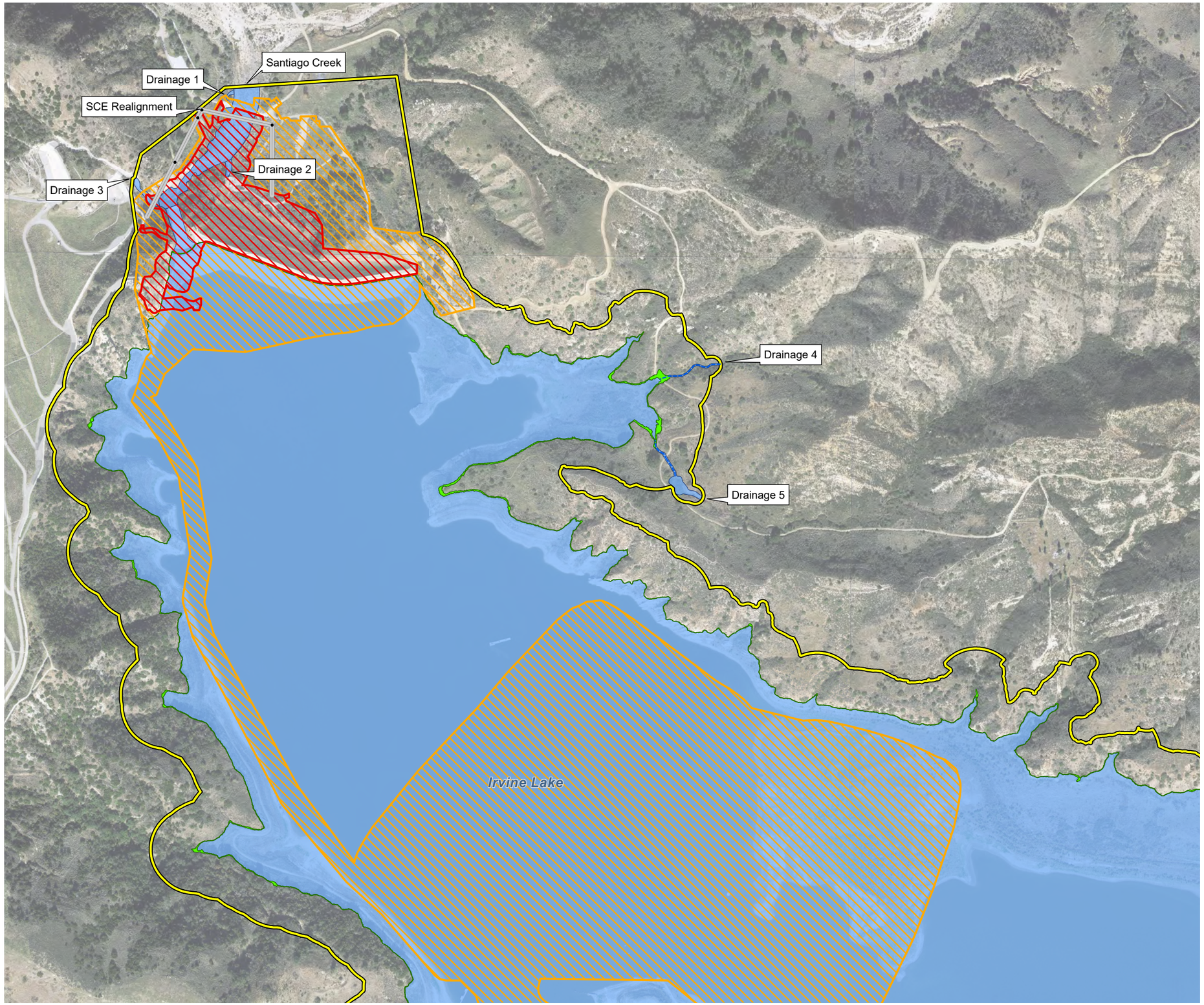
The Project would impact an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area (Table 4.3-6; Exhibit 4.3-11). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of RWQCB would be considered less than significant.

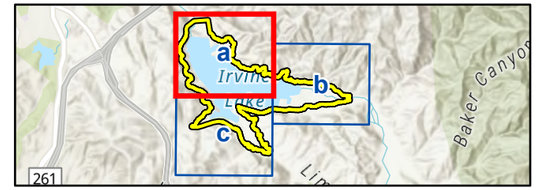
CDFW

A total of 233.744 acres of waters under the regulatory authority of CDFW would be impacted to construct the Project (3.924 acres permanent; 229.850 acres temporary) (Table 4.3-6; Exhibit 4.3-12). This represents impacts to waters under the authority of CDFW in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. Implementation of **MM BIO-4** would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of waters of the State under the jurisdiction of CDFW.

Additional Inundation

The Project would impact an additional 8.980 acres of waters under the authority of CDFW with the additional inundation area (Table 4.3-6; Exhibit 4.3-12). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the existing bed and bank, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of CDFW would be considered less than significant.





Biological Study Area

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

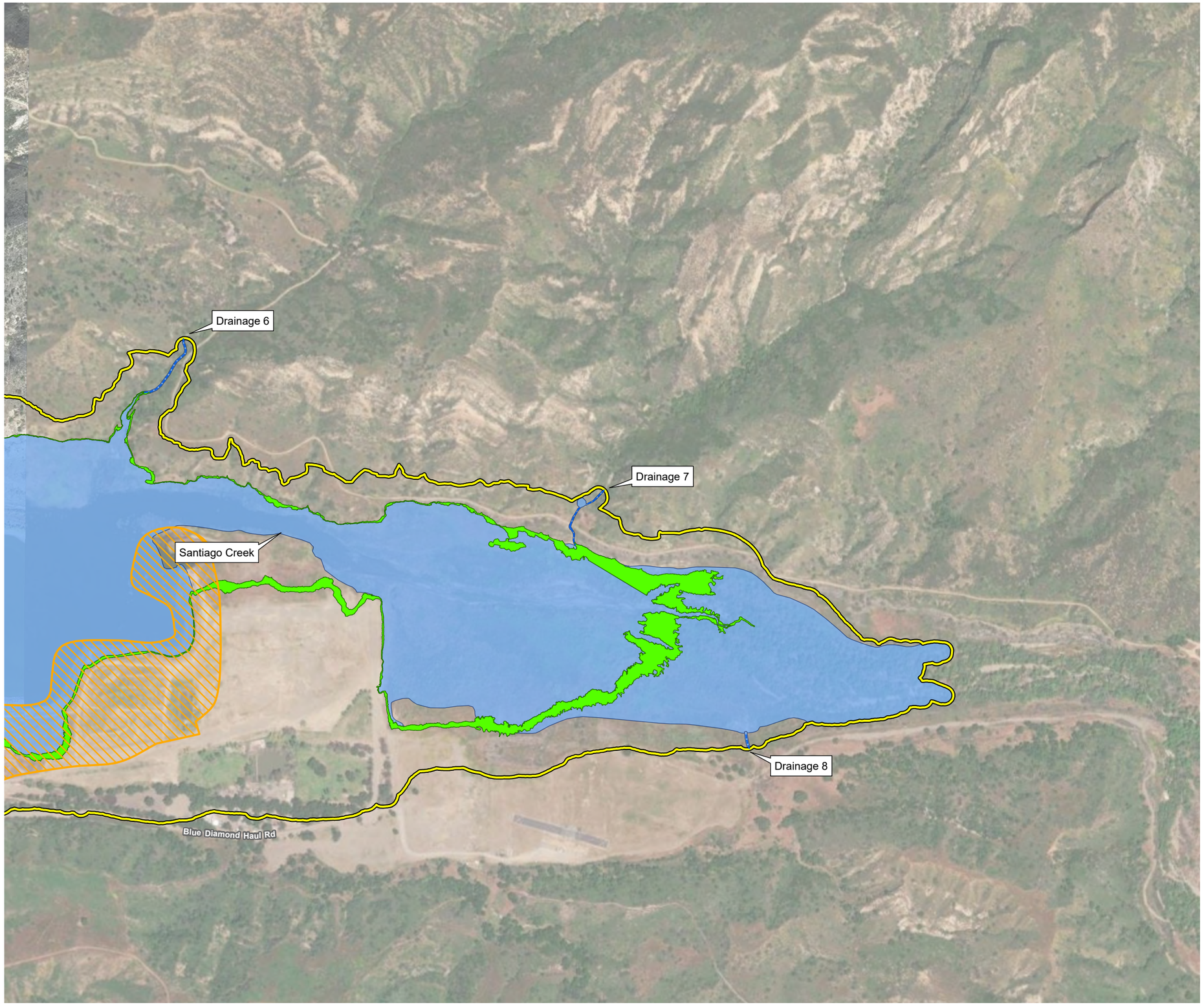
Project Impacts
CDFW Jurisdictional Waters Exhibit 4.3-12a

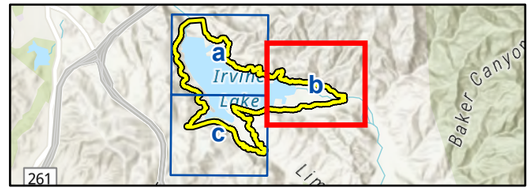
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

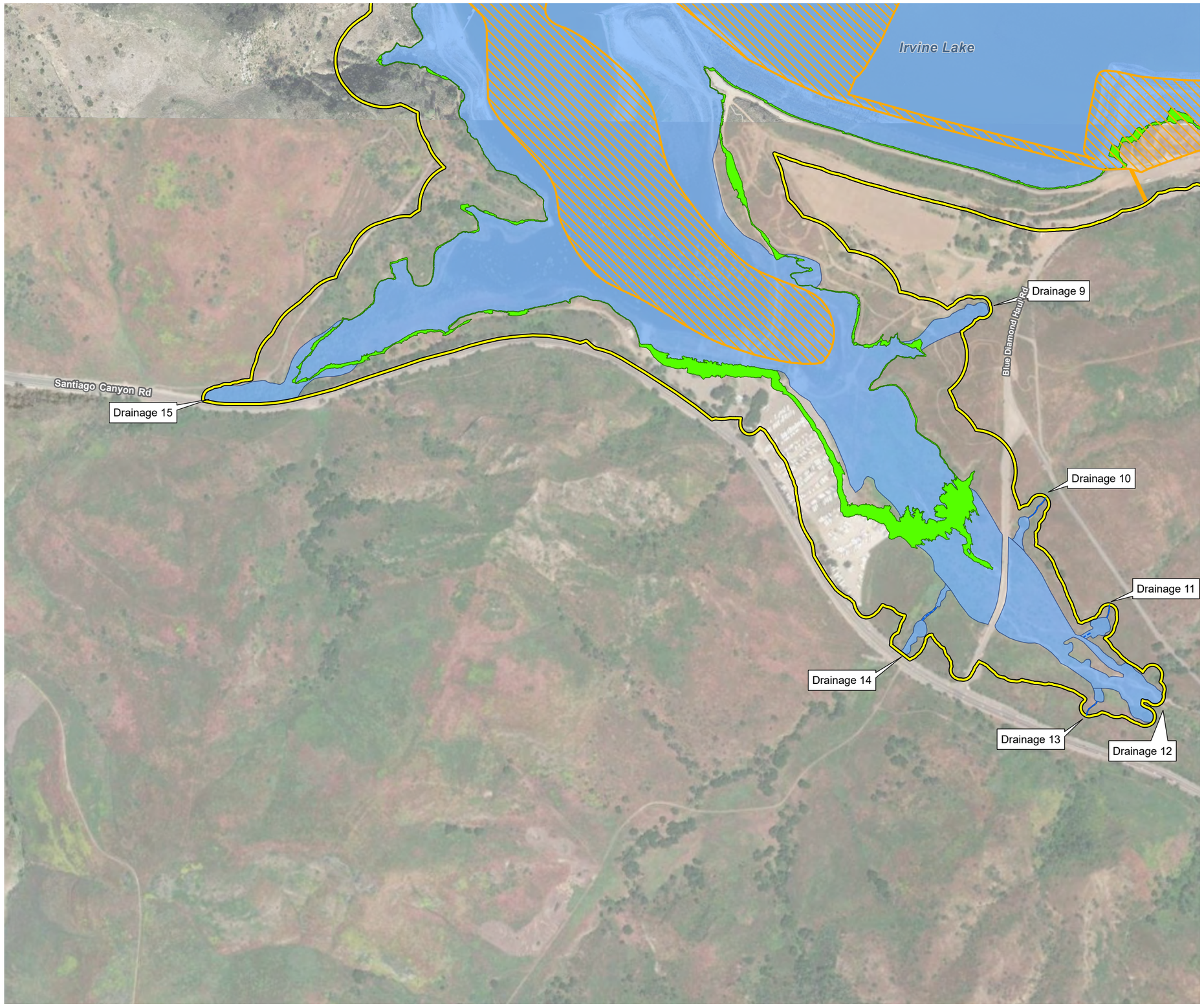
Project Impacts
CDFW Jurisdictional Waters Exhibit 4.3-12b

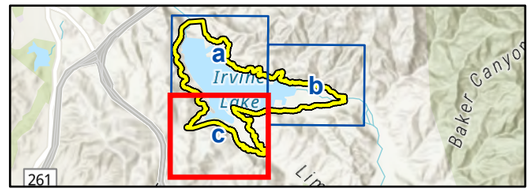
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

Exhibit 4.3-12c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts

TABLE 4.3-6
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)				
	Existing	**Permanent**	**Temporary**	**Total Permanent/ Temporary Impact**	**Additional Inundation Area[a]**
USACE WOTUS	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 326.770	Non-wetland: 1.798	Non-wetland: 137.857	Non-wetland: 139.655	Non-wetland: 0.000
	Total: 428.476	Total: 1.798	Total: 201.772	Total: 203.570	Total: 0.673
RWCQB Waters of the State	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 333.499	Non-wetland: 1.861	Non-wetland: 137.865	Non-wetland: 139.726	Non-wetland: 0.038
	Total: 435.20	Total: 1.861	Total: 201.780	Total: 203.641	Total: 0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

Indirect Impacts

Water Quality

During construction, excess silt, petroleum, or chemicals on the soil surface within the construction could be washed into drainages (including Santiago Creek) and Irvine Lake during storms and may affect areas downstream of the Project. Adverse effects on water quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the Project will obtain a State Water Resources Control Board's General Permit for Storm Water Discharge Associated with Construction Activity (Construction Activities General NPDES Permit), which will include development of a Storm Water Pollution Prevention Plan and provisions for the implementation of Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant and no mitigation would be required.

No urban pollutants would be expected during operation of the Project. Therefore, there would be no long-term impact and no mitigation would be required.

Impact Conclusion: *The Project has potential to impact areas within the jurisdiction of the USACE, RWQCB, and CDFW and water quality. With implementation of* ***MM BIO-4*** *and standard best management practices these impacts would be less than significant. Therefore, the potential impact on state and*

federally protected wetlands and other jurisdictional resources would be less than significant, pursuant to Threshold 4.3-3.

Threshold 4.3-4

Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Santiago Creek Dam presents an existing barrier to wildlife movement for fish and amphibians along the Creek. As such, existing wildlife movement in the BSA is expected to be restricted to movement along the creek upstream of Irvine Lake and movement along the creek downstream of the dam. Although wildlife may avoid the dry lakebed during construction, the Project would not be expected to interfere with movement upstream or downstream of construction area. Wildlife species (e.g., mountain lion) would be expected to move through upland areas or along the edge of the Project through habitat not impacted by the Project. The Project would include night construction, which could temporarily decrease wildlife movement in the vicinity of construction at the dam embankment, spillway, near the staging area, and along access roads that are used by medium to large-sized mammals for movement at night. However, medium to large-sized mammals and other wildlife would still able to use ridgelines that would not be affected by the Project. It is possible that wildlife may choose to move along the roads despite the construction, which would increase the potential for wildlife strikes along the roadways at night. Speed limits and wildlife crossing signage would be posted along access roads (**PDF BIO-6**). Therefore, the impact on wildlife movement would be less than significant.

The Project would permanently impact 14.73 acres of habitat downstream of the dam along Santiago Creek that wildlife currently moves through (Table 4.3-5); however, it would be in the same location as the existing dam structure; it would not create a new barrier to movement.

Additional Inundation

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet); it would not create any new barriers to wildlife movement. Therefore, the effect of the additional inundation on wildlife movement would be less than significant and no mitigation would be required.

Noise

See discussion under Threshold 4.3-1.

Night Lighting

See discussion under Threshold 4.3-1.

Human Activity

See discussion under Threshold 4.3-1.

Impact Conclusion: *Santiago Creek Dam represents an existing barrier to wildlife movement; therefore the Project would not impact wildlife movement along a regional wildlife corridor. However, the Project is located within a NCCP/HCP Reserve and wildlife movement in adjacent areas could be affected by noise, night lighting, and human activity during construction. With*

*implementation of **PDF BIO-1**, **PDF BIO-6**, and **PDF BIO-7**, impacts would be less than significant, pursuant to Threshold 4.3-4.*

Threshold 4.3-5

Would the Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Several common bird species have the potential to nest in the vegetation, on the ground, or in structures in the BSA. The loss of an active migratory bird nest, including nests of common species, would be considered a violation of the MBTA and Sections 3503, 3503.5, and 3513 of *California Fish and Game Code*. Standard pre-construction surveys and nesting bird protections would ensure that construction would not violate the provisions of the MBTA or *California Fish and Game Code* (**PDF BIO-5**).

Additional Inundation

The additional inundation areas would be expected to be inundated during the storm season, which is generally outside the peak bird breeding season. The inundation would be associated with natural storm events, which could lead to a natural loss of nests early in the spring. The potential inundation of nests is expected to be extremely limited because (1) it would only affect species nesting within two feet in elevation above the current maximum water line; (2) it would only affect species nesting in February and March; and (3) it would only occur approximately once every several years. Therefore, the effect on nesting birds would be expected to be less than significant and no mitigation would be required.

Impact Conclusion: *The Project has potential to affect nesting birds/raptors, which are protected by the MBTA and California Fish and Game Code. With implementation of standard pre-construction surveys and nesting bird protections (**PDF BIO-5**), the impact would be less than significant, and no conflict with applicable requirements would occur, pursuant to Threshold 4.3-5.*

Threshold 4.3-6

Would the Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The Project is located within the Central-Coastal NCCP/HCP area and is within a NCCP/HCP Non-Reserve Open Space Area (Exhibit 4.3-3).

Consistency With Non-Reserve Open Space Policies

The NCCP/HCP Implementation Agreement allows development of infrastructure within the Reserve System in accordance with the provisions of Chapter 5.3, 5.9, and 5.11 of the NCCP/HCP and 5.3.3 of the Implementation Agreement. Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP would be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP. Implementation of **MM BIO-3** would ensure that IRWD's take is accounted for according to the NCCP/HCP.

Consistency With Coastal Sage Scrub Take Authorization

Under the NCCP/HCP, IRWD is allotted up to 87 acres of take (60 within the Reserve System and 27 outside the Reserve System); this Project may use credits from within the Reserve System. IRWD merged with the Santiago County Water District, which was allotted 9 acres within the Reserve System, bringing the total allotted for IRWD to 96 acres (69 acres within the Reserve System and 27 acres outside the Reserve System). As of March 2025, IRWD has approximately 44 acres within the Reserve remaining in their allocation.

Per Section 5.11 of the NCCP/HCP, infrastructure is an existing use that is allowed within the Reserve. The Project would remove 8.41 acres of coastal sage scrub habitat (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment) (Table 4.3-5, Exhibit 4.3-8). Coastal sage scrub vegetation types that would be impacted include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, and disturbed floodplain sage scrub. Raising the spillway would also temporarily impact 3.36 acres within the additional inundation area (Table 4.3-5, Exhibit 4.3-8). Coastal sage scrub in the additional inundation area include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, southern cactus scrub, and disturbed southern cactus scrub. Implementation of **MM BIO-3** would ensure that IRWD's take is accounted for according to the NCCP/HCP.

Conditionally Covered Species

Intermediate Mariposa Lily

Potential habitat for the Intermediate mariposa lily is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020, and one individual mariposa lily was observed. Focused surveys for this species were conducted upstream of Santiago Creek Dam in 2022, and five individual intermediate mariposa lilies were observed in three locations. The intermediate mariposa lily location downstream of the dam is within the temporary impact area and would be impacted if it cannot be avoided during construction. The remaining intermediate mariposa lily locations observed are outside the permanent and temporary impact areas for the Project. Two of the intermediate mariposa lily locations (consisting of four individuals) are located within the additional inundation area (Exhibit 4.3-9); however, they are already located at the edge of the existing inundation area and would not be expected to be significantly impacted. Additionally, the NCCP/HCP covers the loss of up to 20 intermediate mariposa lily individuals; therefore, the loss of one individual within the temporary impact area plus the potential loss of four individuals within the additional inundation area would be covered by the NCCP/HCP.

Least Bell's Vireo

Potential habitat for the least Bell's vireo is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020; no vireo were observed. Focused surveys for this species were conducted upstream of Santiago Creek Dam in 2022; least Bell's vireo were observed throughout riparian scrub/woodland habitat at the upper end of Irvine Lake, along Santiago Creek, and in the southern portion of Irvine Lake (Exhibit 4.3-9). Least Bell's vireo was incidentally observed in the riparian habitat downstream of the dam during focused surveys conducted in summer 2024. Implementation of **MM BIO-4** and **MM BIO-5** would ensure that impacts on least Bell's vireo are reduced to less than significant.

Impact Conclusion: *The Project is consistent with the NCCP/HCP. With implementation of* ***MM BIO-3*** *and* ***MM BIO-5****, the impact would be reduced to less than significant, and no conflict with the NCCP/HCP would occur, pursuant to Threshold 4.3-6.*

4.3.6 CUMULATIVE IMPACTS

To ensure that the cumulative impact analysis is as comprehensive as possible, pending projects in surrounding cities have been analyzed (see Table 4-1, Exhibit 4-1).

The Santiago Canyon Road Safety Improvement Project is currently under construction. It includes measures to improve roadway safety along the existing road such as adding passing lanes, retaining walls, guard rails, drainage improvements, stormwater treatment, and relocating utilities; however, this project is not expected to have substantial impacts on biological resources as the majority of improvements would occur within the existing right-of-way as shown on project maps. There may be limited impacts to biological resources along the edge of the roadway; any impact on coastal sage scrub would be covered by the County's participation in the NCCP/HCP and accounted accordingly. Any impact on riparian resources would be mitigated as required through the project's permitting.

The other two cumulative projects under consideration are updates to the City of Orange and County of Orange Housing Elements. The updates to these documents provide policy guidance for housing for the City/County to address housing opportunities and needs for present and future residents. The updates to these housing elements would not have impacts on biological resources.

Impact Conclusion: *When considered with the cumulative list of projects, the Project would not have a disproportionate contribution to cumulative impacts. Each project would be mitigated at the project-level and cumulative impacts would be less than significant.*

4.3.7 MITIGATION PROGRAM

Mitigation Measures

This section focuses on the development of mitigation measures for those impacts of the Project found to be significant or potentially significant. Strategies to mitigate each impact to a less than significant level are identified and described in the following section.

MM BIO-1A **Special Status Plants/Pre-construction Surveys:** During the peak blooming season prior to the initiation of construction (within the same year or the spring/summer prior), IRWD will retain a qualified Botanist to conduct a focused survey for mud nama. Although not required, the pre-construction survey will also include intermediate mariposa lily, many-stemmed dudleya, and Coulter's matilija poppy to minimize impacts on these species. The pre-construction survey will focus on these species in the general locations where they were previously observed within the impact area, including a 100-foot survey buffer. The Botanist will record special status plant locations within the impact area and within 100 feet of the impact area using GPS and will clearly mark locations with pin flags or lathe and flagging. The Botanist will meet in the field with IRWD to discuss whether avoidance of these locations would be feasible (e.g., whether they could be protected within the temporary impact areas).

No compensatory mitigation will be required if the locations of intermediate mariposa lily,[11] many-stemmed dudleya, and Coulter's matilija poppy cannot be avoided. However, IRWD will notify the Natural Communities Coalition (NCC) and allow the NCC to collect seed and/or salvage special status plants that will be impacted by the Project. Seed collection/salvage will be coordinated so that it does not delay the construction schedule.

Compensatory mitigation will be required if more than 10 percent of the mud nama locations mapped in 2022 will be impacted, as described below under MM BIO-1B.

Following the pre-construction survey and field meeting with IRWD, the Botanist will prepare a Pre-construction Special Status Plant Survey Report to document the results of the pre-construction surveys and will document the special status plant locations that will be avoided during construction. The Botanist will calculate the percent of the mud nama population that will be impacted by comparing the amount of mud nama within the construction impact area to the mud nama locations mapped in 2022. The report will also document that the final engineering plans, coupled with construction avoidance areas, will impact less than 50 percent of the mud nama population mapped in 2022.

After the field meeting with IRWD, the Botanist will work with IRWD/Contractor to clearly mark the locations that will be avoided during construction with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing until the initiation of construction. During construction, the Biological Monitor will ensure that these areas are protected as described below under MM BIO-1C.

MM BIO-1B **Mud Nama/Compensatory Mitigation:** As described under MM BIO-1A, if compensatory mitigation is required for mud nama (i.e., more than 10 percent of the mud nama locations mapped in 2022 will be impacted by the Project), IRWD will retain a qualified Restoration Biologist to prepare a detailed Mud Nama Mitigation Plan. The Plan will describe collection of seed, salvage of individuals, salvage of soils (i.e., seed bank), and establishment of a new on-site location that will replace the area of mud nama impacted at a 1:1 ratio (i.e., 1 acre impacted to 1 acre replaced). The on-site mitigation areas will provide similar microhabitat, including similar soils and elevation, to provide similar inundation frequency to current conditions. The Mud Nama Mitigation Plan will include the following topics: (1) responsibilities and qualifications of the personnel to implement and supervise the plan; (2) mitigation site selection criteria; (3) site preparation and planting implementation, including pilot studies (if needed); (4) implementation schedule; (5) maintenance plan/guidelines; (6) monitoring plan; (7) performance criteria and contingency planning; and (8) long-term preservation. IRWD will implement the Plan.

IRWD will retain a qualified Restoration Biologist/Seed Collector to collect seed, salvage individuals, and salvage soils (i.e., seed bank) from the mud nama during the spring/summer prior to impacts on this plant. IRWD will ensure that the seed/salvaged individuals/soil are stored by a qualified Seed Collector in

[11] The NCCP/HCP covers impacts on this species up to 20 individuals; if more than 20 individuals would be impacted, additional consultation with the resource agencies would be required. However, this is not anticipated to be necessary because only six individuals have been observed in the BSA during focused surveys, and only one individual is located in the impact area.

appropriate conditions to maintain the viability of the seed to be used in the implementation of the Mud Nama Mitigation Plan.

MM BIO-1C **Special Status Plants/Biological Monitoring:** Before the start of construction, IRWD will retain a qualified Biological Monitor to confirm that the special status plant locations to be avoided are clearly marked with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing. The Biological Monitor will post signs to indicate each location as an "Environmentally Sensitive Area" that no work activities may occur within the fencing. The Biological Monitor will conduct a WEAP training regarding the importance of Environmentally Sensitive Areas. Once Project activities begin, the Biological Monitor will check the fencing/signage weekly to ensure that it stays in place throughout construction activities and will notify IRWD and the construction contractor immediately if the fencing/signage needs to be repaired.

MM BIO-2 **Crotch's Bumble Bee:** If the California Department of Fish and Wildlife (CDFW) determines that listing of the Crotch's bumble bee as threatened or endangered under the California Endangered Species Act is not warranted prior to or during implementation of the Project, this measure will not be required.

Until CDFW makes a determination, or if CDFW determines that listing of the Crotch's bumble bee as threatened or endangered under the California Endangered Species Act is warranted, the following measures will be required.

MM BIO-2A **Incidental Take Permit:** IRWD will obtain an Incidental Take Permit (2081) prior to removal of suitable habitat for Crotch's bumble bee. IRWD will consult with CDFW to determine the appropriate mitigation to compensate for loss of floral resources associated with the species at a minimum 1:1 ratio of suitable habitat impacted (i.e., 1 acre impacted to 1 acre compensated). Potential compensatory mitigation options include on-site revegetation of temporarily disturbed areas using a seed mix of species preferred by Crotch's bumble bee at a minimum 1:1 ratio of temporarily impacted areas; payment of an in-lieu mitigation fee to an approved mitigation bank at a minimum 1:1 ratio of permanently impacted areas; long-term preservation of on-site or off-site habitat at a minimum 1:1 ratio of permanently impacted areas; or another strategy as approved by CDFW. Mitigation provided for under MM BIO-3 (Coastal Sage Scrub) may be used towards mitigation for Crotch's bumble bee.

MM BIO-2B **Pre-construction Survey.** Prior to vegetation clearing or other ground-disturbance during each year of Project construction, IRWD will retain a qualified Biologist to conduct pre-construction focused surveys for active nests of Crotch's bumble bee following the most current CDFW guidelines[12] within 100 feet of Project impact areas with suitable habitat for Crotch's bumble bee. According to current guidelines (CDFW 2023), the Biologist will conduct three visual surveys during the species' active period (i.e., April to August). The timing between each visual survey may be reduced to accommodate the construction schedule, as long as the first and last survey are conducted at least one week apart during the active period.

[12] The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

If no active nests of Crotch's bumble bee are observed, vegetation clearing, grading, and ground disturbance may proceed.

If a ground nest is observed, it will be protected in place until it is no longer active, as determined by the qualified Biologist retained by IRWD. IRWD will implement applicable protective measures from the Incidental Take Permit for the species (see MM BIO-2A). Potential protective measures may include protective buffers coupled with biological monitoring to avoid take of an active ground nest. The protective buffer will be determined by the Biologist conducting the pre-construction survey, or as designated in conditions in the Incidental Take Permit.

IRWD will ensure that a Letter Report is prepared to document the results of the pre-construction survey and will provide the letter to CDFW within 30 days of the completion of the survey.

MM BIO-2C **Biological Monitoring.** Biological monitoring for Crotch's bumble bee will follow the most current CDFW guidelines[13] at the time of construction. According to current guidelines (CDFW 2023), IRWD will retain a Biological Monitor to be present onsite during vegetation clearing and/or ground-disturbing activities that take place during the Crotch's bumble bee queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring will be required for vegetation clearing or ground-disturbance that occurs from November to January.

If a ground nest of Crotch's bumble bee is observed during the monitoring, it will be protected in place until it is no longer active, as determined by the qualified Biologist retained by IRWD. IRWD will also implement applicable protective measures from the Incidental Take Permit for the species (see MM BIO-2A). If establishment of a protective buffer and/or avoidance of the nest is not feasible, IRWD and its qualified Biologist will consult with CDFW regarding potential encroachment into the protective buffer that may result in take of Crotch's bumble bee pursuant to MM BIO-2A.

MM BIO-3 **Coastal Sage Scrub and Coastal California Gnatcatcher:** Potential direct and indirect impacts on coastal sage scrub and coastal California gnatcatcher are fully mitigated through IRWD's participation and contribution in the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Mitigation Program. This participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other Covered Species and Covered Habitats. IRWD will mitigate for impacts on coastal sage scrub and coastal California gnatcatcher through a combination of the following, as approved by USFWS and CDFW: (1) use of IRWD's NCCP/HCP take allocation at a 1:1 ratio for impacted coastal sage scrub; (2) restoration of coastal sage scrub habitat at a minimum 1:1 ratio in areas temporarily disturbed by construction including weeding and three years of restoration monitoring; and/or (3) restoration of coastal sage scrub habitat at an on-site or off-site location at a minimum 1:1 ratio, as described in a Habitat Mitigation and Monitoring Plan (HMMP) in order to preserve IRWD's remaining NCCP/HCP take allocation (if desired by IRWD).

[13] The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

If a coastal sage scrub habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will prepare a Coastal Sage Scrub HMMP and submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Coastal Sage Scrub HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Ecologist to prepare the Coastal Sage Scrub HMMP and will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Coastal Sage Scrub HMMP and ensuring that the mitigation program achieves the approved performance criteria.

MM BIO-4 **Riparian Vegetation and Jurisdictional Permitting:** Before the start of construction, IRWD will obtain all necessary permits for impacts to U.S. Army Corps of Engineers (USACE), California Department of Fish and Wildlife (CDFW), and/or Regional Water Quality Control Board (RWQCB) jurisdictional areas and will determine the compensatory mitigation needed for the loss of jurisdictional waters and wetlands. Potential compensatory mitigation options will include one or a combination of the following, as determined through consultation with the above-listed resource agencies: (1) establishment of riparian habitat (on site or off site) at a minimum 1:1 ratio for impacted jurisdictional areas; (2) payment to a resource agency-approved mitigation bank or regional riparian enhancement program (e.g., invasive species removal) at a minimum 1:1 ratio for impacted jurisdictional areas; and/or (3) preservation of off-site riparian habitat on IRWD lands at a minimum 1:1 ratio for impacted jurisdictional areas.

If in-lieu mitigation fees are required, IRWD will pay the in-lieu mitigation fee before the start of construction to a mitigation bank/enhancement program for the replacement of impacted jurisdictional resources.

If a riparian habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will retain a qualified Restoration Ecologist to prepare a Riparian Habitat Mitigation and Monitoring Plan (HMMP) and will submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Riparian HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Riparian HMMP and ensuring that the mitigation program achieves the approved performance criteria.

MM BIO-5 **Least Bell's Vireo:** IRWD will consult with USFWS and CDFW under Section 7 of the Federal Endangered Species Act and Section 2080.1 of the California Fish and Game Code to approve the mitigation approach and whether NCCP/HCP Conditional Coverage will be extended to least Bell's vireo based on the measures below.

A. IRWD will obtain concurrence from USFWS and CDFW that the riparian mitigation described in MM BIO-4 will provide appropriate compensatory mitigation for the loss of riparian habitat.

B. To the extent feasible, removal of riparian habitat will be conducted during the non-breeding season (i.e., September 16 to March 14) in order to minimize direct impacts on nests of least Bell's vireo. IRWD will retain a qualified Biologist to monitor vegetation clearing of riparian habitat.

C. Before starting construction each spring, IRWD will retain a qualified Biologist to survey all habitat within 500 feet of the construction limits for the presence of least Bell's vireo. The Biologist will map any active nests/territories as Environmentally Sensitive Areas on an aerial photograph. IRWD will also ensure that the Biologist prepares a Letter Report and that it is submitted to USFWS and CDFW to document the results of the pre-construction survey within 30 days of completion of the survey.

D. IRWD will retain a qualified Biologist to conduct weekly focused surveys during construction to update the location of active least Bell's vireo territories. The Biologist will map new territories as Environmentally Sensitive Areas and will remove inactive Environmentally Sensitive Areas from the map. Once construction is in progress, IRWD will provide Weekly Reports to USFWS and CDFW.

E. IRWD will retain a qualified Biologist to establish a 500-foot protective buffer around each least Bell's vireo territory identified during pre-construction or weekly surveys. The Biologist will verify that occupied riparian habitat is protected with lathe and rope, orange snow fencing, or other suitable fencing to provide an adequate buffer from construction work. The Biologist will post signs to indicate that the area is an "Environmentally Sensitive Area" and that no work activities may occur within the fencing. The Biologist will conduct training to educate workers on the importance of Environmentally Sensitive Areas.

F. If construction activities need to occur within 500 feet of an active least Bell's vireo territory, IRWD will consult with USFWS and CDFW to determine an appropriate noise reduction strategy. Appropriate noise reduction measures may include, but are not limited to, specifications for equipment type, siting of equipment, and temporary noise barriers. IRWD will retain a qualified Biologist to monitor the installation of any noise reduction measures.

G. IRWD will retain a qualified Biologist to conduct daily monitoring when construction activities are conducted within 500 feet of an active least Bell's vireo territory or until the Biologist determines that the individuals are not being impacted by the noise (i.e., the noise measures are established and birds are acclimated to the activities).

MM BIO-6 **Bald Eagle:** IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW.

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or early April to confirm the nesting stage (i.e., presence of eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing until the young fledge or May 15, whichever comes last. The Biologist will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

MM BIO-7 **Pre-Construction Bat Surveys:** IRWD will retain a qualified Biologist to conduct a pre-construction roosting bat survey (including both day and evening efforts) before construction begins. The day survey will involve inspection of the structures within the impact area to look for signs of bat roosting. The evening survey will involve monitoring each potential roost site for evening emergence, conducting exit counts, and acoustic monitoring (from a half an hour before sunset to no greater than three hours after sunset) near potential roosts within the impact area. If the Biologist determines that bats are actively roosting onsite, IRWD will retain a qualified Biologist to prepare a Project-specific Bat Roost Minimization Plan (BRMP) and will implement the plan. The BRMP will include relevant avoidance and minimization measures based on the survey results. If tree roosting bat species are found to be both foraging and potentially roosting onsite, IRWD will conduct tree removal only during the non-maternity season (September 1 through March 31). When potentially-occupied roost trees are removed, IRWD will implement a phased tree removal method (i.e., leaving the felled tree on the ground for 24-48 hours after the felling to allow any tree-roosting bats to leave). IRWD will avoid all Project-structures proposed for demolition that support an active day-roost until either the roost is no longer active, as determined by a qualified Biologist, or the occupants can be humanely evicted as described in the BRMP. IRWD will retain a qualified Biologist to conduct bat eviction during the fall months outside of the bat maternity season (i.e., September 1 through November 30).

MM BIO-8 **Tree Survey/Replacement:** Before the start of construction, IRWD will retain a qualified Biologist or Certified Arborist to conduct a tree survey to identify the location and health of western sycamore trees within 100 feet of the Project impact area. To the extent practicable, temporary impact areas will be revised to avoid and minimize effects on western sycamore trees. Standard tree protection measures to fence western sycamores will be recommended for trees within or near the work area (PDF BIO-4).

Any western sycamores that are greater than four inches diameter at breast height (dbh) removed by construction will be replaced at no less than a 1:1 ratio. Trees with a dbh of 4 inches to 8 inches will replaced at a 1:1 ratio with a minimum container size of 15 gallons. Trees with a dbh of greater than 8 inches to 16 inches will be replaced at a 1:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 16 inches to 24 inches will be replaced at a 3:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 24 inches to 36 inches will be replaced at a 5:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 36 inches will be replaced at a 10:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). The replacement trees will be replaced either on-site or off-site in a location with appropriate microclimate conditions. The replacement trees will be incorporated into the Coastal Sage Scrub HMMP or Riparian HMMP (described above).

4.3.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Assuming impacts to mud nama can be reduced to less than 50 percent of the population mapped in 2022 through refinement of Project design, the impact will be reduced to less than significant with the incorporation of recommended mitigation. For all other impacts, implementation of the recommended mitigation measures will mitigate biological impacts to a level that is considered less than significant.

4.3.9 REFERENCES

American Ornithological Society (AOS). 2024 (July). *Check-list of North and Middle American Birds (7th ed., as revised through 65th Supplement)*. *Ornithology* 141(ukae019). Washington, D.C.: AOU. https://checklist.americanornithology.org/taxa/

Atwood, J.L. 1992. *Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look.* Birding 25: 228-233.

Atwood, J.L. 1990. Status Review of the California Gnatcatcher (*Polioptila californica*). Manomet Bird Observatory, Manomet, MA.

Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.

Bennett, A.F. 1990. Habitat Corridors and the Conservation of Small Mammals in the Fragmented Forest Environment. *Landscape Ecology* 4(2–3):109–122. New York, NY: International Association for Landscape Ecology.

California Department of Fish and Wildlife (CDFW). 2025a (March 12, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

———. 2025b (February 27). *California Natural Communities List*. Natural Communities List Arranged Alphabetically by Life Form (PDF). Sacramento, CA: CDFW Biogeographic Data Branch. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

———. 2025c (January). *Special Vascular Plants, Bryophytes, and Lichens List.* Sacramento, CA: CDFW, Natural Heritage Division. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline.

———. 2025d (January). *Special Animals List.* Sacramento, CA: CDFW, Natural Heritage Division. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline.

———. 2024a (January 19, date accessed). *Bald Eagles in California.* California Department of Fish and Wildlife. http://wildlife.ca.gov/Conservation/Birds/Bald-Eagle

———. 2024b (December 18, date accessed). *Petitions to List Species Under the California Endangered Species Act, Petitions, Notices and Documents, Mountain Lion.* California Fish and Game Commission. https://fgc.ca.gov/cesa#ml.

———.2024c (March). *Report to the Fish and Game Commission. Evaluation of the petition from San Francisco Baykeeper, The Bay Institute, Restore the Delta, and California Sportfishing Protection Alliance to list White Sturgeon (Acipenser transmontanus) as threatened under the California Endangered Species Act.* California Department of Fish and Wildlife.

———.2023. (June 6). *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species*. Sacramento, CA: CDFW.

———. 2021 (May 18). Office of Administrative Law's Notice ID #Z2019-0716-03 and Z2020-0421-01 Petition to List Mountain Lion (Puma concolor) as a Threatened or Endangered Species. https://fgc.ca.gov/CESA#ml.

———. 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.

_____. 2014. California Wildlife Habitat Relationships System (version 9.0 personal computer program). Life History Accounts for Species in Table 8. Sacramento, CA: CDFW, California Interagency Wildlife Task Group. https://www.wildlife.ca.gov/Data/CWHR.

———. 2000. Biogeographic Data Branch (CDFW BDB). California Wildlife Habitat Relationships System (CWHR). Western Pond Turtle (*Actinemys marmorata*). By: S. Morey. California Interagency Wildlife Task Group. Sacramento, CA: CDFW BDB. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2657&inline=1.

California Department of Forestry and Fire Protection (CAL FIRE). 2020 (December 17, Accessed March 26, 2021). Incident information: Bond Fire. https://www.fire.ca.gov/incidents/2020/12/2/bond-fire/.

CalFire. 2023 (October 23). Statistics. https://www.fire.ca.gov/our-impact/statistics.

California Native Plant Society (CNPS). 2025 (March 12, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. http://www.rareplants.cnps.org/.

———. 2024 (January 19, date accessed). A Manual of California Vegetation, Online Edition. Sacramento, CA: CNPS. https://vegetation.cnps.org.

California Irrigation Management Information System (CIMIS). 2020. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. http://www.cimis.water.ca.gov.

Center for Biological Diversity. 2019 (June 25). A Petition to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act (CESA). Oakland, CA: Center for Biological Diversity. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=171208&inline.

Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.

Collins, Paul W. 1999b. Rufous-crowned Sparrow (Aimophila ruficeps), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/472.

Consortium of California Herbaria (CCH). 2023. Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. http://ucjeps.berkeley.edu/consortium/.

Cregg, Bert. 2013 (April 25). *Trees and flooding FAQs.* East Lansing, Michigan: Michigan State University Extension, Department of Horticulture and Department of Forestry. https://www.canr.msu.edu/news/trees_and_flooding_faqs.

Crother, B.I. (Ed.). 2017 (September). Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding. *Society for the Study of Amphibians and Reptiles Herpetological Circular*

43:1–102. https://ssarherps.org/wp-content/uploads/2017/10/8th-Ed-2017-Scientific-and-Standard-English-Names.pdf

Curtis, K.E. and R.W. Lichvar. 2010 (July). *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1). Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

Faber-Langendoen, D., L. Master, J. Nichols, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, and B. Young. 2012 (June). *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks* (Revised Edition). Arlington, VA: NatureServe. http://www.natureserve.org/sites/default/files/publications/files/natureserveconservationstatusmethodology_jun12_0.pdf.

Fahrig, L. and G. Merriam. 1985. Habitat Patch Connectivity and Population Survival. *Ecology* 66(6): 1762–1768. Tempe, AZ: Ecological Society of America.

Francis, Robert A. et al. 2005. Survival and Growth Responses of *Populus nigra, Salix elaeagnos and Alnus incana* cuttings to varying levels of hydric stress. *Forest Ecology and Management* 210:291–301. Cambridge, MA: Elsevier.

Goodman, R.H. 1999. *Relocation Project of the Southwestern Pond Turtle (Clemmys marmorata pallida) from the San Gabriel Dam to the Upper West Fork of the San Gabriel River*. Irvine, CA: Chambers Group, Inc.

Germano, D.J., and R.B. Bury. 2001. Western Pond Turtles (*Clemmys marmorata*) in the Central Valley of California: Status and Population Structure. *2001 Transactions of the Western Section of the Wildlife Society.* 37:22–36. Rancho Cordova, CA: The Wildlife Society, Western Section.

Glenz, C. et al. 2006. Flooding Tolerance of Central European Tree and Scrub Species. *Forest Ecology and Management* 235:1–13. Cambridge, MA: Elsevier.

Good, J.E.G. et al. 1992. Species and Clonal Variation in Growth Responses to Waterlogging and Submersion in the Genus *Salix. Proceedings of the Royal Society of Edinburgh* 98:21–48. Cambridge, England: Cambridge University Press.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

Harris, L.D. and P.B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors (pp. 11–34). *Preserving Communities and Corridors* (G. Mackintosh, Ed.). Washington, D.C.: Defenders of Wildlife.

Hayes, Erin. 2023 (May 4). Personal communication. Email between Erin Hayes (OC Parks) and Jacob Moeder (IRWD) regarding the type and amount of fish that are stocked in Irvine Lake by OC Parks.

Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.

Irvine Ranch Water District (IRWD). 2020 (April 16, date accessed). About Irvine Lake. Irvine, CA: IRWD. https://www.irwd.com/construction/irvine-lake.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 255 pp.

Jepson Flora Project. 2024 (January 19). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. http://ucjeps.berkeley.edu/eflora/.

Lichvar, R.W. and S.M. McColley. 2008 (August). *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Lordson, Brian. 2020 (February 25). Sounding the alarm: Wildfire exposure and prevention in construction. https://axaxl.com/fast-fast-forward/articles/sounding-the-alarm_wildfire-exposure-and-prevention-in-construction.

MacArthur, R.H. and E.O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton, NJ: Princeton University Press.

Munz, P.A. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

National Park Service. 2022 (March). Wildfire Causes and Evaluations. https://www.nps.gov/articles/wildfire-causes-and-evaluation.htm.

Noss, R.F. 1983. A Regional Landscape Approach to Maintain Diversity. *BioScience.* 33(11): 700–706. Washington, D.C.: American Institute of Biological Sciences.

Orange, County of. 1996a (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.

———. 1996b (July). *Implementation Agreement Regarding the Natural Community Conservation Plan for the Central/coastal Orange County Subregion of the Coastal Sage Scrub Natural Community Conservation Program.* Santa Ana, CA.

Pareti, Jennifer. 2024 (October 23). Personal communication. Email between Jennifer Pareti (CDFW) and Amber Heredia (Psomas) and Andy Uk (IRWD) regarding the release site for the possible translocation of Santa Ana speckled dace by CDFW.

Proudfoot, G.A., Sherry, D.A., and Johnson, S. 2000. Cactus Wren (*Campylorynchus brunneicapillus*) in the Birds of North America (A. Poole and F. Gill, eds.) no. 558. Birds of North America. Philadelphia.

Psomas. 2024a (September 19) *Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

_____. 2024b (October 21) *Results of Visual Survey and Trapping Program for Southwestern Pond Turtle for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California*. Santa Ana, CA: Psomas.

_____. 2022a (September 27). *Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

_____. 2022b (May 2). *Results of Focused Presence/Absence Surveys for the Quino Checkerspot Butterfly for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____. 2022c (August 23). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____. 2022d (July 25). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____. 2022e (September 27). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____. 2022f (September 27). *Results of Focused Presence/Absence Surveys for the Western Yellow-billed Cuckoo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____.2020a (August 18). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas

_____. 2020b (August 24). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____. 2020c (August 26). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas

_____. 2020d (September 3). Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.

Ruben, J.A. and W.J. Hillenius. 2005 (May). Cold Blooded. *Natural History*. New York, NY: American Museum of Natural History.

Shuford, W.D. and T. Gardali (Eds.). 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. *Studies of Western Birds 1*. Camarillo, CA and Sacramento, CA: Western Field Ornithologists and CDFG (respectively).

Simberloff, D. and J. Cox. 1987. Consequences and Costs of Conservation Corridors. *Conservation Biology* 1(1): 63–71. Boston, MA: Blackwell Scientific Publications.

Smithsonian National Museum of Natural History (SNMNH). 2011. Mammal Species of the World (3rd ed.) (a database based on Wilson, D.E., and D.M. Reeder's 2005 publication entitled Mammal Species of the World, A Taxonomic and Geographic Reference, 3rd ed.). Washington, D.C.: SNMNH. https://www.departments.bucknell.edu/biology/resources/msw3/.

Soule, M.E. 1987. *Viable Populations for Conservation*. New York, NY: Cambridge University Press.

Spinks, P.Q., G.B. Pauly, J.J. Crayon, and H.B. Shaffer. 2003. "Survival of the western pond turtle (*Emys marmorata*) in an urban California environment." US Geological Survey Staff -- Published Research. University of Nebraska: USGS. 526.http://digitalcommons.unl.edu/usgsstaffpub/526.

State Water Resources Control Board (SWRCB). 2019 (April 2). *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf.

Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians* (3rd ed.). Boston, MA: Houghton-Mifflin Company.

Tallent-Halsell, N.G. and L.R. Walker. 2002 (December). Responses of *Salix Goodhingii* and *Tamarix Ramosissima* to Flooding. *Wetlands* 22(4):776–785. Fargo, ND: The Society of Wetland Scientists.

Tietje et al. 2005. Oak Woodlands as Wildlife Habitat. *A Planner's Guide for Oak Woodlands, Second Edition*. Davis, CA: University of California. https://anrcatalog.ucanr.edu/pdf/3491E.pdf.

Unitt, P. 1984. *The Birds of San Diego County.* San Diego Society of Natural History, Memoir 13, San Diego, CA.

U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0). (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2020 (April 16, date accessed). State Soil Data Access Hydric Soils List. Washington, D.C.: USDA, NRCS. http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

U.S. Department of Agriculture, U.S. Forest Service (USDA USFS). 2023 (June 17, date accessed). Put on Your Eagle Eyes! It's Time to Count Eagles! San Bernardino National Forest. San Bernardino, CA. https://www.fs.usda.gov/detail/sbnf/news-events/?cid=STELPRDB5408473.

U.S. Environmental Protection Agency (USEPA). 2017 (January 17, last update). Climate Change. Washington, D.C.: USEPA. https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html.

U.S. Fish and Wildlife Service. 2024a (August 13). Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for the Santa Ana Speckled Dace. Federal Register Vol. 89, No. 156.

———. 2024b (December 12). Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Monarch Butterfly and Designation of Critical Habitat. Federal Register Vol. 89, No. 239.

———. 2023 (June 17, date accessed). Monarch butterfly (*Danaus plexippus*). Environmental Conservation Online System. https://ecos.fws.gov/ecp/species/9743#lifeHistory.

———.2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.

———.2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.

———. 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf.

———. 1997a (February 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines.* Washington, D.C.: USFWS.

———. 1997b (July 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Protocol.* Washington, D.C.: USFWS.

———. 1992. Endangered and threatened wildlife and plants; 90-day finding and commencement of status reviews for a petition to list the western pond turtle and California red-legged frog. *Federal Register.* 57:45761–45762. Washington, D.C.: USFWS.

United States Forest Service. 2018. Pacific Southwest Region, Climate Change. https://www.fs.usda.gov/main/r5/climatechange.

U.S. Department of the Interior, U.S. Geological Survey (USGS). 2006a. Draft USGS Western Pond Turtle (*Emys marmorata*) Visual Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.

———. 2006b. Draft USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.

Williams, P.H., Thorp, R.W., Richardson, L.L. and Colla, S.R. 2014. *The Bumble bees of North America: An Identification guide*. Princeton University Press, Princeton.

Xeres Society. 2023 (June 12, date accessed). Western Monarch Count. Xeres Society for Invertebrate Conservation. https://www.westernmonarchcount.org.

———. 2016 (June). State of the Monarch Butterfly Overwintering Sites in California. Prepared for the U.S. Fish and Wildlife Service by the Xeres Society for Invertebrate Conservation.

https://www.xerces.org/sites/default/files/2018-05/16-015_01_XercesSoc_State-of-Monarch-Overwintering-Sites-in-California_web.pdf.

Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, M. White (Eds). 1990. *California's Wildlife Vol. 3: Mammals.* Sacramento, CA: CDFG, The Resources Agency.

———. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

4.4 CULTURAL RESOURCES

This section evaluates the Project's potential to result in adverse effects on cultural resources, including historical and archaeological resources. Information in this section is based on the *Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California* (Report), prepared by Psomas (2024) included as Appendix D of this EIR, and the *Historical Resources Assessment, Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California*, prepared by South Environmental (2023) and included as an attachment to the Report.

4.4.1 REGULATORY SETTING

Cultural resource laws, regulations, and guidelines set up the processes for defining what is or is not a significant cultural resource and include various agency procedures for managing these archaeological and historical resources and assessing the information from the cultural remains to determine their significance. Most important is whether these resources are eligible for inclusion in a national or State register (i.e., National Register of Historic Places [NRHP] and California Register of Historical Resources [CRHR]). The laws and regulations serve to do the following:

- Set forth the criteria for assessing the relative importance of cultural remains;
- Outline the procedures for reviewing assessments;
- Delineate the responsible parties involved in making such assessments;
- Identify and then define the extent of jurisdiction and responsibility of each party in the evaluation process;
- Set forth the criteria for making a determination of significance, as well as indicating which party can or cannot make such determinations;
- Set forth the criteria for the archaeological and historic preservation work performed; and
- Set forth the criteria regarding who can perform the archaeological and historic preservation work.

A summary of both federal and State laws, regulations, and standards that govern cultural resource management within the Project site is provided below.

Federal

The National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (16 United States Code 470f) requires federal agencies to account for the effects of their undertakings on historic properties, and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Historic properties are defined as buildings, structures, districts, sites, or objects which are included in or eligible for inclusion in the NRHP. Section 106 is implemented through 36 Code of Federal Regulations (CFR) Part 800, which outlines the process for historic preservation review, including participants, identification efforts, and the assessment and resolution of adverse effects. Per 36 CFR 800.16(y), a federal undertaking is defined as any project requiring or receiving a federal permit, license, approval, or funding. Federal agencies must take steps to determine if the undertaking would result in an adverse effect to historic properties and take measures to avoid or resolve those effects as feasible.

National Historic Preservation Act

The NRHP is the United States' official list of districts, sites, buildings, structures, and objects worthy of preservation. Overseen by the National Park Service, under the U.S. Department of the Interior, the NRHP was authorized under the NHPA, as amended. Its listings encompass all National Historic Landmarks and historic areas administered by the National Park Service.

NRHP guidelines for the evaluation of historic significance were developed to be flexible and to recognize the accomplishments of all who have made significant contributions to the nation's history and heritage. Its criteria are designed to guide federal agencies, State and local governments, and others in evaluating potential entries in the NRHP. For a property to be listed in or determined eligible for listing, it must be demonstrated to possess integrity[1] and to meet at least one of the following criteria:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history.

Native American Graves and Repatriation Act

The Native American Graves and Repatriation Act (NAGPRA) established a means for Native Americans, including Indian Tribes, to request the return of human remains and other sensitive cultural items held by federal agencies or federally assisted museums or institutions. NAGPRA also contains provisions regarding the intentional excavation and removal of, inadvertent discovery of, and illegal trafficking in Native American human remains and sensitive cultural items.

State

California Register of Historical Resources

The California Environmental Quality Act (CEQA) requires a lead agency to determine whether a project would have a significant effect on one or more historical resources. According to Section 15064.5(a) of the CEQA Guidelines, a "historical resource" is defined as a resource listed in or determined to be eligible for listing in the CRHR (*California Public Resources Code* [PRC] Section 21084.1); a resource included in a local register of historical resources (*California Code of Regulations* [CCR], Title 14, Section 15064.5[a][2]); or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (14 CCR 15064.5[a][3]).

[1] Within the concept of integrity, the National Register criteria recognize seven aspects or qualities that, in various combinations, define integrity. These are location, design, setting, materials, workmanship, feeling, and association (NPS 1990).

Section 5024.1 of the PRC, Section 15064.5 of the CEQA Guidelines (CCR, Title 14, Chapter 3, Sections 15000–15387), and Sections 21083.2 and 21084.1 of the CEQA (PRC, Sections 21000–21189) were used as the basic guidelines for the cultural resources study. PRC Section 5024.1 requires an evaluation of historical resources to determine their eligibility for listing in the CRHR. The purpose of the CRHR is to maintain listings of the State's historical resources and to indicate which properties are to be protected from substantial adverse change. The criteria for listing resources in the CRHR, which were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP (per the criteria listed at 36 CFR 60.4), are stated below.

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and that:

(1) Are associated with events that have made a significant contribution to the broad patterns of our history; or

(2) Are associated with the lives of persons significant in our past; or

(3) Embody the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(4) Have yielded, or may be likely to yield, information important in prehistory or history.

According to Section 15064.5(a)(3) (A–D) of the CEQA Guidelines, a resource is considered historically significant if it meets the criteria for listing in the NRHP, as stated above, in addition to the CRHR. Impacts that affect those characteristics of the resource, that qualify it for the NRHP or that would adversely alter the significance of a resource listed in or eligible for listing in the CRHR, are considered to have a significant effect on the environment. Proposed Project impacts to cultural resources are considered significant if the Project: (1) physically destroys or damages all or part of a resource; (2) changes the character of the use of the resource or physical feature within the setting of the resource that contributes to its significance; or (3) introduces visual, atmospheric, or audible elements that diminish the integrity of significant features of the resource.

The purpose of a cultural resources' investigation is to evaluate whether any cultural resources remain exposed on the surface of a project site or can reasonably be expected to exist in the subsurface. If resources are discovered, management recommendations would be required for evaluation of the resources for CRHR eligibility.

California Environmental Quality Act

As described further below, the following CEQA statutes and CEQA Guidelines are of relevance to the analysis of archaeological, historic, and tribal cultural resources:

- California PRC Section 21083.2(g) defines "unique archaeological resource."
- California PRC Section 21084.1 and CEQA Guidelines Section 15064.5(a) define "historical resources." In addition, CEQA Guidelines Section 15064.5(b) defines the phrase "substantial adverse change in the significance of an historical resource." It also defines the circumstances when a project would materially impair the significance of a historical resource.
- California PRC Section 21074(a) defines "tribal cultural resources."

- California PRC Section 5097.98 and CEQA Guidelines Section 15064.5(e) set forth standards and steps to be employed following the accidental discovery of human remains in any location other than a dedicated ceremony.
- California PRC Sections 21083.2(b)-(c) and CEQA Guidelines Section 15126.4 provide information regarding the mitigation framework for archaeological and historic resources, including examples of preservation-in-place mitigation measures; preservation-in-place is the preferred manner of mitigating impacts to significant archaeological sites because it maintains the relationship between artifacts and the archaeological context and may also help avoid conflict with religious or cultural values of groups associated with the archaeological site(s).

More specifically, under CEQA, a project may have a significant effect on the environment if it may cause "a substantial adverse change in the significance of an historical resource" (California PRC Section 21084.1; CEQA Guidelines Section 15064.5(b).) If a site is either listed or eligible for listing in the CRHR, or if it is included in a local register of historic resources or identified as significant in a historical resources survey (meeting the requirements of California PRC Section 5024.1(q)), it is a "historical resource" and is presumed to be historically or culturally significant for purposes of CEQA (California PRC Section 21084.1; CEQA Guidelines Section 15064.5(a)). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California PRC Section 21084.1; CEQA Guidelines Section 15064.5(a)).

A "substantial adverse change in the significance of an historical resource" reflecting a significant effect under CEQA means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (CEQA Guidelines Section 15064.5(b)(1); California PRC Section 5020.1(q)). In turn, CEQA Guidelines Section 15064.5(b)(2) states the significance of a historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or
2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the PRC or its identification in an historical resources survey meeting the requirements of Section 5024.1(g) of the PRC, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
3. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

Pursuant to these sections, the CEQA inquiry begins with evaluating whether a project site contains any "historical resources," then evaluates whether that project will cause a substantial adverse change in the significance of a historical resource such that the resource's historical significance is materially impaired.

Assembly Bill 52

Assembly Bill (AB) 52 (Chapter 532, Statutes of 2014), which became effective on July 1, 2015, requires lead agencies to provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project, if they have requested such notice in writing. Once Native American tribes receive a project notification, they have 30 days to respond as to whether they wish to initiate consultation regarding the project, including subjects such as mitigation for any potential project impacts to tribal cultural resources (TCR). A TCR is defined as either a site, feature, place, or cultural landscape that is geographically defined in terms of size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is eligible for the CRHR or a local historic register. If a tribe requests consultation and the lead agency and the tribe ultimately agree on mitigation to address any potentially significant impacts to TCRs, the mitigation measures agreed upon during consultation must be recommended for inclusion in the environmental document.

Senate Bill 18

Senate Bill (SB) 18 (*California Government Code,* Section 65352.3) incorporates the protection of California's traditional tribal cultural places into land use planning for cities, counties, and agencies by establishing responsibilities for local governments to contact, refer plans to, and consult with California Native American tribes prior to the adoption or amendment of any general plan or specific plan proposed on or after March 1, 2005. SB 18 requires that public notice to be sent to tribes listed on the NAHC's SB 18 Tribal Consultation List within the geographical areas affected by the proposed general plan or specific plan (or general plan or specific plan amendment). Tribes must respond to a local government notice within 90 days (unless a shorter time frame has been agreed upon by the tribe), indicating whether or not they want to consult with the local government. Consultations are for the purpose of preserving or mitigating impacts to places, features, and objects described in Sections 5097.9 and 5097.993 of the *Public Resources Code* (PRC) that may be affected by the proposed adoption or amendment to a general plan or specific plan.

Human Remains

Section 7050.5 of the *California Health and Safety Code* provides for the disposition of accidentally discovered human remains. Section 7050.5 states that, if human remains are found, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains would occur until the County Coroner has determined the appropriate treatment and disposition of the human remains.

Section 5097.98 of the PRC states that, if remains are determined by the Coroner to be of Native American origin, the Coroner must notify the Native American Heritage Commission (NAHC) within 24 hours. The NAHC, in turn, must identify the person or persons it believes to be the most likely descendant of the deceased Native American. The descendant shall complete their inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

Local

County of Orange General Plan

Resources Element

Cultural historic resources are defined as buildings, structures, objects, sites, and districts of significance in history, archaeology, architectural history, and culture. The County maintains a list of certified archaeological professionals who are qualified to work on projects within the County's jurisdiction (i.e., unincorporated areas).

The following goals, policies, and objectives of the Resources Element pertaining to archaeological and historical resources are applicable to the proposed Project.

Cultural-Historic Resources

Goal 1: To raise the awareness and appreciation of Orange County's cultural and historic heritage.

Goal 2: To encourage through a resource management effort the preservation of the county's cultural and historic heritage.

Objective 2.1: Promote the preservation and use of buildings, sites, structures, objects, and districts of importance in Orange County through the administration of planning, environmental, and resource management programs.

Objective 2.2: Take all reasonable and proper steps to achieve the preservation of archaeological and paleontological remains, or their recovery and analysis to preserve cultural, scientific, and educational values.

Objective 2.3: Take all reasonable and proper steps to achieve the preservation and use of significant historic resources including properties of historic, historic architectural, historic archaeological, and/or historic preservation value.

Policy 1: Identification of resources shall be completed at the earliest stage of project planning and review such as general plan amendment or zone change.

Policy 2: Evaluation of resources shall be completed at intermediate stages of project planning and review such as site plan review, subdivision map approval, or at an earlier stage of project review.

Policy 3: Final preservation actions shall be completed at final stages of project planning and review such as grading, demolition, or at an earlier stage of project review.

Policy 4: To identify historic resources through literature and records research and/or onsite surveys.

1. To evaluate historic resources through comparative analysis or through subsurface or materials testing.

2. To preserve significant historic resources by one or a combination of the following alternatives, as agreed upon by RDMD and the project sponsor:
    a. Adaptive reuse of historic resource.
    b. Maintaining the historic resource in an undisturbed condition.
    c. Moving the historic resource and arranging for its treatment.
    d. Salvage and conservation of significant elements of the historic resources.
    e. Documentation (i.e., research narrative, graphics, photography) of the historic resource prior to destruction.

Policy 5: To identify archaeological resources through literature and records research and surface surveys.

1. To evaluate archaeological resources through subsurface testing to determine significance and extent.
2. To observe and collect archaeological resources during the grading of a project.
3. To preserve archaeological resources by:
    a. Maintaining them in an undisturbed condition, or
    b. Excavating and salvaging materials and information in a scientific manner.

Goal 3: To preserve and enhance buildings structures, objects, sites, and districts of cultural and historic significance.

Objective 3.1: Undertake actions to identify, preserve, and develop unique and significant cultural and historic resources.

Objective 3.3: To appraise, collect, organize, describe, preserve, and make available County of Orange records of permanent, historical value.

Orange County Municipal Code

Sec. 7-9-42.2. – Definitions

Historic structure. Any structure that is:

1. Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
2. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
3. Individually listed on a State inventory of historic places in states with historic preservation programs which have been approved by the Secretary of Interior; or
4. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either by an approved State program as determined by the Secretary of the Interior or directly by the Secretary of the Interior in states without approved programs.

4.4.2 METHODOLOGY

CEQA requires a lead agency to determine whether a project would have a significant effect that would cause a substantial adverse change in the significance of a historical resource or a unique archaeological resource. The cultural resource analysis in this section provides that documentation and is based on the record searches and a consideration of the issues described below.

Built Environment Survey

A survey of all built environment within the Project site was completed by Psomas on July 17, 2023. The survey included documenting all built environment with notes and photographs, as well as the immediate setting.

Background Research

Previous Evaluations of the Santiago Dam (30-176757)

The Santiago Dam is listed in the Office of Historic Preservation's Built Environment Resources Directory with a status code of 2S2, indicating it was determined eligible for the NRHP by consensus through the Section 106 process and is listed in the CRHR.

The Santiago Dam was first recorded and evaluated for historical significance in 2003, who found the dam eligible under NRHP Criterion A for its important historical associations:

> The water provided by the creation of Santiago Dam and Reservoir contributed significantly to the early and mid-20th century development of the citrus industry in Orange County, which was a leading supplier of oranges, lemons, and grapefruit to the entire nation at that time. Therefore, given its strong association with the history of water resources development in Orange County, as well as with the citrus agriculture industry on not only a regional but on a State and national level, the dam is recommended eligible for listing on the NRHP under Criterion A. Because the dam has undergone little modifications since its construction, it retains good integrity of location, design, materials, workmanship, and association.

In 2021, a Continuation Sheet was prepared to update the 2003 evaluation stating they "found no evidence to indicate that the historic integrity of the Santiago Dam has been compromised subsequent to its initial recordation in 2003. The Continuation Sheet concurs with the 2003 recommendation that the Santiago Dam is eligible for listing on the NRHP under Criterion A at the local, State, and national level and retains sufficient integrity to convey that historical significance".

Neither of these studies addressed the eligibility of other aspects of the Dam, such as the Dam Keeper's Residence, Dam Keeper's Garage, Second Garage, Storage Shed, Orange County Waste and Recycling (OCWR) Landfill Flare Facility, or Control Building and Valve Vault.

Project Evaluation

A Historical Resources Assessment (HRA) was prepared for the Project by South Environmental to assess the Project-related effects on historic properties and historical resources on the site and within the vicinity. The HRA includes a pedestrian survey of all built environmental resources over 45 years old within the Project's Area of Potential Effect (APE) and reviewed all background materials regarding the dam, including previously conducted built environment studies, historic

photographs, and current architectural and engineering plans. South Environmental reviewed all available historical newspapers covering the Project site in an effort to understand the development of the Project site and surrounding areas and to review relevant articles pertaining to Santiago Dam development and other structures within the Project site. South Environmental reviewed Sanborn Fire Insurance Company maps, available on the Los Angeles Public Library website, to understand the development of properties in and around the Project site. No Sanborn maps were available for the location of the Project site.

South Environmental reviewed all available historic topographic maps and aerial imagery to understand the development history of the Project site. Historic topographic maps of the Project site were available from U.S. Geological System (USGS) topoView and historic aerial photographs were available from Nationwide Environmental Title Research LLC (NETR) and University of California, Santa Barbara, FrameFinder Maps for various years for the Black Star Canyon.

Cultural Resource Records Search and Literature Review

An archaeological resources records search was conducted at the South Central Coastal Information Center (SCCIC) at California State University, Fullerton on September 21, 2021. The SCCIC is the designated branch of the California Historical Resources Information System for the Project area and houses records concerning archaeological and historic resources in Los Angeles, Ventura, San Bernardino, and Orange Counties. The review consisted of an examination of the USGS Black Star Canyon 7.5-minute quadrangle to evaluate the Project area for any sites recorded or cultural resources studies conducted on the parcel and within a one-mile radius. Data sources consulted at the SCCIC include the Historic Property Data File maintained by the California Office of Historic Preservation, archaeological records, Archaeological Determinations of Eligibility, Historical Landmarks, and historic maps. The records were reviewed to accomplish the following:

- Identify cultural resources (e.g., archaeological sites) in the Project site and surrounding areas;
- Identify and determine the adequacy of previous cultural resources studies in the Project site;
- Develop management recommendations for cultural resources within or adjacent to the Project site; and
- Assess what additional cultural resources studies would need to be undertaken for the proposed Project.

Native American Sacred Lands File Review

An inquiry was made of the NAHC on September 11, 2020, to request a review of the Sacred Lands File (SLF) database regarding the possibility of Native American cultural resources and/or sacred places in the Project vicinity that are not documented on other databases.

Archaeological Field Survey

Psomas surveyed the Project site on October 20, 2020. The entire Project site was surveyed by walking evenly spaced transects spaced no more than 10 meters (32 feet) apart. The archaeologist examined all areas considered highly sensitive for cultural resources and the ground surface for the presence of the following:

- Prehistoric artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools);

- Historic artifacts (e.g., metal, glass, ceramics);
- Sediment discoloration that might indicate the presence of a cultural midden;
- Depressions and other features indicative of the former presence of structures or buildings (e.g., post holes, foundations); and
- Fossil Localities.

Psomas maintained transect accuracy in the Project site using a Garmin global positioning system (GPS) receiver and Project field maps. A field notebook and a digital camera were used to record the survey conditions and findings.

4.4.3 EXISTING CONDITIONS

Precontact Setting

Southern California has a long history of human occupation, with dates of the earliest evidence of human occupation during the late Pleistocene, circa (ca.) 11,000 years B.C. (Glassow et al. 2007: 191). Prehistoric material culture in the State's southern region has been categorized according to periods or patterns that define technological, economic, social, and ideological elements. Within these periods, archaeologists have defined cultural patterns or complexes specific to prehistory within the State's southern region, including the Project site.

The following text and table (Table 4.4-1) illustrates the chronological framework developed for Southern California. This framework is divided into four major periods: Paleoindian period (ca. 11,000–7000 B.C.), Milling Stone period (7000 B.C.–3000 B.C.), Intermediate period (3000 B.C.–A.D. 500), and Late Prehistoric period (A.D. 500–Historic Contact). Within these broad temporal periods are variations in the timing and nomenclature of cultural complexes for the region. The timescales referenced in the following discussion are presented as calendar dates (years B.C.–A.D.).

TABLE 4.4-1
CULTURAL CHRONOLOGY FOR SOUTHERN CALIFORNIA

Period	Cultural Traits	Years (B.C.–A.D.)
Paleoindian	Clovis and Folsom Fluted Projectile Points	11,000 B.C.–7000 B.C.
Milling Stone	Ground Stone Implements; Large Leaf-Shaped Projectile Points	7000 B.C.–3000 B.C.
Intermediate	Large Side-Notched, Stemmed, and Leaf-Shaped Projectile Points; Mortar and Pestle	3000 B.C.–A.D. 500
Late Prehistoric	Smaller Projectile Points with Convex or Concave Bases, Bow and Arrow; Increased Population Size	A.D. 500–1769
Source: Psomas 2024.		

Paleoindian Period (11,000–7000 B.C.)

Recent data from coastal and inland sites during this period indicate that the economy was a diverse mixture of hunting and gathering, with a major emphasis on aquatic resources in many coastal areas and on Pleistocene lakeshores (Moratto 1984:90–92). Although few Clovis-like or Folsom-like fluted points have been found in Southern California, it is widely thought that there was a greater emphasis on hunting at near-coastal and inland sites during the Paleoindian Period than in later periods (e.g., Dillon 2002; Erlandson et al. 1987). Subsistence patterns shifted around 6000 B.C., concurrent with the gradual desiccation associated with the onset of the Altithermal, a

warm and dry period that lasted for about 3,000 years. As the climate changed, a greater emphasis was placed on plant foods and small animals.

Milling Stone Period (7000–3000 B.C.)

The Milling Stone Period (Wallace 1955, 1978) is the earliest well-established period of occupation in Southern California (Glassow et al. 2007: 192). This period is characterized by an ecological adaptation to collecting, accompanied by a dependence on ground stone implements associated with the horizontal motion of grinding small seeds: milling stones (metates, slabs) and hand stones (manos, mullers). Milling stones are found in large numbers for the first time and become more numerous toward the end of this period. As evidenced by their tool kits and shell middens in coastal sites, people during this period practiced a mixed food-procurement strategy. Subsistence patterns became more specialized as groups became better adapted to their regional or local environments. Projectile points from the period are relatively rare, but are large and generally leaf-shaped, and were probably employed with darts or spears thrown with atlatls. Bone tools, such as awls, and items made from shell, including beads, pendants, and abalone dishes, are also quite uncommon. Evidence of weaving or basketry is present at a few sites. The mortar and pestle, associated with the vertical motion of pounding foods such as acorns, were introduced during the Milling Stone Period but did not become common until the Intermediate Period.

Intermediate Period (3000 B.C.–A.D. 500)

The Intermediate Period is characterized by a shift toward a hunting and maritime subsistence strategy, along with a wider use of plant foods. During this period, a pronounced trend toward greater adaptation to regional or local resources can be observed. For example, the remains of fish, land mammals, and marine mammals are increasingly abundant and diverse in sites along the Southern California coast. Chipped stone tools suitable for hunting are more common and both stylistically and technologically varied. Projectile points include large side-notched, stemmed, and lanceolate or leaf-shaped forms. Larger knives, a variety of stone flake scrapers, and drill-like implements are also common during this period. Shell fishhooks become an integral part of the tool kit. Bone tools, including awls, are more numerous than in the preceding period; and the use of asphaltum adhesive becomes more common.

Late Prehistoric Period (A.D. 500–1769)

During the Late Prehistoric Period, use of plant food resources increased in conjunction with land and marine mammal hunting. The variety and complexity of material culture also increased during this period, demonstrated by more diverse classes of artifacts. The recovery of many small, finely chipped projectile points, usually stemless with convex or concave bases, suggests an increased utilization of the bow and arrow for hunting rather than the atlatl and dart.

During this period, an increase in population size is accompanied by the advent of larger, more permanent villages with greater numbers of inhabitants (Wallace 1955:223). Some coastal and near-coastal settlements were occupied by as many as 1,500 people. Many of these larger settlements were permanent villages where at least some people resided year-round. The populations of these villages may have also increased seasonally.

Post Contact History

Prior to European exploration and colonization efforts in the 18th century, Orange County and the Santiago Canyon was home to Juaneño and Gabrielino Native American communities. The earliest European colonizers traveled through Orange County as part of Don Gaspar de Portolá's overland expedition into Alta California. The Portola expedition camped in what is now Santiago

Canyon in July of 1769 and again in January of 1770 when missionary Juan Crespi noted the location of the Santiago Creek and that the missionaries had named it Santiago after the patron Saint of Spain. In 1797, Father Junipero Serra founded Mission San Gabriel in present day Los Angeles and Mission San Juan Capistrano in 1776. Between these two missions, the majority of Orange County was under mission control and used primarily as grazing lands. In 1821, Mexico gained independence from Spain and in 1833 the Mexican government moved to secularize former mission lands and granted them to Mexican citizens. Teodocio Yorba, the youngest son of Jose Antonio Yorba who was one of the largest landowners in orange County, received the Rancho Lomas de Santiago land grant in 1846. Teodocio established his ranch headquarters at the present site of Irvine Lake.

With the signing of the Treaty of Guadalupe Hidalgo in 1848, Alta California was ceded to the United States and California became a U.S. Territory. The Congressional Act of 1851 forced landholders to reapply to the Board of Land Commissioners to get valid title to their ranchos. Yorba was able to retain his claim to Rancho Lomas de Santiago and sold the rancho to William Wolfskill in 1860. After suffering financial misfortune as a result of the drought of 1863–1864, Wolfskill sold the rancho to Llewellyn Bixby, Thomas and Benjamin Flint, and James Irvine in 1866. Bixby, the Flints, and Irvine had also purchased other large sections of rancho land, but the acquisition of Rancho Lomas de Santiago was important to securing water rights in the region. In 1877, James Irvine acquired his partner's shares in the various ranchos they had purchased together, becoming sole owner of over 110,000 acres of land that stretched 23 miles from the Pacific Ocean to the Santa Ana River.

Santiago Dam

For most of the late 19th and early 20th centuries, the land around the present site of Santiago Dam was used for cattle and sheep grazing, as well as recreation. The Serrano Irrigation District (known today as the SWD) provided water for the earliest citrus groves in the Orange and Villa Park areas, beginning in 1876. By the late 1920's, the demand for irrigation water had increased to the point that a large storage reservoir was needed. In response to this demand, the Serrano Irrigation District and the John T. Carpenter Water Company of Villa Park undertook a joint project in 1930. Santiago Dam was constructed, creating Santiago Reservoir (now called Irvine Lake), during 1931. Although the dam was designed by Kempkey, the on-site supervising engineer was Wess Albert, and the construction contractor was R.G. Tourneau. The dam was completed in 1933, and the reservoir was first completely filled, with water running over the spillway at its west end, in 1937. In 1934, a dam keeper's residence was constructed on a hillside overlooking the east end of the dam. The water provided by the creation of the dam and reservoir contributed significantly to the early and mid-20th century development of the citrus industry in Orange County, one of the leading citrus-producing regions of the U.S. at that time. The facility was originally intended only for irrigation water storage but was opened for recreational use in 1941. Today, IRWD still distributes untreated water from the reservoir for irrigation and can treat water from Irvine Lake to potable standards at its Baker Water Treatment and at the Howiler Treatment Plant. The County of Orange currently operates Irvine Lake's recreational concessions.

Report Findings

South Central Coastal Information Center

The SCCIC record search identified 28 prior technical cultural resources studies and academic overviews within ½-mile of the Project site. Of the 28 previous investigations, 14 of these studies occurred or overlapped within the Project site (Table 4.4-2). The studies crossed the current Project site as early as 1979 and as recently as 2007. The types of studies include academic overviews, cultural resource surveys and assessments, mitigation monitoring, and testing and

evaluations. The academic overview studies are a testament to the archaeological sensitivity of region, including the Project site. The records search results summary letter from SCCIC are included in Appendix D.

TABLE 4.4-2
CULTURAL RESOURCE STUDIES WITHIN THE PROJECT SITE

Report	Author	Year	Study	Type of Study
OR-00305	Schroth, Adella	1979	The History of Archaeological Research on Irvine Ranch Property: The Evolution of a Company Tradition	Cultural Resources Research
OR-00648	Breece, Bill and Beth Padon	1982	Cultural Resource Survey: Archaeological Resources. Foothill Transportation Corridor, Phase II	Cultural Resources Research
OR-00752	Mason, Roger D.	1984	Eastern Corridor Alignment Study, Orange County, California. Volume II: Prehistory and History	Cultural Resources Research
OR-00983	Bissell, Ronald M.	1989	Cultural Resources Reconnaissance of East Orange Planning Area 1: 1,800 Acres in Eastern Orange County, California	Cultural Resources Research
OR-01005	Breece, William H.	1989	Archaeological Survey of Proposed Landfill Gas Recovery and Disposal System at the Santiago Canyon and Prima Deshecha Landfills	Cultural Resources Research
OR-01026	Mason, Roger D.	1990	Cultural Resources Survey Report Santiago Canyon Road Alignment Study Orange County, California	Cultural Resources Research
OR-01039	Sturm, Bradley L.	Unknown	An Archaeological Assessment of the Irvine Lake Desilting Project	Cultural Resources Research
OR-01080	Palmer, Robert	1991	Archaeological Monitoring at Santiago Canyon Landfill Flare Station	Cultural Resources Research
OR-02225	Strozier, Hardy	1978	The Irvine Company Planning Process and California Archaeology: A Review and Critique	Cultural Resources Research
OR-02534	Anonymous	1976	Annual Report to the Irvine Company from Archaeological Research, Inc.	Cultural Resources Research
OR-02858	Chace, Paul G.	1971	The Black Star Canyon Project: A Landmarks Survey	Cultural Resources Research
OR-02882	Dice, Michael and Christeen Taniguchi	2004	Final Phase II Archaeological Testing Evaluation of Irvine Ranch Cultural Resources. Santiago Hills Planned Community – Tract Maps Nos 16199 and 16201 and East Orange Planned Community Area – Tract Map No 16514 and the East Orange Planned Community	Cultural Resources Research
OR-02918	Cotterman, Cary D., Evelyn N. Chandler, and Roger D. Mason	2003	Cultural Resources Survey Report for a Verizon Telecommunications Facility: Santiago Dam Located at Irvine Lake (Santiago Reservoir), Orange County, California	Cultural Resources Research

TABLE 4.4-2
CULTURAL RESOURCE STUDIES WITHIN THE PROJECT SITE

Report	Author	Year	Study	Type of Study
OR-03600	Garcia, Kyle H. and Marcy Rockman	2007	Results of Archaeological Survey and Monitoring for Southern California Edison's Pole Replacements After Santiago Fire Along Santiago Canyon Road, Modjeska Canyon Road, and Hicks Canyon Road; Orange County, California	Cultural Resources Research
Source: Psomas 2024.				

The SCCIC records searches identified 18 previously recorded cultural resources within ½-mile of the Project site (Table 4.4-3). The previously recorded resources include two precontact isolates (ground stone), 12 precontact sites, three historic sites/built environments, and one multicomponent site. The precontact sites consist of rock shelters, lithic scatters (stone debris left over from making stone tools), hearths (roasting pits/remnants of campfires), cairns (rock features), bedrock milling features (ground stone technology), habitation debris (midden), and burials. The historic sites consist of roads/trails, single family residences, standing structures, wells/cisterns, water conveyance systems and a standing engineering structure (dam). Of the 18 cultural resources, two (P-30-001012 and P-30176757) were identified within the Project site. Cultural resource P-30-001012 is described as a precontact lithic scatter and cultural resource P-30-17657 is the Santiago Dam.

TABLE 4.4-3
PRIOR CULTURAL RESOURCES WITHIN THE 1/2-MILE RADIUS OF THE PROJECT SITE

Primary Number	Site Number	Site Type	Attribute Type	Year(s) Recorded	Proximity to Project Site
P-30-000237	CA-ORA-237	Prehistoric: lithic scatter; cairns/rock features; burials; hearth/pits; other	AP02; AP08; AP09; AP11; AP16	1969	Outside
P-30-000238	CA-ORA-238	Prehistoric: burials; hearths/pits	AP09; AP11	1969	Outside
P-30-000239	CA-ORA-239	Prehistoric: lithic scatter	AP02	1969	Outside
P-30-000240	CA-ORA-240	Prehistoric: habitation debris	AP15	1968	Outside
P-30-000304	CA-ORA-304	Prehistoric: lithic scatter; bedrock milling feature	AP02; AP04	1971	Outside
P-30-000319	CA-ORA-319	Prehistoric: lithic scatter	AP02	1982	Outside
P-30-000320	CA-ORA-320	Prehistoric: lithic scatter; hearth/pits; rock shelter/cave	AP02; AP11; AP14	1995	Outside
P-30-001012	CA-ORA-1012	Prehistoric: lithic scatter	AP02	1971	Within
P-30-001272	CA-ORA-1272	Prehistoric: lithic scatter	AP02	1990	Outside
P-30-001277	CA-ORA-1277	Prehistoric: lithic scatter; rock shelter/cave	AP02; AP14	1971	Outside
P-30-001294	CA-ORA-1294	Prehistoric: lithic scatter; hearth/pits	AP02; AP11	1990	Outside
P-30-001460	CA-ORA-460/H	Multicomponent: lithic scatter; monument/mural/gravestone	AP02; HP26	1982	Outside
P-30-001474	CA-ORA-1474H	Historic: foundations/structures pads; landscaping/orchard; water conveyance system; standing structures; single family property; farm/ranch	AH02; AH03; AH06; AH15; HP02; HP33	2004	Outside
P-30-001535	CA-ORA-1535	Prehistoric: lithic scatter; cairns/rock features	AP02; AP08	1991	Outside
P-30-001771	CA-ORA-1771H	Historic: foundations/structure pads; landscaping/orchard; roads/trails/railroad grades	AH02; AH03; AH07	1990	Outside
P-30-100304	–	Prehistoric: isolated lithic scatter	AP02 (Isolate)	1991	Outside
P-30-100460	–	Prehistoric: isolated lithic scatter	AP02 (Isolate)	2004	Outside
P-30-176757	–	Historic: engineering structure; dam	HP11; HP21	2018	Within

Source: Psomas 2024.

CA-ORA-1012 (P-30-001012)

This archaeological site was originally recorded by W. H. Bryce in 1982 as a precontact lithic scatter measuring 70 x 95 meters and consisting of debitage (debris from manufacturing stone tools) and groundstone (stone that has been pecked or ground into a specific shape). The debitage includes 16 pieces of secondary debitage comprising of 12 white chert secondary flakes and four chalcedony flakes, all described as small to medium in size. The groundstone assembly includes one piece (fragment) of a basin metate and one piece (fragment) of a shallow bowl. The metate fragment measured 19 x 19 x 7 centimeters (cm) and the stone bowl fragment measured 21 cm x 14 cm x 26 cm.

In 2004, the archaeological site was relocated. None of the cultural resources (artifacts discussed above) previously identified in 1982 were visible on the ground surface. However, it should be noted disturbance from agricultural activities may have displaced these resources after 1982. No cultural resources (i.e., groundstone, projectile points) were recovered from the excavations and no stratigraphic evidence for cultural middens (habitation debris) were observed. In accordance with CEQA, and using criteria outlined for the CRHR eligibility, it was determined that the site does not qualify for the CRHR and is not a unique archaeological resource for the purposes of CEQA. However, should modifications take place within the site boundary beyond the area tested, it was concluded that additional subsurface investigations should be considered.

Santiago Dam (P-30-176757)

As a cultural resource, Santiago Dam was first documented in 2003, when a DPR 523 Series Form was prepared documenting the dam was built in 1933 as an earthen and concrete structure containing 1,100,000 cubic yards of clay, porous soil, and rock. The dam was noted as 1,425 feet (0.27 mile) long as the crest, which rose 136 feet above the surrounding ground at its highest point. At this time, the dam was recommended as eligible for listing on the NRHP under Criterion A.

Native American Sacred Lands File Review Results

On September 11, 2020, Psomas requested that the NAHC conduct a search of its SLF to determine if cultural resources important to Native Americans have been recorded in the Project site or in the immediate vicinity. The results of the NAHC SLF search were received on October 9, 2020, and were positive for sacred lands in the vicinity of the Project site. The NAHC recommended contacting the Juaneño Band of Mission Indians Acjachemen Nation – Belardes for more information.

The results letter also included a list of tribes affiliated with the Project area (see Table 4.4-4). Consultation pursuit to AB 52 was conducted by IRWD. The results of the AB 52 consultation between IRWD and local Native American representatives have been documented as part of the CEQA review prepared for the Project. The SLF search results summary letter from the NAHC are included in Appendix D. For additional information regarding the consultation process, please see Chapter 4.15, Tribal Cultural Resources, of this EIR.

TABLE 4.4-4
NAHC TRIBAL REPRESENTATIVES CONTACT LIST

Tribal Organization	Indigenous Affiliation	Contact(s)
Campo Band of Diegueno Mission Indians	Diegueno	Ralph Goff
Ewiiaapaayp Band of Kumeyaay Indians	Diegueno	Robert Pinto; Michael Garcia
Cabazon Band of Mission Indians	Cahuilla	Daniel Salgada
Gabrieleno Band of Mission Indians – Kizh Nation	Gabrieleno	Andrew Salas
Gabrieleno/Tongva San Gabriel Band of Mission Indians	Gabrieleno	Anthony Morales
Gabrielino/Tongva Nation	Gabrielino	Sandonne Goad
Gabrielino Tongva Indians of California Tribal Council	Gabrielino	Robert Dorame
Gabrielino-Tongva Tribe	Gabrielino	Charles Alvarez
Juaneño Band of Mission Indians Acjachemen – Belardes	Juaneño	Matias Belardes
La Posta Band of Diegueno Mission Indians	Diegueno	Gwendolyn Parada; Javaugh Miller
Pala Band of Mission Indians	Cupeno; Luiseno	Shasta Gaughen
Manzanita Band of Kumeyaay Nation	Diegueno	Angela Elliott
Mesa Grande Band of Diegueno Mission Indians	Diegueno	Michael Linton
Pala Band of Mission Indians	Cupeno; Luiseno	Shasta Gaughen
Santa Rosa Band of Cahuilla Indians	Cahuilla	Lovina Redner
Soboba Band of Luiseno Indians	Cahuilla; Luiseno	Isaiah Vivanco

Archeological Field Survey Results

As indicated above, a Psomas cross-trained archaeologist/paleontologist surveyed the Project site on October 20, 2020. The Santiago Dam was noted as being within the Project site. No new archaeological resources were identified within the Project area; however, it should be noted the ground visibility was obscured by several species of native and non-native vegetation. Additionally, Psomas relocated archaeological site P-30-001012. None of the cultural resources previously recorded were observed on the surface; however, as noted in 2004 the artifact assemblage and site boundary were not observed due to the site being stripped for agricultural practices along with scattered debris piled and placed along a nearby small drainage.

Significance Evaluation

Santiago Dam (P-30-176757)

NRHP, CRHR, and County Designation Criteria

The Santiago Dam appears to remain eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements.

NRHP Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history.

CRHR Criterion 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

Santiago Dam is directly associated with events that made significant contributions to the development of the citrus industry in Orange County in the late 19th and early 20th century with a period of significance of 1933, when the dam was built. The subject property was constructed by the Serrano Irrigation District, John T. Carpenter Water Company, and the Irvine Company. Prior to construction on the dam, farmers dug wells, built reservoirs, and laid pipelines to irrigate their crops. Water quality and water scarcity prompted a change in water distribution and the installation of wells. Water runoff and irrigation rights were a constant struggle between the Irvine, Carpenter, and Serrano Irrigation Districts. The dispute between the three districts was resolved when they came together to construct the Santiago Dam. The Dam provided water for domestic and agricultural uses and is directly related to the development of the citrus industry in Orange County during the late 19th and early 20th century.

The Santiago Dam, including the dam, outlet tower, spillway, and reservoir, is directly associated with the historical and current function of the Dam. Although the Dam Keeper's Residence and Garage appear to have been constructed around the same time as the Dam, their significantly altered appearance makes them unrecognizable from the period of significance of the Dam. The remaining features within the Dam such as the Storage Shed, Second Garage, Control Building and Valve Vault, and OCWR Landfill Flare Facility are non-contributing features constructed outside the period of significance of the Dam.

Therefore, the Santiago Dam is eligible under NRHP Criterion A and CRHR Criterion 1 for its important contributions to local water and agricultural history.

NRHP Criterion B. That are associated with the lives of persons significant in our past.

CRHR Criterion 2. Is associated with the lives of persons important in our past.

The subject property is a dam constructed by the John T. Carpenter Water Company, Serrano Irrigation District, and the Irvine Company. Review of local publications and newspaper articles failed to indicate that the subject property has any important associations with significant persons in regional history. Therefore, the subject property is not eligible under NRHP Criterion B or CRHR Criterion 2.

NRHP Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

CRHR Criterion 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

The Santiago Dam is an earthen and concrete structure constructed in 1933. Although Augustus Kempkey appears to have consulted on numerous water projects throughout California, he does not appear to have been a master engineer when considered among others in his field. Further, the Santiago Dam is an earthen embankment dam, the most common type of dam in the United States; they can be built from locally available materials that require minimal processing, saving money on the construction process. The Dam does not possess high artistic value or innovative engineering features. Therefore, the Santiago Dam is not eligible under NRHP Criterion C or CRHR Criterion 3.

NRHP Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRHR Criterion 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The subject property is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials, or technologies. Therefore, the subject property is not eligible under NRHP Criterion D or CRHR Criterion 4.

Integrity

Location: The subject property retains integrity of location as it remains in its current location.

Design: The subject property has integrity of design. Although there have been a few alterations, the design of the Dam remains relatively unchanged.

Setting: The subject property has integrity of setting. The Dam is still located in an undeveloped rural setting.

Materials: The subject property retains integrity of materials as the dam and spillway retain original materials.

Workmanship: The subject property retains integrity of workmanship as evidence of the original craftsmanship is present.

Feeling: The subject property retains integrity of feeling as the area remains undeveloped and rural.

Association: The subject property continues to be associated with the distribution of water for agricultural and domestic use.

The Santiago Dam is eligible for listing under NRHP and CRHR under Criterion A/1.

Taiwan 12kV Overhead Distribution Line

The Taiwan 12kV Overhead Distribution Line is not eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements.

NRHP Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history.

CRHR Criterion 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

Guidance provided in Tinsley Becker et al. 2015 states that sub transmission lines and their associated infrastructure should be evaluated under two important themes, which are most appropriately examined below under Criteria A/1/2:

1. An association with and representation of SCE's organizational history as evidence of key expansion periods that contributed to or served as the genesis of settlement or marked growth in community services by SCE.

   The Taiwan 12kV Overhead Distribution line was energized c. 1952. Information regarding the construction of the line is limited. The design for distribution lines was borrowed from

telegraph transmission technology and uses infrastructure that is found State-wide. The principles of the design of distribution systems are rudimentary with minor changes since their inception and are unable to reflect significance from the period from which they were constructed.

2. An association with SCE's original construction and implementation campaigns or the established period of significance for the company's 66kV, 220kV, and 500kV systems.

   The Taiwan 12kV Overhead Distribution line is not associated with SCE's early construction and implementation campaigns, nor does it fall within the period of significance for either SCE's 66kV, 220kV, or 500kV systems.

For the reasons demonstrated above, the subject property is not eligible under NRHP Criterion A or CRHR Criterion 1.

NRHP Criterion B. That are associated with the lives of persons significant in our past.

CRHR Criterion 2. Is associated with the lives of persons important in our past.

The subject property is a transmission line that is owned by SCE. Review of local publications and newspaper articles failed to indicate that the subject property has any important associations with significant persons in regional or SCE history. Therefore, the subject property is not eligible under NRHP Criterion B, CRHR Criterion 2, or County Criterion 3.

NRHP Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

CRHR Criterion 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

The Taiwan 12kV Overhead Distribution Line does not serve as an important example of electrical infrastructure on SCE's system. Under this criterion, wood poles are considered ubiquitous and indistinctive utilitarian structures that are purely functional and do not exhibit any important construction methods or technologies. Further, the line is not an early example of electrical voltage or transmission technology and does not represent an innovation in engineering design or for construction material technology. Therefore, the subject line is not eligible under NRHP Criterion C or CRHR Criterion 3.

NRHP Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRHR Criterion 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The subject property is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials, or technologies. Therefore, the property is not eligible under NRHP Criterion D or CRHR Criterion 4.

Integrity

Location: The subject property retains integrity of location as it remains in its current location.

Design: The subject property has integrity of design. Although there have been a few alterations, the design of the dam and spillway remain unchanged.

Setting: The subject property has integrity of setting. The line continues to be located in an undeveloped rural setting.

Materials: The subject property appears to retain integrity of materials as they do not appear to have been replaced.

Workmanship: The subject property retains integrity of workmanship as evidence of the original craftsmanship is present.

Feeling: The subject property retains integrity of feeling as the presence of wood poles help it retain a circa 1952 feeling.

Association: The subject property has no important associations with any patterns of regional development or SCE organization history and falls outside the period of significance for 66kV electrical transmission.

The Taiwan 12kV Overhead Distribution line is not eligible for listing under NRHP and CRHR under any designation criteria.

4.4.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant cultural resources impact if it would:

Threshold 4.4-1 Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5.

Threshold 4.4-2 Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.

Threshold 4.4-3 Disturb any human remains, including those interred outside formal cemeteries.

4.4.5 IMPACT ANALYSIS

Regulatory Requirement

RR CR-1 If human remains are found during ground-disturbing activities, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains will occur, in accordance with Section 7050.5 of the California Health and Safety Code. The County Coroner will be notified of the discovery immediately. If the County Coroner determines that the remains are or believed to be Native American, s/he will notify the NAHC within 24 hours of the discovery. In accordance with Section 5097.98 of the California Public Resources Code, the NAHC must immediately notify those persons it believes to be the most likely descended from the deceased Native American (i.e., the most likely

descendant). The descendants will complete their inspection within 48 hours of being granted access to the site by IRWD. IRWD will discuss and confer with the most likely descendants regarding all reasonable options regarding the descendants' preferences for treatment of the human remains prior to disturbing the site by further construction activity.

Threshold 4.4-1

Would the Project cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?

Less Than Significant Impact. One historic property/historical resource was identified within the Project site: the Santiago Dam (P-30-176757), which currently has a status code of 2S2, indicating it has been determined eligible for the NRHP and is listed in the CRHR. The updated evaluation completed as part of the current study found that the Dam remains eligible for the NRHP/CRHR under Criterion A/1. The Dam is eligible for its important historical associations with water resources development in Orange County, as well as with the citrus agriculture industry.

Although specific aspects of the Dam would be modified, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. The character-defining features of the Dam necessary for it to continue to convey its historical significance under Criterion A/1 include its ongoing function as an earthen embankment dam on Santiago Creek, maintaining the same general massing and scale. Therefore, the proposed Project would result in no adverse effects to historic properties under Section 106 of the NHPA, and no significant impacts to historical resources under CEQA.

Impact Conclusion: *The Santiago Dam (P-30-176757) was determined eligible for the CRHR and listed in the CRHR. Although specific aspects of the Dam would be modified, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. Thus, the Project would not cause a substantial adverse change in the significance of an historical resource, and no mitigation is required.*

Threshold 4.4-2

Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section15064.5?

Less Than Significant with Mitigation. A significant impact could occur if grading or excavation activities associated with the Project were to disturb archaeological resources that presently exist within the Project site. As stated previously, the results of the 2021 SCCIC cultural resources records searches identified 18 previously recorded cultural resources within ½-mile of the Project site. The previously recorded resources include two precontact isolates (ground stone), 12 precontact sites, three historic sites/built environments, and one multicomponent site. The precontact sites consist of rock shelters, lithic scatters (stone debris left over from making stone tools), hearths (roasting pits/remnants of campfires), cairns (rock features), bedrock milling features (ground stone technology), habitation debris (midden), and burials. The historic sites consist of roads/trails, single family residences, standing structures, wells/cisterns, water conveyance systems and a standing engineering structure (dam). Of the 18 cultural resources, one archaeological resource (P-30-001012) was identified within the Project area. Cultural resource P-30-001012 is described as a precontact lithic scatter. Furthermore, the NAHC SLF search was positive for sacred sites.

Fieldwork relocated P-30-001012; however, no new archaeological resources and/or cultural resources were identified within the Project site. Both the Project site and the surrounding area are considered highly sensitive for archaeological resources dating to both the precontact period and the historic era. Moreover, the Santiago Dam, a documented resource eligible for listing on the NRHP/CRHR under Criterion A/1, is located within the Project site, and while the resource is not an archaeological resource, historic refuse left behind from the construction of the dam may be present below the ground surface. As such, there is the possibility that undiscovered intact archaeological resources (precontact or historic era) may be present in previously undisturbed soils. Therefore, the Project would implement **MM CR-1**, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM CR-2**, which provides details for treatment of unanticipated discoveries.

Impact Conclusion: *The Project has potential to cause a substantial adverse change in the significance of an archaeological resource. However, potential effects would be mitigated to a less than significant level with the implementation of **MM CR-1**, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM CR-2**, which identifies treatment of unanticipated discoveries.*

Threshold 4.4-3

Would the Project disturb any human remains, including those interred outside of formal cemeteries?

Less Than Significant Impact. A Project-related significant adverse effect could occur if grading or excavation activities associated with the Project were to disturb previously interred human remains. No known burial sites are located on or adjacent to the Project site. In the unlikely event of an unanticipated encounter with human remains in Project site, the *California Health and Safety Code* and the *California Public Resources Code* require that any activity in the area of potential finding be halted, and the Orange County Coroner be notified, as described in **RR CUL-1**. Implementation of **RR CUL-1** would reduce this impact to a less than significant level.

Impact Conclusion: *Pursuant to Threshold 4.4-3, Project activities are not expected to disturb human remains. However, if human remains are encountered during grading activities, **RR CR-1** requires that any activity in the area of a potential find be halted, and the Orange County Coroner be notified. Implementation of **RR CR-1** would reduce this impact to a less than significant level.*

4.4.6 CUMULATIVE IMPACTS

Archaeological and historic resources impacts are site-specific with regard to any given resource. Impacts that may be considered cumulative relate to the general loss of cultural resources over time throughout the region. The Project would not cause an adverse change to the significance of a historical resource pursuant to Section 15064.5. The Project, in conjunction with cumulative development, could lead to the accelerated degradation of previously unknown archaeological resources. However, the Project would comply with **MM CR-1** and **MM CR-2**, which require archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and identify treatment of unanticipated discoveries. Thus, the Project would result in less significant impacts to archaeological resources.

The Discovery of human remains are also site-specific. Although unlikely to occur, potential impacts associated with human remains would be reduced to a less than significant level with adherence to existing State law (**RR CR-1**).

Therefore, implementation of the Project would have no significant cumulative impacts associated with historic resources, archaeological resources, and human remains.

4.4.7 MITIGATION PROGRAM

Mitigation Measures

MM CR-1 IRWD will retain a certified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Standards for professional archaeology, to observe ground-disturbing activities (including but not limited to geotechnical excavations, vegetation removal, grubbing, grading, and excavation) within previously undisturbed soils below fill soils and to salvage and catalogue archaeological resources as necessary. Monitoring will not be required for secondary movement of soils, such as backfilling. The archaeologist will be present at the pre-construction meeting, will establish procedures for archaeological resource surveillance within previously undisturbed soils in coordination with IRWD throughout construction of the proposed Project, and will establish, in cooperation with IRWD, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the artifacts as appropriate. The archaeological monitor will have the authority to temporarily halt or divert work away from any discoveries of archaeological resources in order to evaluate the resources pursuant to **MM CR-2**. The archaeologist may determine, in consultation with IRWD, to reduce monitoring to spot-checking or eliminate monitoring depending on site conditions observed, such as the presence of fill material, soil stratigraphy, encountering bedrock, or other factors.

The archaeological monitor will keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the certified archaeologist will prepare a monitoring report that details the results of monitoring. The report will be submitted to IRWD and any Native American groups who request a copy. The certified archaeologist will submit a copy of the final report to the California Historic Resources Information System South Central Coastal Information Center.

MM CR-2 If archaeological resources are inadvertently unearthed during excavation activities (within disturbed or undisturbed soils), the contractor will immediately cease all earth-disturbing activities within a 50-foot radius of the area of discovery, and the certified archaeologist and IRWD will be notified immediately. If the certified archaeologist determine the archaeological resources are potentially significant pursuant to CEQA Guidelines Section 15064.5 or California PRC Section 21083.2(g), the archaeologist, in consultation with IRWD and representatives from the tribal governments consulting under AB 52, will determine appropriate treatment, which may include avoidance of the area of the find, data recovery, documentation, testing, reburial, archival review, and/or transfer to the appropriate museum or educational institution, or other appropriate actions. After the find has been appropriately avoided or mitigated, work in the area may resume.

4.4.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project-specific and cumulative impacts to historic resources, archaeological resources, and human remains associated with the Project would be less than significant. Potential impacts to archeological resources would be mitigated to a less than significant level with the implementation of **MM CR-1**, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM CR-2**, which provides details for treatment of unanticipated discoveries. Additionally, the Project would comply with the State requirements pertaining to the protection of human remains by implementing **RR CR-1**.

4.4.9 REFERENCES

Dillon, Brian D. 2002. California Paleo-Indians: Lack of Evidence, or Evidence of a Lack? In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, edited by William J. Wallace and Francis A. Riddell, pp. 110–128. Contributions of the University of California Archaeological Research Facility, No. 60. University of California, Berkeley.

Erlandson, J. M., T. C., and R. Carrico.1987. A Fluted Projectile Point Fragment from the Southern California Coast: Chronology and Context at CA-SBA-1951. *Journal of California and Great Basin Anthropology* 9:120–128.

Glassow, M.A., L. Gamble, J. Perry, and G.S. Russell. 2007. Prehistory of the Northern California Bight and the Adjacent Transverse Ranges. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 191-213. Alta Mira Press, New York.

Moratto, M. 1984. *California Archaeology*. Academic Press, New York.

Office of Historic Preservation (OHP). 1990 (February). *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format.* Department of Parks and Recreation, Office of Historic Preservation. Sacramento, CA: OHP. https://ohp.parks.ca.gov/pages/1054/files/armr-remediated.pdf

Psomas. 2024 (February). Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California. Pasadena, CA: Psomas. Appendix D.

South Environmental. 2023 (November). Historical Resources Assessment, Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, CA. Pasadena, CA: South Environmental.

U.S. Department of the Interior, National Park Service (NPS). 1990, revised for internet 1995). National Register Bulletin. Washington, D.C.: NPS. https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf.

Wallace, W. J. 1978. Post-Pleistocene Archaeology, 9000 to 2000 B.C. In *California*, edited by Robert F. Heizer, pp. 25–36. Handbook of North American Indians, Vol. 8, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

———. 1955. A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11(3):214–230.

4.5 ENERGY

This section of the Environmental Impact Report (EIR) describes the existing energy conditions of the Project area and identifies associated potential energy impacts related to development of the proposed Project. Energy consumption calculations associated with this Project are included as Appendices B and E to this EIR.

4.5.1 BACKGROUND

Existing Conditions

Electric Power

Southern California Edison (SCE) maintains electrical facilities and infrastructure within the County and surrounding areas that provide service to the Project area under the applicable rules and tariffs approved by the California Public Utilities Commission (CPUC). SCE delivers power to approximately 15 million people in California, including the Project site (SCE 2019).

Natural Gas

SoCalGas (SCGC) is the nation's largest natural gas distribution utility, delivering increasingly clean, safe and reliable energy to 21.1 million consumers through 5.9 million meters in more than 500 communities (SCGC 2023). SoCalGas' service territory encompasses approximately 24,000 square miles throughout Central and Southern California, from Visalia to the Mexican border. The service would be provided in accordance with SCGC's policies and extension rules on file with the CPUC.

4.5.2 REGULATORY SETTING

Federal

Energy Independence and Security Act of 2007

The Energy Independence and Security Act (EISA) of 2007 (Public Law 110–140) seeks to provide the nation with greater energy independence and security by increasing the production of clean renewable fuels; improving vehicle fuel economy; and increasing the efficiency of products, buildings, and vehicles. It also seeks to improve the energy performance of the federal government. The EISA sets increased Corporate Average Fuel Economy Standards; the Renewable Fuel Standard; appliance energy efficiency standards; building energy efficiency standards; and accelerated research and development tasks on renewable energy sources (e.g., solar energy, geothermal energy, and marine and hydrokinetic renewable energy technologies), carbon capture, and sequestration.

State

CEQA

California Public Resources Code Section 21100(b)(3) and Appendix F to the CEQA Guidelines require a discussion of potential energy impacts of proposed projects.

Appendix F states:

> The goal of conserving energy implies the wise and efficient use of energy. The means of achieving this goal include:
>
> (1) Decreasing overall per capita energy consumption,
>
> (2) Decreasing reliance on fossil fuels such as coal, natural gas, and oil, and
>
> (3) Increasing reliance on renewable energy sources.

Appendix F of the CEQA Guidelines also requires that "EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy".

California Public Utilities Commission

The CPUC regulates utility companies and ensures the provision of safe, reliable utility service and infrastructure related to electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies. CPUC General Order 112E, which is based on the Federal Department of Transportation Guidelines contained in Part 192 of the Code of Federal Regulations, specifies a variety of design, construction, inspection, and notification requirements. The CPUC conducts annual audits of pipeline operations to ensure compliance with these safety standards. In addition, SCGC has a safety program which has reduced the risk of gas distribution fires by improving welds on the larger diameter (24- to 30-inch) pipelines and by replacing old distribution pipes with flexible plastic pipes.

California Energy Commission

In 1974, the California Energy Commission (CEC) was created to be the State's principal energy planning organization and to meet the energy challenges facing the State in response to the 1973 oil embargo. The CEC is charged with seven basic responsibilities when designing State energy policy:

- Advancing State Energy Policy;
- Achieving Energy Efficiency;
- Certifying Thermal Power Plants;
- Investing in Energy Innovation;
- Transforming Transportation;
- Developing Renewable Energy; and
- Preparing for Energy Emergencies.

Local

Orange County

General Plan

The Orange County General Plan provides the vision of the future and framework for development in the County. The General Plan is comprised of various elements or topical sections that cover different aspects of the County. The two Elements that are most relevant to the Project are the Public Services and Facilities Element and Resources Element.

Public Services and Facilities Element

The Public Services and Facilities Element focuses on those publicly managed services and facilities which have a direct influence on the distribution and intensity of development that can be accommodated through the utilization of existing technologies and assumptions that are used to determine adequate service levels. These services include flood control, waste management, water and wastewater, transportation, and community services (i.e., fire protection, library, sheriff patrol, local special services districts, and public-school facilities).

The following goals, objectives, and policies from the Public Services and Facilities Element of the Orange County General Plan are relevant to the proposed Project.

Water System

Goal 1: Encourage the planning and development of a water conveyance and distribution system to meet the County's future demand.

Objective 1.1: To achieve desired water system service levels through the coordination of land use and water system planning.

Objective 1.2: To implement State, regional, and local facility plans for water delivery to Orange County.

Objective 1.3: To increase storage and delivery capacity for water supplies in Orange County.

Policy 1: *System Capacity and Phasing* – To ensure the adequacy of water system capacity and phasing, in consultation with the service providing agency(ies), in order to serve existing and future development as defined by the General Plan.

Policy 2: *Water Delivery System* – To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.

Resources Element

The Resources Element, one of nine elements of the Orange County General Plan, contains official County policies on the conservation and management of resources. The Resources Element establishes a strategy for the development, management, preservation, and conservation of resources that are necessary to meet Orange County's existing and future demands. Aspects of this Element that relate to the Project are local water availability and water quality. The Water Resources Component of the Element describes the need to manage local water resources to meet the County's needs.

The following goals, objectives, and policies from the Resources Element of the Orange County General Plan are relevant to the proposed Project.

Water Resources Component

The use, supply, and conservation of water are critical issues in Orange County. Since almost every urban activity is dependent on water to some extent, it is in the best interest of the general public that the County's water resources are properly planned and managed.

Goal 1: Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.

Objective 1.1: To maintain the adequacy and dependability of imported water supplies.

Objective 1.3: To reduce dependence on imported water supplies through both conservation and local water resource development.

Policies

Policy 1: *Water Supply* – To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.

Policy 2: Conservation – To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.

Policy 4: *Shortage Planning* – To ensure that Orange County will not be severely impaired by any potential future water shortages.

Policy 5: *Water Quality* – Protect and improve water quality through continued management, enforcement, and reporting requirements. Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats. Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles. Consider implementation of LID principles to conserve natural features (e.g., trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils. Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources. Additional water quality policies are also provided in the Land Use Element.

4.5.3 METHODOLOGY

Construction

Fuel use for diesel and gasoline are provided for the construction phase for off-road equipment, worker commutes, haul trips, and vendor trips. Fuel consumption was estimated based on anticipated construction durations, as well as equipment quantities and types. Construction energy consumption was estimated using a combination of the California Emissions Estimator Model (CalEEMod), the Off-Road Diesel Analysis (OffRoad) inventory tool, and the Emission Factors (EMFAC) database. Construction equipment assumptions were based on data provided by Irvine Ranch Water District (IRWD) and CalEEMod for construction equipment activities, which are included in Appendix B, while fuel consumption was derived from OffRoad for off-road vehicles and EMFAC for on-road vehicles, which is included in Appendix E.

Operations

The operations phase would result in energy consumption from vehicle trips associated with the Project as well as electrical consumption. Due to the lack of change in energy consumption between existing operations and Project conditions, the assessment of energy impacts is addressed qualitatively.

4.5.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, the Project would result in a significant energy impact if it would:

Threshold 4.5-1 Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Threshold 4.5-2 Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?

4.5.5 IMPACT ANALYSIS

Threshold 4.5-1

Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Less Than Significant Impact. Project construction would require the use of construction equipment for development of Project components, hauling, and demolition activities. Construction would also include the vehicles of construction workers and vendors traveling to and from the Project site and on-road haul trucks for the export of materials from site clearing and the export of sediment from excavation.

Off-road construction equipment use was calculated from the equipment data (i.e., vehicle types, hours per day, horsepower, load factor) provided in the CalEEMod construction output files included in Appendix B of this EIR. The total horsepower hours for construction equipment used for the Project was then multiplied by fuel usage rates to obtain the total fuel usage for off-road equipment.

Fuel consumption from construction worker, vendor, and delivery/haul trucks was calculated using the trip rates and distances provided in the CalEEMod construction output files. Total vehicle miles traveled (VMT) was then calculated for each type of construction-related trip and divided by the fuel consumption factor from California Air Resources Board's EMFAC 2021 model. EMFAC provides the total annual VMT and fuel consumed for each vehicle type. Construction vendor and delivery/haul trucks were assumed to be heavy-duty diesel trucks. As shown in Table 4.5-1, Energy Use During Construction, the Project would consume a total of 75,906 gallons of gasoline and 474,188 gallons of diesel fuel during construction.

TABLE 4.5-1
ENERGY USE DURING CONSTRUCTION

Source	Gasoline Fuel (gallons)	Diesel Fuel (gallons)
Off-road Construction Equipment	30,569	362,201
Worker commute	38,413	95
Vendors	6,815	70
On-road haul	110	111,822
Total	**75,906**	**474,188**
Sources: Based on data from CalEEMod (Appendix B), Offroad, and EMFAC2021 (Appendix E).		

Fuel energy consumed during construction would be temporary in nature and would not represent a significant demand on energy resources. Furthermore, there are no unusual Project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than comparable equipment at construction sites in other parts of the State. Though energy consumption related to the Project's infrastructure improvements, they are necessary to meet the Project's objectives of meeting the seismic, safety, and design requirements; fulfill operational requirements; extend the useful life of the dam; and improve water supply reliability. Therefore, the proposed construction activities would not result in inefficient, wasteful, or unnecessary fuel consumption. This impact would be less than significant, and no mitigation is required.

Impact Conclusion: *Based on the analysis presented, the Project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation. The Project's impact would be less than significant, and no mitigation is required.*

Threshold 4.5-2

Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less Than Significant Impact. The Project does not involve the development of renewable energy, nor is energy efficiency an issue related to the dam improvements as discussed above under Threshold 4.5-1. As such, the Project would not conflict or obstruct the State of California or local plans for renewable energy or energy efficiency. The proposed Project however would be consistent with the goals, objectives, and policies established within the Public Services and Facilities Element and Resource Element of the Orange County General Plan. The Project would maintain local water supply reliability, fulfill IRWD's operational requirements, and reduce the potential for seismic issues that may result in dam failure and inundation of developed areas (refer to Section 4.6, Geology and Soils). If inundation of developed areas occurs due seismic or other issues that would be addressed by the Project, a tremendous amount of energy would need to be expended to restore these areas to preflood conditions. As such, implementation of the Project and subsequent fulfillment of Project objectives would be preventative and would be more energy efficient than reacting to restoration efforts related to inundation. As such, the Project would not conflict with State or local plans related energy and water. Impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *Implementation of the Project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Impacts would be less than significant, and no mitigation is required.*

4.5.6 CUMULATIVE IMPACTS

The Project would require energy during the construction and operations phases of the Project. As previously discussed, the dam improvements associated with the Project are necessary to meet today's seismic and safety standards, water supply reliability, and current Division of Safety of Dams regulatory requirements; and to satisfy IRWD's operational requirements and extend the useful life of the facilities. Energy used to update and upgrade the current infrastructure is a preventative measure to avoid flooding and water loss related to failure of the dam infrastructure and potentially use more energy for restorative actions. Cumulative energy consumption with other projects would occur within the region but is considered necessary and no cumulative impacts would occur.

4.5.7 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant impacts to energy; therefore, no mitigation measures are required.

4.5.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed Project would not result in significant impacts related to energy and impacts would be less than significant, and no mitigation is required.

4.5.9 REFERENCES

California Air Resources Board (CARB). Emissions Factors EMFAC 2021. Sacramento, CA: CARB. https://www.arb.ca.gov/emfac/.

Southern California Edison (SCE). 2019 (April 25, Updated). Southern California Edison – SCE's Service Area. Rosemead, CA: SCE. https://download.newsroom.edison.com/create_memory_file/?f_id=5cc32d492cfac24d21aecf4c&content_verified=True.

SoCalGas (SCGC). 2023. SoCalGas – About Us, Company Profile. Monterey Park, CA: SCGC. https://www.socalgas.com/about-us/company-profile.

4.6 GEOLOGY AND SOILS

This section of the Environmental Impact Report (EIR) describes existing geologic and soil conditions and known or anticipated paleontological resources in the Project area, identifies associated potential geotechnical impacts related to development of the proposed Project, and sets forth measures designed to mitigate identified significant adverse impacts. Information in this section is based upon the *Santiago Creek Dam Outlet Tower and Spillway Improvements Project, PR 01813, Preliminary Design Report* (PDR) prepared by AECOM and GEI Consultants (July 2022) and the *Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study, Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California* dated February 2024 and prepared by Psomas (Appendix D; Psomas 2024).

4.6.1 REGULATORY SETTING

Federal

Public Resources Code Sections 5097.5 and 30244

California Public Resources Code (PRC) Sections 5097.5 and 30244 specify State requirements for paleontological resource management. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, defining their removal as a misdemeanor. PRC Sections 5097.5 and 30244 require reasonable mitigation of adverse impacts on paleontological resources from developments on public (i.e., State, county, city, district) lands.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) was adopted by the State of California in 1972 in order to mitigate surface fault rupture hazards along known active faults (Section 2621 et. seq. of the PRC). The purpose of the Alquist-Priolo Act is to reduce the threat to life and property—specifically from surface fault rupture—by preventing the construction of buildings used for human occupancy on the surface trace of active faults. Under the Alquist-Priolo Act, the California Geological Survey (CGS) has defined an “active” fault as one that has had surface displacement during the past 11,000 years (Holocene time). This law directs the State Geologist to establish Earthquake Fault Zones (known as “Special Studies Zones” prior to January 1, 1994) to regulate development in designated hazard areas. In accordance with the Alquist-Priolo Act, the State has delineated “Earthquake Fault Zones” along identified active faults throughout California. City and County jurisdictions must require a geologic investigation to demonstrate that a proposed development project, which includes structures for human occupancy, is adequately set back (generally at least 50 feet) from an active fault prior to permitting.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (SHMA) was passed in 1990 and directs the CGS (formerly the California Division of Mines and Geology) to identify and map areas subject to earthquake hazards such as liquefaction, earthquake-induced landslides, and amplified ground shaking (Sections 2690–2699.6 of the PRC). Passed by the State legislature after the 1989 Loma Prieta Earthquake, the SHMA is aimed at reducing the threat to public safety and minimizing potential loss of life and property in the event of a damaging earthquake event. Seismic Hazard Zone Maps

are a product of the resultant Seismic Hazards Mapping Program and are produced to identify Zones of Required Investigation; most developments designed for human occupancy in these zones must conduct site-specific geotechnical investigations to identify the hazard and to develop appropriate mitigation measures prior to permitting by local jurisdictions.

The SHMA establishes a Statewide public safety standard for the mitigation of earthquake hazards. The CGS' Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, provides guidance for the evaluation and mitigation of earthquake-related hazards for projects in designated zones of required investigations.

Division of Safety of Dams

In the State of California, dam safety is regulated by the Division of Safety of Dams (DSOD) under the authority granted by the California Water Code (Parts 1 and 2 of Division 3, Dam and Reservoirs). The DSOD provides oversight to the design, construction, and maintenance of over 1,200 jurisdictional sized dams in California, including the Santiago Creek Dam. Jurisdictional dams are dams that are more than 6 feet high and impound 50 acre-feet or more of water, or 25 feet or higher and impound more than 15 acre-feet of water. The jurisdictional height of a dam is from the toe of the dam to its maximum storage elevation, which is typically the spillway crest. The DSOD ensures dam safety by:

- Reviewing and approving dam enlargements, repairs, alterations, and removals to ensure that the dam appurtenant structures are designed to meet minimum requirements.
- Performing independent analyses to understand dam and appurtenant structures performance. These analyses can include structural, hydrologic, hydraulic, and geotechnical evaluations.
- Overseeing construction to ensure work is being done in accordance with the approved plans and specifications.
- Inspecting each dam on an annual basis to ensure it is safe, performing as intended, and is not developing issues. Roughly 1/3 of these inspections include in-depth instrumentation reviews of the dam surveillance network data.
- Periodically reviewing the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California.

The structural elements of the proposed Project would undergo appropriate and final design-level geotechnical evaluations prior to final design and construction. Implementing the regulatory requirements in the DSOD regulations and ensuring that all structures constructed in compliance with the law is the responsibility of the project engineers and building officials. In addition to the DSOD regulations, IRWD goes above and beyond to ensure a heightened level of dam safety by implementing Risk Informed Decision Making (RIDM). The design engineer, as a registered professional with the State of California, is required to comply with the DSOD and local codes while applying standard engineering practice and the appropriate standard of care for the particular region in California, which, in the case of the proposed Project, is Orange County.[1] The California Professional Engineers Act (Building and Professions Code Sections 6700-6799), and the Codes of Professional Conduct, as administered by the California Board of Professional Engineers and Land Surveyors, provides the basis for regulating and enforcing engineering

[1] A geotechnical engineer (GE) specializes in structural behavior of soil and rocks. GEs conduct soil investigations, determine soil and rock characteristics, provide input to structural engineers, and provide recommendations to address problematic soils.

practice in California. For a dam project, the DSOD is responsible for review and approval of the proposed design, and inspections during construction and annually during operations.

Paleontological Resources

Paleontological resources are afforded protection by environmental legislation set forth under CEQA. Appendix G of the CEQA Guidelines provides guidance relative to significant impacts on paleontological resources, indicating that a project will have a significant impact on paleontological resources if it disturbs or destroys a unique paleontological resource or site or unique geological feature.

Under Guidelines for the Implementation of CEQA, as amended on March 29, 1999 (Title 14, Division 6, Chapter 3, California Code of Regulations: 15000 et seq.), procedures define types of activities, persons, and public agencies required to comply with CEQA and include as one of the questions to be answered in the Environmental Checklist: "Will the proposed project disturb paleontological resources?" (Appendix G, Section VII, Part f)

The California Public Resources Code Section 5097.5 states:

a) "No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

b) As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof."

Local

County of Orange General Plan

Safety Element

The Safety Element, one of nine elements of the General Plan, contains the County of Orange's (County) policies on identified and potential hazards and safety considerations, their mitigation (i.e., reduction in damage and loss to real and personal property and minimization of adverse social and economic impacts) and implications for development.

The following goals and policies from the Safety Element of the Orange County General Plan are relevant to the proposed Project.

Goal 1: Provide for a safe living and working environment consistent with available resources.

Objective 1.1: To identify natural hazards and determine the relative threat to people and property in Orange County.

Goal 2: Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards, which maximize protection of life and property.

Objective 2.1: To create and maintain plans and programs which mitigate the effects of natural hazards.

Objective 2.2: To support the development and utilization of technologies, which minimize the effects of natural hazards.

Resources Element

The following goals and policies from the Resources Element of the Orange County General Plan are relevant to the proposed Project.

Cultural-Historic Resources

Goal 2: To encourage through a resource management effort the preservation of the county's cultural and historic heritage.

Objective 2.2: Take all reasonable and proper steps to achieve the preservation of archaeological and paleontological remains, or their recovery and analysis to preserve cultural, scientific, and educational values.

Paleontological Resources Policies:

1. To identify paleontological resources through literature and records research and surface surveys.
2. To monitor and salvage paleontological resources during the grading of a project.
3. To preserve paleontological resources by maintaining them in an undisturbed condition.

4.6.2 METHODOLOGY

Information in this section is derived from the "Geotechnical Investigation and Design Criteria" and "Structural Design Criteria" chapters of the *Santiago Creek Dam Outlet Works and Spillway Improvements Preliminary Design Report – Volume I* (Geotechnical Investigation) prepared by AECOM and GEI Consultants (GEI) and dated July 15, 2022 (AECOM and GEI 2022a); the *Seismic Hazard Analysis Report: Santiago Creek Dam Outlet Tower and Spillway Improvements Project* (Seismic Hazards Analysis) prepared by AECOM and dated July 30, 2020 (AECOM 2020); the *Construction Hydrologic and Geotechnical Risk Evaluation* (Technical Memorandum) prepared by GEI Consultants and dated February 6, 2023 (GEI 2023); the *Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study, Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California* prepared by Psomas and dated February 2024 (Psomas 2024; Appendix D); and publicly available information published by the California Geological Survey (CGS). It is noted that the Geotechnical Investigation incorporates the relevant data from the Seismic Hazards Analysis.

Paleontological Records Search

On October 15, 2020, Psomas requested that the Natural History Museum (NHM) of Los Angeles County conduct a search of its paleontology collection records for the locality and specimen data for the Project site and surrounding area.

Paleontological Field Survey

Psomas surveyed the Project site on October 20, 2020. The entire Project site was surveyed by walking evenly spaced transects spaced no more than 10 meters (32 feet) apart. The paleontologist examined the ground surface for the presence of the following:

- Unique Geological Formations and
- Fossil Localities.

Psomas maintained transect accuracy in the Project site using a Garmin global positioning system (GPS) receiver and Project field maps. A field notebook and a digital camera were used to record the survey conditions and findings.

4.6.3 EXISTING CONDITIONS

The geotechnical investigation for the PDR consisted of a review of relevant literature and field investigations that included geologic mapping, test pits, auger borings, and rotary-wash borings. The following sections summarize the key findings of the literature review and the field investigations.

Literature Review

Principal sources of existing information include geologic maps and reports on the regional geology published by the U.S. Geological Survey and unpublished reports, drawings, and photographs related to site-specific studies and construction of Santiago Creek Dam. Review of these geologic publications and unpublished project reports provided a framework of the subsurface geologic conditions at the Project site, which served as the basis for preparation of the geotechnical investigation work plan and subsurface exploration program (Kempkey 1930; Marliave 1939; WCC 1979; Schoellhamer et al. 1981; Morton and Miller 1981; Morton and Miller 2006).

Santiago Creek Dam is on Santiago Creek, which is a major north-flowing drainage in the Northern Santa Ana Mountains. Geologic mapping shows the Project area to be underlain by Cretaceous to Eocene sedimentary rock, which is locally overlain by Pleistocene to Holocene age alluvium. Bedrock in the vicinity of the outlet tower and spillway consists of marine sediments of the Williams Formation. The Williams Formation is subdivided into the Schulz Ranch Sandstone Member and the Pleasants Sandstone Member. The Schulz Ranch Member, which is the stratigraphically lower member of the Williams Formation, is typically a brownish yellow to gray, massive coarse-grained sandstone and conglomerate. It is also reported that portions of the Schulz Ranch Member consist of interbedded conglomeratic sandstone with siltstone beds that are about 12 to 30 feet thick. The Pleasants Sandstone Member is described as a light brown to gray, fine-grained sandstone. The contact between the two members is mapped in the vicinity of the spillway (WCC 1979; Schoellhamer et al. 1981; Morton and Miller 1981; Morton and Miller 2006).

Although the published literature describes the Williams Formation as predominantly consisting of sandstone, much of the Williams Formation mapped in the left abutment and spillway area as shale. Much of the spillway excavation and the entire length of the trench for the outlet pipe mapping indicates a predominance of shale. Shale also was encountered in a diamond drill hole (Drill Hole No. 9) about 50 feet south of the outlet tower that was done as part of the original dam explorations. The log of the borehole suggests that the top of the brown shale bedrock was at an elevation of approximately 672 feet. Based on the mapping and outlet trench log, the orientation of the bedrock in the vicinity of the spillway and outlet tower typically strikes northwest and dips

approximately 50 to 75 degrees toward the southwest (Schoellhamer 1954 and 1981; Marliave 1939; Kempkey 1930; and WCC 1979).

Geotechnical Field Investigations

Geologic Mapping

Geologic mapping of the Project area was performed in July 2021. The field mapping was supplemented by existing map data and included foundation contours beneath the embankment in the vicinity of the dam crest and embankment, spillway, and outlet works. The field mapping generally corroborated the published mapping described above and depicts various bedrock units of the Williams Formation and local surficial deposits consisting of artificial fill, colluvium, and alluvium (Marliave 1939).

Subsurface Investigations for the Outlet Works

Three vertical borings (O-1 through O-3) were explored as part of the Outlet Works investigations in October of 2020. Two borings (O-1 and O-2) were drilled from a barge on the alignment of the sloping intake structure and one boring was drilled (O-3) near the downstream control structure. The borings at the sloping intake (O-1 and O-2) were drilled to depths of 90 and 90.5 feet, respectively. These borings encountered colluvium and lake deposits ranging from about 8 to 14 feet thick. Comparison of the current reservoir bottom from the bathymetric survey to the as-built topographic contours suggests that these lake deposits thicken towards the outlet tower and outlet pipe to approximately 25 feet thick. Beneath the lake deposits, borings O-1 and O-2 encountered embankment fills ranging from about 5 to 37 feet thick, overlying shale bedrock. The boring drilled near the downstream control structure encountered 13.5 feet of artificial fill, overlying 17 feet of older alluvium, overlying sandstone bedrock.

A geotechnical laboratory testing program was performed on soil and rock core samples obtained from the outlet works borings. This data and other information related to the outlet works borings are summarized in the project Geotechnical Data Report (GDR) previously prepared by AECOM and GEI (AECOM and GEI 2021).

Subsurface Investigations for the Spillway

Fourteen borings (S-1 through S-14) were drilled as part of the spillway investigations between October and December 2020. The borings included vertical and inclined borings that ranged in length from about 20 feet to 160 feet. Note that several of the borings, including S-8, S-10, and S-12, are labeled as “a” and “b”. In these cases, the original borings (labeled “a”) were abandoned due to drilling difficulties, and a second boring (labeled “b”) was drilled and completed nearby.

Borings S-1 through S-4 and S-12a through S-14 were drilled in the existing spillway approach area. These borings were vertical and drilled to depths ranging from about 20 feet to 53 feet. These borings encountered embankment fills ranging from about 13 to 35 feet thick overlying bedrock.

Borings S-5 through S-10b were drilled in the spillway chute. Two of the borings (S-7 and S-10b) were inclined; the remaining borings were vertical. The inclined borings were drilled to a maximum length of about 160 feet; the vertical borings were drilled to depths ranging from about 21 feet to 51 feet. These borings encountered bedrock beneath the spillway slab.

Boring S-11 was drilled above the existing spillway "waste channel," on the hillside directly opposite the downstream end of the chute. The boring was inclined and drilled to a total length of about 160 feet. This boring encountered bedrock along its entire length.

A geotechnical laboratory testing program was performed on soil and rock core samples obtained from the spillway borings. These data and other information related to the spillway borings are summarized in the GDR (AECOM and GEI 2021).

Geotechnical Properties

The following subsections summarize information contained in the *Santiago Creek Dam Outlet Works and Spillway Improvements Geotechnical Interpretive Report (GIR)* (AECOM and GEI 2022b). The GIR describes the geologic and geotechnical site conditions for the Project. The descriptions and geologic interpretations provided herein are based on the geotechnical field and laboratory exploration programs recently completed by AECOM and GEI, along with other published and unpublished data and information. The recent field and laboratory test data obtained by AECOM and GEI are included in the GDR (AECOM and GEI 2021).

Soils

The strength parameters used to evaluate the soils at the Project site are based on current and historical information, which includes laboratory test data (e.g., Unified Soil Classification System classification, strength testing) and blow counts from boring logs, as well as the team's professional judgement. These soil parameters would be used as a basis for stability analyses, retaining walls, and foundation recommendations.

Bedrock

The strength parameters used to evaluate the stability of the cuts in the rock mass are based on the available laboratory test data (e.g., unconfirmed compressive strength [UCS] results), field observations of existing outcrops, and professional judgement. The rock parameters were developed for sandstones and shales, each considering two weathering classes: intensely to moderately weathered rock; and slightly weathered to fresh rock. GSI determines the rock joint parameters and friction angles which ensure future stability of the bedrock cuts.

Seismic Considerations

The U.S. Army Corps of Engineers (USACE) requires that civil works structures are to be designated as either "critical" or "normal." EM 1110-2-2100 (USACE 2005) states that "structures designated as critical are those structures on high hazard projects whose failure will result in loss of life. Loss of life can result directly, due to flooding, or indirectly from secondary effects. Loss of life potential should consider the population at risk, the downstream flood wave depth and velocity, and the probability of fatality of individuals within the affected population." Should the outlet works or spillway be damaged, IRWD could lose the ability to perform an emergency release to protect the dam, and lead to an uncontrolled release of the reservoir. Therefore, the structural classifications for the Project are all "critical."

USACE requires that for critical structures, the maximum design earthquake (MDE) used for seismic evaluation should be set equal to the Maximum Considered Earthquake (MCE). DSOD requires dams be designed to withstand loads from the MCE. Based on USACE and DSOD requirements, the MCE will be used to design the outlet works and spillway structures. Although the USACE has no official authority with respect to Santiago Creek Dam or the design of the Project facilities, USACE engineering publications are typically very specific and technically

detailed, and the design standards are recognized as being consistent with sound engineering practice. As such, the geotechnical design of the Project is based on current DSOD requirements and informed by USACE design standards.

Seismic Hazard Analysis

The design earthquake ground motions for Santiago Creek Dam were developed using a Deterministic Seismic Hazard Analysis, in accordance with the requirements of DSOD. The seismic source faults that can generate significant earthquake ground motions at the dam site (local faults are shown in Exhibit 4.6-1, Fault Map for Santiago Creek Dam) were identified, and the acceleration time histories were developed, which adequately represent the intensity of ground motions corresponding to the controlling maximum earthquakes.

Basin Physiology and Geology

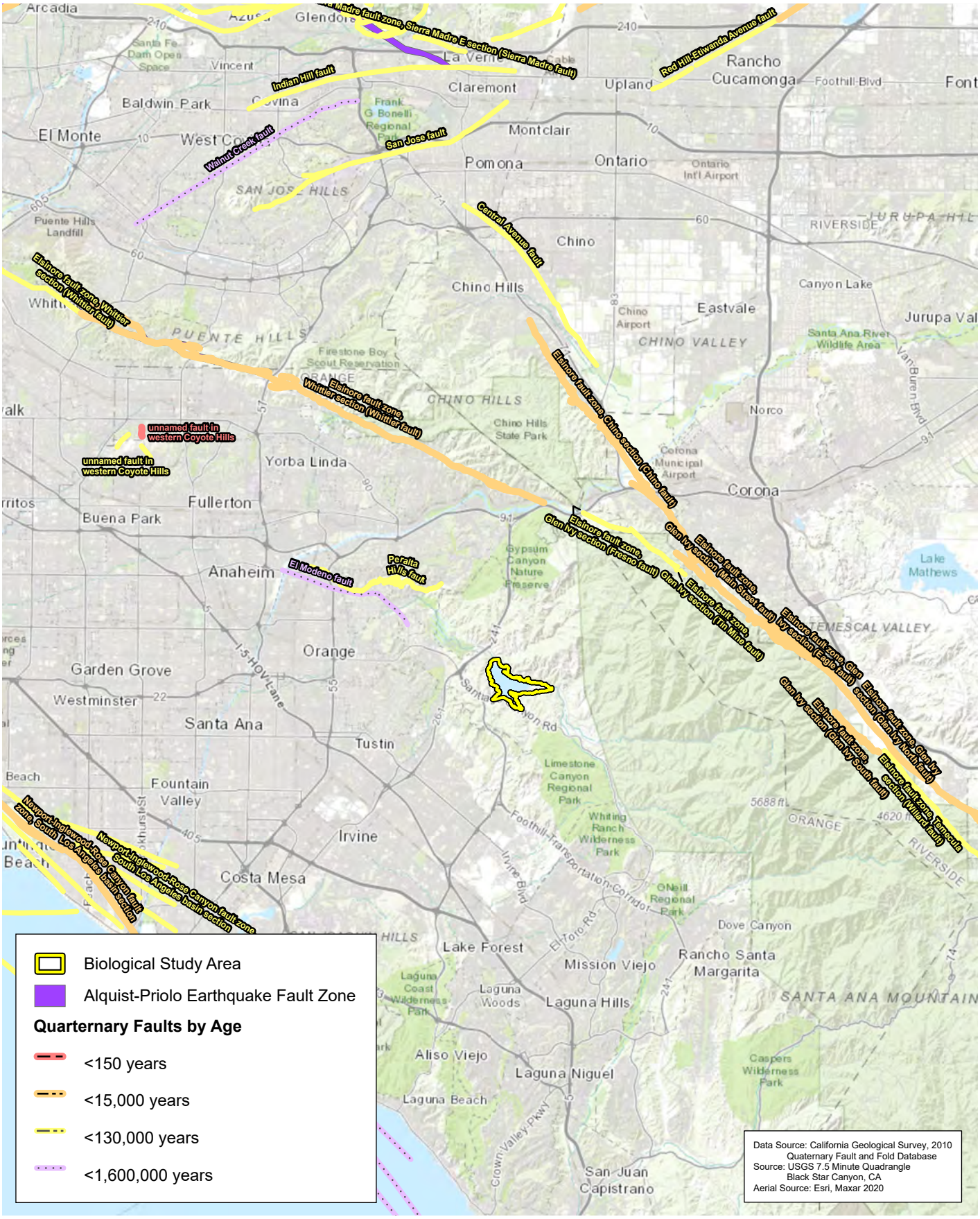
Santiago Creek is located on the western slope of the Santa Ana Mountains in southern California. The creek flows in a northwesterly direction for about 32 miles from its headwaters near Santiago Peak to its confluence with the Santa Ana River about 14.5 miles downstream of Santiago Creek Dam. Santiago Creek Dam drains about 63 square miles of the Santiago Creek watershed. The drainage basin upstream of the dam generally consists of steep and mountainous terrain, ranging in elevation from approximately 780 feet at the dam to 5,680 feet in the headwaters near Santiago Peak. Urban development and agricultural use within the watershed are limited, with much of the drainage basin located in the Cleveland National Forest. Vegetation within the basin generally consists of scrub/rangeland with areas of dense shrubs and trees. Most of the basin soils fall into Natural Resource Conservation Service (NRCS) hydrologic group D, indicating a poor infiltration rate and high runoff potential when thoroughly wet, though there are pockets of more well-drained soils.

Paleontological Records Search Results

The paleontological records search was completed on October 16, 2020. The record search included a thorough search of the NHM paleontology collection records for the locality and specimen data for the Project site and surrounding area. The records search identified fossil localities that lie directly within the proposed Project site as well as numerous fossil localities nearby from the same sedimentary deposits that occur in the proposed Project area, either at the surface or at depth. One locality, LACM IP 26171, is located along the northwest shore of Santiago Reservoir, where unspecified invertebrates were collected from the Williams Formation during excavations for the spillway in 1969 (depth of fossils is not known). Additionally, eight localities were located nearby the same sedimentary deposits that occur in the Project site, either at the surface or at depth. The Project site is generally underlain by Pleistocene age alluvium, which could contain previously undiscovered fossils of extinct mega-fauna (i.e., saber-toothed cats, mammoths, dire wolves).

Paleontological Field Survey Results

A Psomas cross-trained archaeologist/paleontologist surveyed the Project site on October 20, 2020. The Psomas archaeologist did not identify new archaeological and/or paleontological resources within the Project site; however, it should be noted the ground visibility was obscured by several species of native and non-native vegetation. Additionally, Psomas identified archaeological site P-30-001012, which was preserved in place. None of the cultural resources previously recorded were observed on the surface; however, the artifact assemblage and site boundary were not observed due to the site being stripped for agricultural practices along with scattered debris piled and placed along a nearby small drainage.



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Faults

Fault Map for Santiago Creek Dam

Exhibit 4.6-1

Santiago Creek Dam Improvement Project

N
W
E
S

0 2.5 5 Miles

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Faults.pdf

Geotechnical Investigations

As stated in Section 3.0, Project Description, although IRWD previously completed comprehensive geotechnical investigations of the site to support the Project design and the development of detailed construction documents, it was determined that additional geotechnical investigations would be necessary to support the final design. A supplemental geotechnical investigation was conducted in January 2025 and included additional borings. Other supplemental field investigations may include additional borings, test pits, and geophysical surveys needed to support the ongoing Project design. The additional geotechnical investigations would remain within the proposed limits of disturbance defined by the Project and would be mitigated as part of the overall Project.

4.6.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant geology and soils impact if it would:

Threshold 4.6-1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

(i) Strong seismic ground shaking

(ii) Seismic-related ground failure, including liquefaction

(iii) Landslides

Threshold 4.6-2 Result in substantial soil erosion or the loss of topsoil.

Threshold 4.6-3 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

Threshold 4.6-4 Be located on expansive soils, as defined in Table 18-1-B of the California Building Code (1994), creating substantial direct or indirect risks to life or property.

Threshold 4.6-5 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

4.6.5 IMPACT ANALYSIS

Threshold 4.6-1

Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

(i) Strong seismic ground shaking?

Less Than Significant Impact. The Project site, as with the entire Southern California region, may be subject to strong ground shaking resulting from a major earthquake on one or more faults in the area. Exhibit 4.6-1, Fault Map for Santiago Creek Dam, illustrates the locations and names of active regional faults. The nearest active fault is the Elsinore-Whittier fault zone (i.e., all segments), located approximately six miles to the north-northeast of the site.

The Irvine Lake dam and reservoir are under the regulatory jurisdiction of the DSOD. The USACE has no official authority with respect to Santiago Creek Dam or the design of the Project facilities. However, USACE engineering publications are typically very specific and technically detailed, and the design standards are recognized as being consistent with sound engineering practice. As such, the geotechnical design of the Project is based on current DSOD requirements and informed by USACE design standards, among other applicable codes and standards.

USACE requires that civil works structures are to be designated as either "critical" or "normal", and states that "structures designated as critical are those structures on high-hazard projects whose failure will result in loss of life. Loss of life can result directly, due to flooding, or indirectly from secondary effects." Should the outlet works or spillway be damaged, IRWD could lose the ability to perform an emergency release to protect the dam and lead to an uncontrolled release of the reservoir. Therefore, the structural classifications for the Project are all designated "critical." USACE requires that for critical structures, the MDE used for seismic evaluation should be set equal to the MCE. Based on USACE and DSOD requirements, the MCE—a multi-segment rupture on the Elsinore-Whittier faults with M 7.75—will be used to design the outlet works and spillway structures.

The Project's structural and geotechnical design has been prepared consistent with DSOD and USACE requirements and standards, respectively, based on site-specific seismic and geologic conditions, and applicable seismic safety requirements of the 2022 California Building Code (CBC), among other requirements. The potential for strong ground shaking is an existing seismic hazard that affects the site, and the Project would not exacerbate this condition. As discussed in Section 3.0, Project Description, of this EIR, the rehabilitation and replacement of the Santiago Creek Dam outlet works and spillway facilities and improvements to the dam crest and embankment are necessary in part to address seismic safety concerns and identified dam safety deficiencies and to meet current DSOD regulatory requirements. As such, implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving strong seismic ground shaking. There would be less than significant impacts related to strong seismic ground shaking with implementation of engineering design requirements applicable to the Project, and no mitigation is required.

Impact Conclusion: *The Project site is in a seismically active area that would likely experience strong ground shaking during the life of any project developed thereon. However, compliance with existing regulations (2022 CBC) would reduce potentially significant impacts associated with strong seismic ground shaking to a less than significant level.*

Threshold 4.6-1

Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

(ii) Seismic-related ground failure, including liquefaction?

Less Than Significant Impact. Liquefaction refers to loose, saturated sand or silt deposits that behave as a liquid and lose their load-supporting capability when strongly shaken. Loose granular soils and silts that are saturated by relatively shallow groundwater are susceptible to liquefaction. Based on review of the *Earthquake Zones of Required Investigation for the Black Star Canyon Quadrangle* dated 2001 and prepared by CGS, the northernmost portion of the footprint of proposed new permanent facilities is identified as potentially susceptible to liquefaction (see Exhibit 4.6-2, Zones of Required Investigation for Landslides and Liquefaction). Lateral spreading

is a liquefaction-related phenomenon that involves primarily lateral movement of earth materials over underlying materials which are liquefied due to ground shaking.

During Project geotechnical investigation activities, a liquefaction event could have potential adverse effects to construction workers onsite while operating heavy equipment or working in trenches. IRWD and its contractors would be required to adhere to all Division of Occupational Safety and Health, better known as Cal/Division of Occupational Safety and Health (OSHA) requirements for working within an active construction site, including specific provisions for working within trenches, to ensure worker safety is given the known site conditions. Therefore, relative to existing conditions, the proposed Project would not expose people or structures to new potential substantial adverse effects related to liquefaction. Impacts would be less than significant.

As noted above, the Project's design has been prepared consistent with DSOD and USACE requirements and standards, and applicable seismic safety requirements of the 2022 CBC, among other requirements. This would include engineering design measures to appropriately manage risks of seismic-related ground failure affecting the Project. Also as noted above, the Project is necessary in part to address seismic safety concerns and meet current DSOD regulatory requirements. As such, implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving seismic-related ground failure. There would be a less than significant impact related to seismic-related ground failure, including liquefaction and lateral spreading, with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.

Impact Conclusion: *Implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving seismic--related ground failure. There would be a less than significant impacts related to seismic-related ground failure, including liquefaction and lateral spreading, with implementation of engineering design requirements applicable to the Project and no mitigation would be required.*

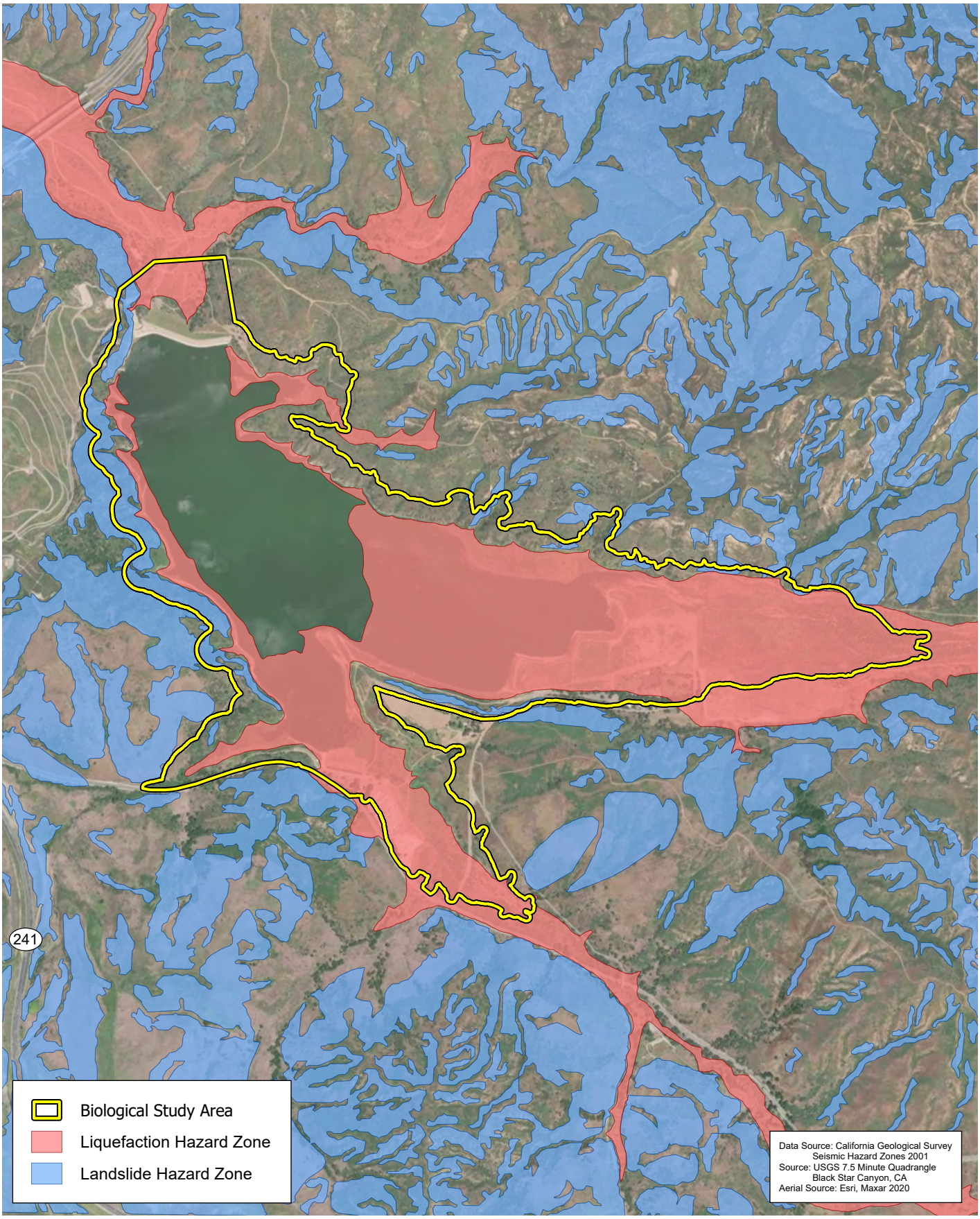
Threshold 4.6-1

Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

(iii) Landslides?

Less Than Significant Impact. Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. According to the CGS seismic hazard mapping of the Black Star Canyon Quadrangle (see Exhibit 4.6-2), the eastern portion of the footprint of proposed new permanent facilities is identified as potentially susceptible to landslides.

As noted above, during Project geotechnical investigation activities, IRWD and their contractors would be required to adhere to all Cal/OSHA requirements for working within active construction sites, including specific provisions for working within trenches, to ensure worker safety given the known site conditions. Additionally, the Project's design has been prepared consistent with DSOD and USACE requirements and standards, and applicable seismic safety requirements of the 2022 CBC, among other requirements. This would include engineering design measures to appropriately manage risks of landslides affecting the Project. Also, the Project is necessary in part to address seismic safety concerns and meet current DSOD regulatory requirements. As such, implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving landslides. There would be a less than significant



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Landslide_Liquefaction

Zones of Required Investigation for Landslides and Liquefaction

Exhibit 4.6-2

Santiago Creek Dam Improvement Project

N
W E
S

0 2.5 5
Miles

PSOMAS

(Rev: 2-27-2025SAK) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Landslide_Liquefaction.pdf

impact related to landslides, including liquefaction and lateral spreading, with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.

Impact Conclusion: *Implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving landslides. There would be a less than significant impact related to landslides, including liquefaction and lateral spreading, with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.*

Threshold 4.6-2

Would the Project result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact. The largest source of erosion and topsoil loss is uncontrolled drainage during construction. As discussed in more detail in Section 4.9, Hydrology and Water Quality, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into "waters of the U.S." Construction activities shall be conducted in compliance with the statewide NPDES General Permit for Storm Water Discharges Associated with the Construction and Land Disturbance Activities (Order No 2012-0006-DWQ, NPDES No. CAS000002), adopted by the SWRCB on July 17, 2012. In compliance with the NPDES permit, erosion potential during construction of the proposed Project would be managed with BMPs implemented on the Project site as part of an SWPPP during construction activities in accordance with NPDES requirements. Implementation of the BMPs would ensure that construction-related erosion impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *Grading activities would increase the potential for soil erosion and loss of topsoil. With the incorporation of construction BMPs as described in Section 4.9, Hydrology and Water Quality, of this EIR and compliance with applicable laws and regulations (e.g., NPDES Construction General Permit), Project impacts on soil erosion and loss of topsoil would be less than significant. Long-term operation of the Project would also result in less than significant impacts. No mitigation measures are required.*

Threshold 4.6-3

Would the Project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less Than Significant Impact. Potential impacts related to liquefaction and lateral spreading would be less than significant at the Project site as discussed above in the Response to Question 4.6-1(iii). As noted above, IRWD and their contractors would be required to adhere to all Cal/OSHA requirements for working within active construction sites, including specific provisions for working within trenches, that would ensure the safety of all construction workers onsite. Additionally, the Project's design has been prepared consistent with DSOD and USACE requirements and standards, and applicable seismic safety requirements of the 2022 CBC, among other requirements. This would include engineering design measures to appropriately manage soil engineering issues such as subsidence or collapse affecting the Project. Also as noted above, the Project is necessary in part to address seismic safety concerns and meet current DSOD regulatory requirements.

According to the Technical Memorandum prepared for the Project, the thickness of the lake sediment at the bottom of the reservoir is unknown but based on recent bathymetric surveys may be up to 35-feet thick. Lake sediment is typically very weak fine-grained soil susceptible to shear failure and significant volumetric consolidation. Borings conducted on the Project site identified approximately 8 feet of lake sediment intermixed with colluvium, and it was described as organic lean soil, gravelly clay, and clayey sand. Therefore, the berm will be constructed according to the thickness and properties of the lake sediment to avoid uncontrolled slope failure or bearing failure (GEI 2023). As such, implementation of the Project would reduce the existing potential for substantial adverse effects to the Santiago Creek Dam involving unstable geologic units, if present. There would be less than significant impacts related to the presence of unstable geologic units with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.

Impact Conclusion: *There would be less than significant impacts related to the presence of unstable geologic units with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.*

Threshold 4.6-4

Would the Project be located on expansive soils, as defined in Table 18-1-B of the California Building Code (1994), creating substantial direct or indirect risks to life or property?

Less Than Significant Impact. Expansive soils are soils that swell when they absorb water and shrink as they dry, such as pure clay soils and claystone. The hazard associated with expansive soils is that they can overstress and cause damage to the foundation of buildings set on top of them. According to the Geotechnical Investigation, the Project site is underlain by artificial fill, embankment fill, older alluvium, and colluvium and lake deposits. These types of surficial sediments typically have a low clay content, being comprised of primarily sand, silt, and gravel. In particular, engineered fill previously placed on the Project site would be expected to have a very low or non-existent expansion potential. While expansive soils are not anticipated on the Project site, as noted above, the Project's design has been prepared consistent with DSOD and USACE requirements and standards, and applicable seismic safety requirements of the 2022 CBC, among other requirements. There would be less than significant impacts related to expansive soils with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.

Impact Conclusion: *The on-site soils were determined to have very low or non-existent expansion potential. There would be less than significant impacts related to expansive soils with implementation of engineering design requirements applicable to the Project, and no mitigation would be required.*

Threshold 4.6-5

Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less than Significant With Mitigation.

This analysis is based on the results of a literature review and records search conducted through the NHM of Los Angeles County and a review of geologic maps and aerial imagery of the Project site. The paleontological records search was completed on October 16, 2020. The record search

included a thorough search of the NHM paleontology collection records for locality and specimen data for the Project site and surrounding area. The records search identified fossil localities that lie directly within the proposed Project site as well as numerous fossil localities nearby from sedimentary deposits that occur in the proposed Project site, either at the surface or at depth. One locality, LACM IP 26171, is located along the northwest shore of Santiago Reservoir, where unspecified invertebrates were collected from the Williams Formation during excavations for the spillway in 1969 (depth of fossils is not known) (Psomas 2024). Additionally, eight localities were located nearby from the same sedimentary deposits that occur in the Project site, either at the surface or at depth. As indicated above, the Project site is generally underlain by Pleistocene age alluvium, which could contain previously undiscovered fossils consisting of extinct mega-fauna that were not previously documented and that may qualify as unique paleontological resources under CEQA. In addition to the Pleistocene age alluvium, several scientifically unique geological formations – Ladd Formation, Williams Formation, Topanga Formation, Vaqueros Formation, Puente Formation – dating between 83 million years ago to 6 million years ago were identified within the Project site. These formations may contain scientifically significant index, land, marine, or dinosaur fossils from geological periods similar to those of the fossil locality located along the northwest shore of Santiago Reservoir, belonging to the Williams Formation.

However, as noted in the geotechnical analysis, earthmoving activities (i.e., grading and excavation) would take place in previously disturbed soils, which consist of artificial fill, embankment fill, older alluvium, and colluvium and lake deposits (AECOM and GEI 2022b). Therefore, it is unlikely the Project will impact scientifically important fossil localities; however, in the event that ground disturbance activities occur within undisturbed soils, the Project would implement **MM GEO-1**, which requires paleontological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM GEO-2**, which provides details for treatment of unanticipated discoveries.

Impact Conclusion: *The Project has a potential to disturb unique paleontological resources during construction. However, potential effects may be mitigated to a less than significant level with the implementation of **MM GEO-1**, which requires retention of a qualified Paleontologist to observe ground-disturbing activities, including geotechnical investigations, within undisturbed soils and **MM GEO-2**, which identifies treatment of unanticipated discoveries.*

4.6.6 CUMULATIVE IMPACTS

Geology and soils impacts are generally site-specific and there is typically little, if any, cumulative relationship between the development of a project and development within a larger cumulative area (e.g., county-wide development). For example, development at the Project site would not alter geologic events or soil features/characteristics (such as ground shaking, seismic intensity, or settlement) at other locations; therefore, the proposed Project would not directly affect the level of intensity at which a seismic event or geologic hazard on an adjacent site is experienced. However, while development of the proposed Project and future development in Orange County may expose more persons to seismic hazards, compliance with all requirements and standards for seismic activity would reduce the potential impacts.

Development projects would be required to comply with the applicable State and local agency grading manuals and ordinances. As with the Project, future development would also be required to have site-specific geotechnical investigations to identify the geologic and seismic characteristics on a site and provide recommendations for engineering design and construction to ensure the structural integrity of proposed development. These recommendations would be incorporated into project design. Compliance of individual projects with the recommendations of the applicable geotechnical investigation would prevent cumulatively significant hazards

associated with seismic conditions, unstable soils, lateral spreading, liquefaction, soil collapse, expansive soil, soil erosion, and other geologic issues. Additionally, potential impacts related to paleontological resources may be mitigated to a less than significant level with the implementation of **MM GEO-1**, which requires retention of a qualified Paleontologist to observe grading activities within undisturbed soils, including geotechnical investigations, and **MM GEO-2**, which provides details for treatment of unanticipated discoveries. Therefore, the Project's contribution to cumulative geology and soils impacts would be less than significant with implementation of **MM GEO-1** and **MM GEO-2,** and compliance with applicable seismic design criteria in the CBC and the County's grading regulations.

4.6.7 MITIGATION PROGRAM

Mitigation Measures

MM GEO-1 Before beginning initial ground-disturbing activities (including but not limited to geotechnical excavations, vegetation removal, grubbing, grading, and excavation), IRWD will retain a paleontologist that meets the 2010 Society of Vertebrate Paleontology standards for paleontology. The paleontologist will observe ground-disturbing activities within previously disturbed or undisturbed soils with high paleontological sensitivity in geological formations, such as the Williams Formation or Pleistocene age alluvium, at the Project site. In the event of discovery, paleontological findings will be salvaged and catalogued by the paleontologist. Monitoring will not be required for secondary movement of soils, such as backfilling. The paleontologist will regularly meet with the contractor to ensure adequate involvement with ground-disturbing activities and will establish procedures for paleontological resource surveillance within previously undisturbed soils in coordination with IRWD throughout construction of the proposed Project. The qualified paleontologist will also establish, in coordination with IRWD, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the fossils/unique geological units as appropriate. The paleontological monitor will have the authority to temporarily halt or divert work away from exposed fossils in order to recover the fossil specimens pursuant to **MM GEO-2**. The paleontologist may determine, in consultation with IRWD, to reduce monitoring to spot-checking or eliminate monitoring depending on site conditions observed, such as the presence of geologic units with low paleontological sensitivity or other factors. The paleontological monitor will prepare daily logs detailing the types of activities and soils observed and any discoveries. Upon the completion of initial ground-disturbing activities, the paleontologist will prepare a final monitoring and mitigation report to document the results of the monitoring effort.

MM GEO-2 If paleontological resources are inadvertently unearthed during excavation activities, the contractor will immediately cease all earth-disturbing activities within a 50-foot radius of the area of discovery and will contact the paleontologist and IRWD immediately. If the paleontologist determines the paleontological resources are potentially significant under CEQA, the paleontologist, in consultation with IRWD, will determine appropriate actions for treatment. Any significant fossils collected during project-related excavations will be salvaged and prepared to the point of identification following the standards of the Society of Vertebrate Paleontology (2010). Any salvaged fossils will be offered for donation to an accredited repository with a scientific interest in the materials. If no accredited repository accepts the donation, then the fossils may be donated to a local museum, historical society, school, or other institution for educational purposes.

After the resource has been appropriately avoided or mitigated, work in the area may resume.

4.6.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Direct and cumulative impacts to geology and soils associated with the Project would be less than significant with implementation of **MM GEO-1** and **MM GEO-2**. No significant unavoidable impacts would occur.

4.6.9 REFERENCES

AECOM. 2020 (July 30). *Seismic Hazard Analysis Report: Santiago Creek Dam Outlet Tower and Spillway Improvements Project*: unpublished consultant report to the Irvine Ranch Water District and Serrano Water District. Orange, CA: AECOM.

AECOM and GEI Consultants (AECOM and GEI). 2022a (July 15). Santiago Creek Dam Outlet Tower and Spillway Improvements Project, PR 01813, Preliminary Design Report. Orange, CA: AECOM and GEI.

_____. 2022b (February 17). Santiago Creek Dam Outlet Works and Spillway Improvements, Geotechnical Interpretive Report: unpublished consultant report to the Irvine Ranch Water District and Serrano Water District. Orange, CA: AECOM and GEI.

_____. 2021 (May 6). Santiago Creek Dam Outlet Tower and Spillway Improvements, Geotechnical Data Report: unpublished consultant report to the Irvine Ranch Water District and Serrano Water District. Orange, CA: AECOM and GEI.

Barton, N.R. and Choubey, V. 1977. The Shear Strength of Rock Joints in Theory and Practice. Rock Mechanics, Vol. 10, No. 1-2, pp. 1-54.

Fraser WA, Howard JK. 2002. Guidelines for use of the consequence-hazard matrix and selection of ground motion parameters. Technical

GEI Consultants. 2023 (February 6). *Construction Hydrologic and Geotechnical Risk Evaluation.* Pasadena, CA: GEI Consultants.

GeoStudio. 2021. Stability Modeling with SLOPE/W, An Engineering Methodology, GeoStudio 2021 R2, version 11.1.3.22700.

Kempkey, A. 1930. Construction Plans for Santiago Creek Dam and Appurtenances, 26 Sheets, December, A. Kempkey Consulting Engineer.

Marinos, V. Marinos, P. and Hoek E. 2005. The geological strength index: applications and limitations. Bulletin of Engineering Geology and the Environment 64.1 (2005): 55-65.

Marliave, C. 1939. Geological Report on Santiago Dam, situated on Santiago Creek in Orange County: California Division of Water Resources, 28 p. including figures and geologic maps.

Morton, P.K. and Miller R.V. 1981. Geologic map of Orange County, California, showing mines and mineral deposits. California Division of Mines and Geology, U.S. Geological Survey Professional Paper 420-D

Morton, D.M., Miller, F.K. 2006. Geologic Map of the San Bernardino and Santa Ana 30′× 60′ Quadrangles. US Geological Survey, California. U.S. Geological Survey Open-File Report 2006 1217, Version 1.0

Psomas. 2024 (February). *Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California.* Pasadena, CA: Psomas. Appendix D.

Schoellhamer, J. E., D. M. Kinney, R. F. Yerkes, and J. G. Vedder, 1954, Geologic map of the northern Santa Ana Mountains, Orange and Riverside counties, California: USGS Oil and Gas Inv. Map OM-154.

Schoellhamer, J.G., Vedder, J.G., Yerkes, R.F. and Kinney, D.M. 1981. Geology of the Northern Santa Ana Mountains, California: U.S. Geological Survey Professional Paper 420-D.

U.S. Army Corps of Engineers (USACE). 2005. EM 1110-2-2100, Stability Analysis of Concrete Structures. Washington, D.C.: USACE. https://www.publications.usace.army.mil/portals/76/publications/engineermanuals/em_1110-2-2100.pdf.

Watts, C.F., Gilliam, D.R., Hrovatic, M.D., Hong, H., 2003. ROCKPACK III: Rock slope stability computerized analysis Package: https://www.rockware.com/product/rockpack-iii.

Woodward-Clyde Consultants (WCC). 1979. Report for Seismic Stability Evaluation of Santiago Creek Dam, unpublished consultant report to the Irvine Ranch Water District, June 11, 1979.

4.7 GREENHOUSE GAS EMISSIONS

This section addresses greenhouse gas (GHG) emissions anticipated from construction and operation of the proposed Project and its potential global climate change impacts. The Project's estimated construction and operational GHG emissions were calculated by using the California Emissions Estimator Model (CalEEMod, Version 2022.1.1.20); the inputs and data for the Project are included in Appendix B.

4.7.1 BACKGROUND

General Environmental Effects of Global Climate Change

Executive Order (EO) S-3-05 mandates the preparation of biennial science assessment reports on climate change impacts and adaptation options for California. EO S-13-08 directs the California Natural Resources Agency (CNRA) to develop a State Climate Adaptation Strategy and to provide State land use planning guidance related to sea level rise and other climate change impacts. Current reports resulting from these directed actions are the *Climate Action Team Report to the Governor and Legislature* and the *California Climate Adaptation Strategy* (CalEPA 2010; CNRA 2023). These studies report that global warming in California is anticipated to impact resources, including, but not limited to, those discussed below.

- **Public Health.** Many Californians currently experience the worst air quality in the nation, and climate change is expected to make matters worse. Higher temperatures would increase the frequency, duration, and intensity of conditions conducive to air pollution formation. If global background ozone (O_3) levels increase as predicted under some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by more frequent wildfires, which emit fine particulate matter that can travel long distances. Rising temperatures and more frequent heat waves would increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress. Climate change may also increase asthma rates and the spread of infectious diseases and their vectors, as well as challenge food and water supplies. Children, the elderly, people with chronic heart or lung disease, outdoor workers, people who exercise outdoors, and the economically disadvantaged would be particularly vulnerable to these changes. In addition, more frequent extreme weather events could also result in increased injuries and deaths from these phenomena.
- **Energy.** Increasing mean temperature and more frequent heat waves will drive up demand for cooling in summer; this new energy demand will only be partially offset by decreased demand for heating in winter. Hydropower, which currently provides 15 percent of in-state generation, would be threatened by declining snowpack, which serves as a natural reservoir for hydropower generation in the spring and summer. Winter storms, earlier snowmelt, and greater runoff may combine to cause flooding, which could, in turn, damage transmission lines and cause power outages.
- **Water Resources.** Rising temperatures, less precipitation, and more precipitation falling as rain instead of snow could severely diminish the snowpack. Because the Sierra Nevada snowpack provides most of California's available water, this potential loss would increase the risk of summer water shortages and would hamper water distribution and hydropower generation. The diminished snowpack would also nearly eliminate all skiing and other snow-related recreation. Rising sea levels would push salt water into California's estuaries, wetlands, and groundwater aquifers, threatening the water quality and reliability in the Sacramento/San Joaquin River Delta—a major California fresh water supply. Extreme precipitation and flooding could also damage water quality by creating sudden increases in runoff. Moreover, warming would increase evapotranspiration rates from

plants, soil, and open water surfaces, which would result in greater demand for irrigation. Overall, climate change would reduce California's water supplies even as its growing population requires additional resources.

- **Sea Level and Flooding.** The sea level at California's coasts is expected to rise by 11 to 18 inches above 2000 levels by 2050 and by 23 to 55 inches by 2100. If realized, these increases would create more frequent and higher storm surges; would erode some coastal areas; and would increase pressure on existing levees. These increases would create a greater risk of flooding in previously untouched inland areas. Consequently, continued development in vulnerable coastal areas would put more people and infrastructure at risk.
- **Agriculture.** Although higher carbon dioxide (CO_2) levels can stimulate plant production and increase plant water-use efficiency, in the long-term, climate change would reduce the quantity and quality of agricultural products Statewide. As temperatures rise, farmers will face greater water demand for crops and a less reliable water supply, as well as increased competition from urban water users. Sea level rise may cause saltwater intrusion in the Delta region, making it difficult to raise certain crops. Rising temperatures will likely aggravate O_3 pollution, interfering with plant growth and making plants more susceptible to disease and pests. In addition, warming would reduce the number of colder hours needed for fruit and nut production; would shift pest and weed ranges; would alter crop-pollinator timing; and would increase the frequency of droughts, heat waves, and floods. Higher average temperatures would also increase mortality and decrease productivity in livestock.
- **Forestry.** California timber production has declined over the past few decades due, in part, to warming and increased wildfires. While further warming may increase production for some species in some locations, climate change is expected to reduce overall forest growth. Increasing average temperatures and drought frequency would result in more wildfires and greater burned areas, while less frequent and more intense rainfall would increase soil erosion and landslides. Higher temperatures and less water would force many tree species to shift their ranges; those that run out of livable habitat may die out. Pests, diseases, and invasive species may also colonize new areas, further challenging forest health and biodiversity.
- **Ecosystems.** Rising average temperatures would subject plants and animals to greater thermal stress, causing some species to adapt or shift their ranges, while others may face extinction. Invasive species may also shift their ranges, threatening native species. Changing temperatures would alter the timing of plant flowering and insect emergence, damaging species' abilities to reproduce. Changing precipitation patterns would impact aquatic and riparian ecosystems by reducing snowpack, stream flow, and groundwater, while increasing the frequency of droughts, floods, and wildfires. As sea levels rise, some coastal habitats may be permanently flooded or eroded, and saltwater intrusion into freshwater resources may threaten terrestrial species. Changes in ocean circulation and temperature, ocean acidification, and increased runoff and sedimentation would threaten pelagic species. In sum, continued global warming would alter natural ecosystems and threaten California's biological diversity.

4.7.2 REGULATORY SETTING

Regulatory Background

Significant changes in global climate patterns have been associated with global warming, which is an average increase in the temperature of the atmosphere near the Earth's surface; this is attributed to an accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere which, in turn, increases the Earth's surface temperature. Some GHGs occur naturally and are emitted into the atmosphere through natural processes, while others are created and emitted solely through human activities.

On June 1, 2005, Governor Arnold Schwarzenegger signed EO S-3-05, which calls for a reduction in GHG emissions to the year 2000 level by 2010, to year 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

The principal overall State plan and policy adopted for the purpose of reducing GHG emissions is Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on Statewide GHG emissions. AB 32 recognizes that California is the source of substantial amounts of GHG emissions. The statute states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the State from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

In order to avert these consequences, AB 32 establishes a State goal of reducing GHG emissions to 1990 levels by the year 2020, codifying the EO S-3-05 goal.

The California Air Resources Board (CARB) approved a *Climate Change Scoping Plan* as required by AB 32 in 2008; this plan is required to be updated every five years. The *Climate Change Scoping Plan* proposes a "comprehensive set of actions designed to reduce overall carbon GHG emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health" (CARB 2008). The *Climate Change Scoping Plan* has a range of GHG-reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 implementation regulation to fund the program. On February 10, 2014, CARB released the Draft Proposed First Update to the *Climate Change Scoping Plan* (CARB 2014). The board approved the final *First Update to the Climate Change Scoping Plan* on May 22, 2014. The first update describes California's progress towards AB 32 goals, stating that "California is on track to meet the near-term 2020 greenhouse gas limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32" (CARB 2014). The latest update occurred in January 2017 and incorporates the 40 percent reduction to 1990 emissions levels by 2030.

California EO B-30-15 (April 29, 2015) set an "interim" Statewide emission target to reduce GHG emissions to 40 percent below 1990 levels by 2030 and directed State agencies with jurisdiction over GHG emissions to implement measures pursuant to statutory authority to achieve this 2030 target and the 2050 target of 80 percent below 1990 levels.

On September 8, 2016, the Governor signed Senate Bill (SB) 32 to codify the GHG reduction goals of EO B-30-15, requiring the State to reduce GHG emissions by 40 percent below 1990 levels by 2030 (Health and Safety Code Section 38566). This goal is expected to keep the State on track to meet the goal set by EO S-3-05 of reducing GHG emissions by 80 percent below 1990 levels by 2050 (California Legislative Information 2017a). SB 32's findings state that CARB will "achieve the state's more stringent greenhouse gas emission reductions in a manner that benefits the state's most disadvantaged communities and is transparent and accountable to the public and the Legislature."

AB 197 was signed at the same time and will make sure that the SB 32 goals are met by requiring CARB to provide annual reports of GHGs, criteria pollutants, and toxic air contaminants (TACs) by facility, City and subcounty level, and sector for stationary sources and at the County level for mobile sources. It also requires the CARB to prioritize specified emission reduction rules and regulations and to identify specified information for emission reduction measures (e.g., alternative compliance mechanism, market-based compliance mechanism, and potential monetary and nonmonetary incentive) when updating the Scoping Plan (California Legislative Information 2017b).

On April 29, 2015, Governor Brown signed EO B-30-15, which orders "A new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030 is established in order to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050" (COOG 2015). Five key goals for reducing GHG emissions through 2030 include (1) increasing renewable electricity to 50 percent; (2) doubling the energy efficiency savings achieved in existing buildings and making heating fuels cleaner; (3) reducing petroleum use in cars and trucks by up to 50 percent; (4) reducing emissions of short-lived climate pollutants; and (5) managing farms, rangelands, forests, and wetlands to increasingly store carbon. EO B-30-15 also directs CARB to update the *Climate Change Scoping Plan* to express the 2030 target in terms of million metric tons of carbon dioxide equivalent.

SB 350, signed October 7, 2015, is the Clean Energy and Pollution Reduction Act of 2015. SB 350 is the implementation of some of the goals of EO B-30-15. The objectives of SB 350 are as follows (California Legislative Information 2015):

1. To increase from 33 percent to 50 percent, the procurement of our electricity from renewable sources.
2. To double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation.

The text of SB 350 sets a December 31, 2030, target for 50 percent of electricity to be generated from renewable sources.

The Sustainable Communities and Climate Protection Act of 2008, SB 375, established a process to coordinate land use planning, regional transportation plans, and funding priorities in order to help California meet the GHG reduction goals established in AB 32. SB 375 required Southern California Association of Governments (SCAG) to incorporate a "sustainable communities strategy" (SCS) into its regional transportation plans (RTPs) that will achieve GHG emission reduction targets though several measures, including land use decisions. SCAG's SCS is included in the SCAG 2024–2050 RTP/SCS (SCAG 2024). The goals and policies of the RTP/SCS that reduce vehicle miles traveled focus on transportation and land use planning that include building infill projects; locating residents closer to where they work and play; and designing communities so there is access to high quality transit service.

County of Orange

The County of Orange General Plan does not specifically reference GHGs; however, the following sections of the General Plan are relevant to the effects of climate change as it relates to the proposed Project.

General Plan

The County of Orange's General Plan provides the vision of the future and framework for development in the County. The General Plan is comprised of various elements or topical sections that cover different aspects of the County. The two Element that are most relevant to the Project are the Public Services & Facilities Element and Resources Element.

Public Services & Facilities Element

The Public Services and Facilities Element focuses on those publicly managed services and facilities which have a direct influence on the distribution and intensity of development that can be accommodated through the utilization of existing technologies and assumptions that are used to determine adequate service levels. These services include flood control, waste management, water and wastewater, transportation, and community services (i.e., fire protection, library, sheriff patrol, local special services districts, and public-school facilities).

Goals, Objectives, and Policies

Water System

Goal 1 Encourage the planning and development of a water conveyance and distribution system to meet the County's future demand.

Objective 1.1 To achieve desired water system service levels through the coordination of land use and water system planning.

Objective 1.2 To implement State, regional, and local facility plans for water delivery to Orange County.

Objective 1.3 To increase storage and delivery capacity for water supplies in Orange County.

Policy 1 System Capacity and Phasing – To ensure the adequacy of water system capacity and phasing, in consultation with the service providing agency(ies), in order to serve existing and future development as defined by the General Plan.

Policy 2 Water Delivery System – To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.

Policy 3 Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and the water agencies through cooperative water facility planning and implementation efforts.

Water Delivery System

Goal 1 To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.

Policy 1 Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and the water agencies through cooperative water facility planning and implementation efforts.

Resources Element

The Resources Element, one of nine elements of the General Plan, contains official County policies on the conservation and management of resources. The Resources Element establishes a strategy for the development, management, preservation, and conservation of resources that are necessary to meet Orange County's existing and future demands. Aspects of this Element that relate to the Project are local water availability and water quality. The Water Resources Component of the Element describes the need to manage local water resources to meet the County's needs. The following have been established in the Water Resources Component.

Goals, Objectives and Policies

Water Resources Component

The use, supply, and conservation of water are critical issues in Orange County. Since almost every urban activity is dependent on water to some extent, it is in the best interests of the general public that the County's water resources are properly planned and managed.

Goal 1 Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.

Objective 1.1 To maintain the adequacy and dependability of imported water supplies.

Objective 1.2 To achieve a reduction in per capita water consumption by the year 2020.

Objective 1.3 To reduce dependence on imported water supplies through both conservation and local water resource development.

Policy 1 Water Supply – To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.

Policy 2 Conservation – To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.

Policy 3 Groundwater Sources – To support groundwater management efforts that are conducted by County water agencies.

Policy 4 Shortage Planning – To ensure that Orange County will not be severely impaired by any potential future water shortages.

Policy 5 Water Quality – Protect and improve water quality through continued management, enforcement, and reporting requirements. Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats.

Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles.

Consider implementation of LID principles to conserve natural features (e.g., trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils.

Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources.

Additional water quality policies are also provided in the Land Use Element.

Policy 6 Intergovernmental Coordination – To encourage and support a cooperative effort among all agencies towards the resolution of problems and the utilization of opportunities in the planning management and protection of water resources, including water quality.

4.7.3 METHODOLOGY

Project related GHG emissions were calculated by using CalEEMod. For this analysis, the results are expressed in metric tons of CO_2 equivalent per year ($MTCO_2e/yr$). Please refer to the methodology in Section 4.2, Air Quality, of this EIR, for a discussion of the CalEEMod inputs, adjustments, outputs, and other characteristics for construction-related and operational emissions.

4.7.4 EXISTING CONDITIONS

GHGs are global pollutants and are therefore unlike criteria air pollutants such as O_3, particulate matter (PM_{10} and $PM_{2.5}$), and TACs, which are pollutants of regional and local concern. While pollutants with localized air quality effects have relatively short atmospheric lifetimes (generally on the order of a few days), GHGs have relatively long atmospheric lifetimes, ranging from one year to several thousand years. Long atmospheric lifetimes allow for GHGs to disperse around the globe. Therefore, GHG effects are global, as opposed to the local and/or regional air quality effects of criteria air pollutant and TAC emissions.

4.7.5 THRESHOLDS OF SIGNIFICANCE

On December 5, 2008, the South Coast Air Quality Management District (SCAQMD) Governing Board adopted its staff proposal for an interim CEQA GHG significance threshold of 10,000 $MTCO_2e$/year for industrial projects where the SCAQMD is the lead agency. In September 2010, the Working Group proposed extending the 10,000 $MTCO_2e$/year screening threshold currently applicable to industrial projects where the SCAQMD is the lead agency, described above, to other lead agency industrial projects. Because the Project's land use is closest to the application of industrial uses as compared to residential and commercial uses, the significance threshold developed for industrial uses will be used for the evaluation of potential GHG impacts.

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant GHG emissions impact if it would:

Threshold 4.7-1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Threshold 4.7-2 Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

4.7.6 IMPACT ANALYSIS

Relevant elements of the proposed Project related to the analysis of potential GHG emissions impacts include construction and operations phase activities which emit GHG emissions. Construction activities which emit GHGs are related to fuel combustion from offroad construction equipment as well as worker and truck trips. The operations phase of the Project would involve GHG emissions from energy usage and vehicular trips. California has adopted several initiatives to reduce the State's contribution to global climate change. This information is incorporated by reference into this report, and information that is relevant to the analysis of GHG emissions resulting from the proposed Project is summarized in this section.

Threshold 4.7-1

Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less than Significant Impact. Based on the proposed construction activities described above, the principal source of construction GHG emissions would be internal combustion engines of construction equipment, on-road construction vehicles, and workers' commuting vehicles. GHG emissions from construction activities were obtained from the CalEEMod model, described above. The estimated construction GHG emissions for the proposed Project would be 15,766 $MTCO_2e$, as shown in Table 4.7-1, Estimated Greenhouse Gas Emissions from Construction.

TABLE 4.7-1
ESTIMATED GREENHOUSE GAS
EMISSIONS FROM CONSTRUCTION

Year	Emissions ($MTCO_2e$)
2024	1,554
2025	7,754
2026	6,298
2027	160
Total	15,766
Amortized	**526**

$MTCO_2e$: metric tons of carbon dioxide equivalent.

Notes:

- Totals may not add due to rounding variances.
- Detailed calculations in Appendix B.

Operational phase activities would not change substantively from existing conditions because of the lack of additional energy consumption, stationary sources, and mobile vehicle trips. As such, the Project would not result in a substantial change in GHG emissions. The Project involves improvements to existing dam infrastructure and would not result in substantial increases in air pollutant sources such as vehicular or energy consumption. Existing operations related to dam inspection and maintenance activities would be comparable to those which would occur under the proposed Project. As such, GHG emissions would likewise be essentially the same.

Because impacts from construction activities occur over a relatively short period of time, they contribute a relatively small portion of the overall lifetime Project GHG emissions. In addition, GHG emission reduction measures for construction equipment are relatively limited. The SCAQMD recommends that construction emissions be amortized over a 30-year Project lifetime so that GHG reduction measures address construction GHG emissions as part of the operational GHG reduction strategies (SCAQMD 2008). Therefore, construction and operational emissions are combined by amortizing the construction and operations over an assumed 30-year Project lifetime. This combination is shown in Table 4.7-2, Estimated Total Project Annual Greenhouse Gas Emissions, using the proposed Project's amortized construction and operational emissions.

TABLE 4.7-2
ESTIMATED TOTAL PROJECT ANNUAL
GREENHOUSE GAS EMISSIONS

Source	Emissions ($MTCO_2e/yr^a$)
Construction (Amortized)	526[a]
Operations	--
Total[b]	**526**
SCAQMD-Recommended Threshold	**10,000**
Exceeds Threshold?	**No**

$MTCO_2e/yr$: metric tons of carbon dioxide equivalent per year; SCAQMD: South Coast Air Quality Management District.

[a] Total derived by dividing construction emissions (see Table 8) by 30.
[b] Total annual emissions are the sum of amortized construction emissions and operational emissions.

It is noted that there are no established applicable quantitative federal, State, regional, or local CEQA significance criteria for GHG emissions for non-industrial projects in the South Coast Air Basin. The SCAQMD has adopted an interim threshold of 10,000 $MTCO_2e$ per year for industrial land use projects. As shown, the estimated GHG emissions from the proposed Project would be less than this suggested threshold. The impact would be less than significant, and no mitigation is required.

Impact Conclusion: *Pursuant to Threshold 4.7-1, the Project would not generate GHG emissions, either directly or indirectly, resulting in a significant impact on the environment. Impacts would be less than significant, and no mitigation is required.*

Threshold 4.7-2

Would the Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less than Significant Impact. The County of Orange has not adopted a Climate Action Plan, and the SCAQMD has not adopted standards for the purpose of reducing GHG emissions. There are a number of GHG reduction plans that have been adopted on the State and regional level. SCAG adopted this 2024–2050 RTP/SCS for the six-county region including Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties.

2022 CARB Scoping Plan

The Project would not impede the State's progress towards carbon neutrality by 2045 under the 2022 Scoping Plan. The Project would be required to comply with applicable current and future regulatory requirements promulgated through the 2022 Scoping Plan. Moreover, and as indicated above, the Project's level of GHG emissions would not exceed the SCAQMD recommended threshold of 10,000 MTCO2e/yr. Moreover, the Project would be consistent with the CAP as demonstrated above; therefore, the Project would be consistent with the GHG reduction mandates established by SB 32 and the 2022 Scoping Plan. A less than significant impact would occur. Vehicle trips associated with operations of the infrastructure are expected to be the same or comparable to existing operating conditions. The minimal amount of vehicle trips would have a negligible effect on GHG emissions. However, the Project's improvements to existing water

infrastructure would meet the Project's objectives of meeting the seismic, safety and design requirements; fulfilling operational requirements; extending the useful life of the dam; and improving water supply reliability. This is especially important to the challenges posed by climate change which includes increased flooding, heat events, and droughts as discussed in the California Scoping Plan. The California Scoping Plan discusses the need to enact climate change adaptation measures for water resources which include modernization, conservation, maintaining water quality, groundwater recharge, and minimizing flood risk. Maintaining and improving water infrastructure is part of the adaptation to climate change that is necessary to prevent flooding, and to assist in the provision of adequate water supplies to the region which are goals established within the County's Resource Element of the General Plan and the California Scoping Plan.

SCAG's 2024-2050 RTP/SCS

As discussed above, the principal State plan and policy adopted for the purpose of reducing GHG emissions is AB 32. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocations. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or alternative planning strategy (APS) that will address land use allocation in that Metropolitan Planning Organization's Regional Transportation Plan (RTP). The principles of SB 375 are incorporated in SCAG's adopted 2024-2050 RTP/SCS. The proposed Project is neither a housing development project nor a transportation project that would increase population within the State or increase vehicle miles travelled (VMT). As discussed previously, the Project would also not result in substantial amounts of GHG emissions from either the construction phase or from the operations phase. As shown above, the Project would result in emissions which are below the SCAQMD's draft interim significance threshold for GHGs. As such, GHG emissions generated by the Project are not considered to be substantial. Moreover, the Project would not conflict with the goals outlined in the plan, which are to build and maintain an integrated multimodal transportation network; develop, connect and sustain communities that are livable and thriving; create a healthy region for the people of today and tomorrow; and support a sustainable, efficient and productive regional economic environment that provides opportunities for all residents. A less than significant impact would occur.

Therefore, the Project would have less than significant impacts regarding conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions, and no mitigation measures are required.

Impact Conclusion: *Pursuant to Threshold 4.7-2, the Project would be consistent with and would not conflict with regulations and policies adopted for the purpose of reducing GHG emissions. Impacts would be less than significant, and no mitigation is required.*

4.7.7 CUMULATIVE IMPACTS

As discussed at the beginning of Section 4.7.5, it is accepted as very unlikely that any individual development project would have GHG emissions of a magnitude to directly impact global climate change. Therefore, the analysis presented in Section 4.7.6 represents the cumulative impact analysis for the Project related to GHG emissions. As concluded in Section 4.7.6, the Project would not generate GHG emissions, either directly or indirectly, resulting in a significant impact on the environment and the Project would be consistent with and would not conflict with regulations and policies adopted for the purpose of reducing GHG emissions.

4.7.8 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant impacts to GHG Emissions; therefore, no mitigation measures are required.

4.7.9 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The analysis of Project GHG emissions shows that the Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment nor would the Project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. Therefore, the Project's GHG emissions impacts would be less than significant, and no mitigation is required.

4.7.10 REFERENCES

California Air Resources Board (CARB). 2014 (May). First Update to the Climate Change Scoping Plan. Sacramento, CA: CARB. http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

———. 2008 (December). Climate Change Scoping Plan: A Framework for Change. Sacramento, CA: CARB. https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/document/adopted_scoping_plan.pdf.

California Department of Environmental Protection (CalEPA). 2010 (December). Climate Action Team Report to Governor Schwarzenegger and the California Legislature. Sacramento, CA: CalEPA. Report hosted by Florida Institute of Technology. https://research.fit.edu/media/site-specific/researchfitedu/coast-climate-adaptation-library/united-states/west-coast-amp-hawaix27i/california---statewide/Bonner-et-al.--2010.--Climate-Action-Team-Report-to-State-Officials.pdf.

California Legislative Information. 2017a. (December 13, 2024, access date). Senate Bill No. 32. Sacramento, CA: California Legislative Information. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB32.

———. 2017b. (December 13, 2024, access date). Assembly Bill No. 197. Sacramento, CA: California Legislative Information. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB197.

California Natural Resources Agency (CNRA). 2023. California Climate Adaptation Strategy: 2022 Implementation Progress Report. Sacramento, CA: CNRA. https://climateresilience.ca.gov/overview/docs/20240405-Climate_Adpatation_Strategy_Report_2023.pdf.

California Office of Governor Edmund G. Brown Jr. (COOG). 2015. (April 29). Top Story – Governor Brown Establishes Most Ambitious Greenhouse Gas Reduction Target in North America. Sacramento CA: COOG. https://www.ca.gov/archive/gov39/2015/04/29/news18938/index.html.

South Coast Air Quality Management District (SCAQMD). 2008 (November 26, updated). Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2.

Southern California Association of Governments (SCAG). 2024 (April 4, Adopted). *2024-2050 Regional Transportation Plan/Sustainable Communities Strategy—Connect SoCal.* Los Angeles, CA: SCAG. https://scag.ca.gov/sites/main/files/file-attachments/23-2987-connect-socal-2024-final-complete-040424.pdf?1714175547.

4.8 HAZARDS AND HAZARDOUS MATERIALS

This section of the Environmental Impact Report (EIR) describes the existing hazards and hazardous materials conditions in the Project area, identifies associated potential hazards and hazardous materials impacts related to development of the proposed Project, and sets forth measures designed to mitigate significant adverse impacts. Information in this section is based upon The EDR Radius Map™ Report with GeoCheck®, Santiago Creek Dam Improvement, Silverado, Anaheim, California 92808 (Inquiry Number 6196088.2s) (2020). This report is included as Appendix F to this EIR.

4.8.1 REGULATORY SETTING

Federal

Hazardous Materials Transportation Act

The Hazardous Materials Transportation Act administered by the U.S. Department of Transportation governs the transport of hazardous materials, such as contaminated soil, asbestos, or lead-containing materials. The California Department of Transportation (Caltrans) implements the federal regulations published as Title 49 of the *Code of Federal Regulations* (CFR), which is known as the Hazardous Materials Transportation Act. The main purpose of the Hazardous Materials Transportation Act is to provide adequate protection against risks to life and property inherent in the transport of hazardous materials by improving the regulatory and enforcement authority of the Secretary of Transportation.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) was authorized by Congress in 1976. This law creates the framework for the proper management of hazardous and non-hazardous solid waste. The RCRA amended the Solid Waste Disposal Act of 1965 and has the following goals: (1) to protect human health and the environment from the potential hazards of waste disposal; (2) to conserve energy and natural resources; (3) to reduce the amount of waste generated; and (4) to ensure that wastes are managed in an environmentally sound manner.

Occupational Safety and Health Administration (OSHA)

The Occupational Safety and Health Act of 1970 (OSH Act) was passed to ensure that employers are responsible for providing a safe and healthful workplace. The Occupational Safety and Health Administration's (OSHA's) mission is to assure safe and healthful workplaces by setting and enforcing standards and by providing training, outreach, education, and assistance. Employers must comply with all applicable OSHA standards. Employers must also comply with the General Duty Clause of the OSH Act, which requires employers to keep their workplace free of serious recognized hazards. OSHA standards are listed in Title 29 CFR Part 1910.

State

California Hazardous Waste Control Act

The California Hazardous Waste Control Act (HWCA), as found in the *California Health and Safety Code* (see Division 20, Chapter 6.5, Article 2, Section 25100, et seq.) authorizes the California State Department of Toxic Substances Control (DTSC) and local Certified Unified

Program Agencies (CUPA) to regulate facilities that generate or treat hazardous waste. The HWCA authorizes CUPAs to perform the following actions:

- Conduct inspections of any factory, plant, construction site, waste disposal site, transfer station, establishment, or any other place or environment where hazardous wastes are stored, handled, processed, disposed of, or being treated to recover resources.
- Maintain records of compliance with the Hazardous Waste Control Act.
- Require hazardous waste generators to pay inspection and administration fees to cover the costs of administering the provisions in the HWCA. Fees may include but shall not be limited to the costs of inspection, document development and processing, recordkeeping, enforcement activities, and informational materials development and distribution.
- Issue authorization for on-site treatment of hazardous waste to persons eligible to operate pursuant to permit-by-rule, conditional authorization, or conditional exemption.
- Enforce against violations of the HWCA.

Certified Unified Program Agency

In 1993, Senate Bill 1082 created the CUPA program to foster effective partnerships between local, State, and federal agencies. The Environmental Health Division was designated as the CUPA for the County of Orange by the State Secretary for Environmental Protection on January 1, 1997. The CUPA is the local administrative agency that coordinates the regulation of hazardous materials and hazardous wastes in Orange County through the following six programs:

- Hazardous Materials Disclosure (HMD)
- Business Emergency Plan (BEP)
- Hazardous Waste (HW)
- Underground Storage Tank (UST)
- Aboveground Petroleum Storage Tank (APST)
- California Accidental Release Prevention Program (CalARP)

County and City Fire Agencies within Orange County have joined in partnership with the CUPA as Participating Agencies (PAs). In most Orange County cities, the Environmental Health Division administers all programs; however, the City of Newport Beach Fire Department is responsible for its Hazardous Materials and Business Emergency Plan Programs.

California Accidental Release Prevention Program

CalARP, managed by the CUPA as noted above, is a merging of the Federal Accidental Release Prevention Program and State programs for the prevention of accidental release of regulated toxic and flammable substances. It replaced the California Risk Management and Prevention Program and was created to eliminate the need for two separate and distinct risk management programs. Stationary sources exceeding a threshold quantity of regulated substances are evaluated under this program to determine the potential for and impacts of accidental releases from the source. Depending on the potential hazards, the owner or occupant of a stationary source may be required to develop and submit a risk management plan.

California Occupational Safety and Health Administration

The Division of Occupational Safety and Health, better known as Cal/OSHA, protects and improves the health and safety of working men and women in California through setting and enforcing standards; providing outreach, education, and assistance; and issuing permits, licenses, certifications, registrations, and approvals. Employers are required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 *California Code of Regulations* Sections 337-340). Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations. Cal/OSHA standards are generally more stringent than federal regulations. Cal/OSHA regulations specify employer requirements including employee training, provision of safety equipment, accident-prevention programs, and hazardous substance exposure warnings.

Asbestos Abatement

Asbestos is a known human carcinogen, and the U.S. Environmental Protection Agency (USEPA) and California Environmental Protection Agency (CalEPA) have identified asbestos as a hazardous air pollutant pursuant to Section 12 of the Federal Clean Air Act. Further, the California Air Resources Board has identified asbestos as a Toxic Air Contaminant, pursuant to the *California Health and Safety Code* (Section 39650 et seq.). Asbestos is also regulated as a potential worker safety hazard under the authority of the Cal/OSHA, discussed above. These rules and regulations prohibit emissions of asbestos from asbestos-related demolition or construction activities; require medical examinations and monitoring of employees engaged in activities that could disturb asbestos; specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers; and require notice to federal and local government agencies prior to beginning renovation or demolition that could disturb asbestos.

In California, asbestos abatement must be performed and monitored by contractors with appropriate certifications from the California Department of Health Services (DHS). In addition, Cal/OSHA has regulations to protect worker safety during potential exposure to asbestos under Title 8 of the *California Code of Regulations* (Section 1529 Asbestos). All demolition that could result in the release of asbestos must be conducted according to Cal/OSHA standards. These standards were developed to protect the general population and construction workers from respiratory and other hazards associated with exposure to these materials.

The South Coast Air Quality Management District's (SCAQMD's) Rule 1403 provides guidelines for the proper removal and disposal of asbestos-containing materials. In accordance with Rule 1403, structures that may contain asbestos are required to be subject to an asbestos survey by a Certified Asbestos Consultant (certified by Cal/OSHA) to identify building materials that contain asbestos. Under this rule, removal of asbestos must include prior SCAQMD notification; compliance with removal procedures and time schedules; asbestos-handling and clean-up procedures; and storage, disposal, and landfilling requirements.

Lead Abatement

Because of its toxic properties, lead is regulated as a hazardous material. Inorganic lead is also regulated as a toxic air contaminant. In California, lead abatement must be performed and monitored by contractors with appropriate certifications from the California DHS. In addition, Cal/OSHA has adopted regulations to protect worker safety during potential exposure to lead under Title 8 of the *California Code of Regulations* (Section 1532.1 Lead). All demolition that could result in the release of lead must be conducted according to these standards, which were

developed to protect the general population and construction workers from respiratory and other hazards associated with lead exposure.

Local

County of Orange General Plan

Safety Element

The Safety Element, one of nine elements of the General Plan, contains County policies on identified and potential hazards and safety considerations, their mitigation (i.e., reduction in damage and loss to real and personal property and minimization of adverse social and economic impacts) and implications for development.

The following goal and objectives of the General Plan Safety Element pertaining to hazards and hazardous materials are applicable to the Project:

Goal 2: Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards, which maximize protection of life and property.

Objective 2.1: To create and maintain plans and programs which mitigate the effects of natural hazards.

Objective 2.2: To support the development and utilization of technologies, which minimize the effects of natural hazards.

4.8.2 METHODOLOGY

An EDR Radius Map™ with Geocheck® Report was prepared for the Project by Environmental Data Resources, Inc. (EDR 2020). Search parameters were based on a one-mile radius of the Project site and consisted of a search of federal, State, local, tribal, and other databases. The complete list of databases and additional information can be found in Appendix F.

4.8.3 EXISTING CONDITIONS

Current Uses of the Project Site

The Santiago Creek Dam impounds water for Irvine Lake on Santiago Creek – a tributary to the Santa Ana River. Existing structures on the Project site include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, a portion of Irvine Lake pipeline, and dam access road.

Previous Uses of the Project Site

Santiago Creek Dam was constructed in 1933 to store water for the benefit of the surrounding communities.

The former Irvine Park-Army Camp was used from 1942 to 1946 for training combat troops in field exercises and command post exercises. The property comprised two neighboring encampments, Camp Irvine and Camp Rathke. An area of the former Irvine Park-Army Camp, known as the Multi-Range Training Complex, has been identified through historical research and site visits as having potential explosive hazards. The munitions known or suspected to have been used at the

property include rockets, practice rockets, grenades, practice grenades, small to medium caliber munitions, and small arms ammunition.

The former Irvine Park-Army Camp is located in the cities of Anaheim and Orange, California, in Orange County. The land is owned by multiple public and private landowners and includes Irvine Regional Park and an Outdoor Education Center.

Surrounding Land Uses

Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of State Route (SR) 241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park and the Recreational Lease Area are located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

4.8.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant hazards and hazardous materials impact if it would:

Threshold 4.8-1 Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Threshold 4.8-2 Expose people or structure, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

4.8.5 IMPACT ANALYSIS

Threshold 4.8-1

Would the Project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Less Than Significant With Mitigation. An EDR Radius Map™ with Geocheck® Report was prepared for the Project by Environmental Data Resources, Inc. (EDR 2020). Search parameters were based on a one-mile radius of the Project site and consisted of a search of federal, State, local, tribal, and other databases. The complete list of databases and additional information regarding the identified sites can be found in Appendix F. According to the EDR Radius Map, no mapped sites were found within ¼-mile of the proposed Project.

However, Irvine Ranch Water District (IRWD) received a letter from the U.S. Army Corps of Engineers (USACE) dated February 11, 2021 regarding the Project site and their former training areas designated for cleanup. IRWD denied access for the time being. USACE's understanding was that Project-specific biological and field investigations research was currently ongoing for the proposed Project. IRWD and USACE are in mutual understanding that USACE will conduct all necessary investigations on the site noted related to munitions-related exposure at a future date.

USACE prepared a Final Munitions Response Quality Assurance Project Plan, Military Munitions Response Program Remedial Investigation/Feasibility Study, Irvine Park – Army Camp Range Complex Munitions Response Site, Formerly Used Defense Site, Orange County, California (Plan) in July 2022 (USACE 2022). The Plan identifies a Munitions Response Site and Hazardous Fragment Distance Boundary covering a large area of Santiago Creek upstream of the dam crest and spillway, but also overlaps on the dam crest and spillway themselves, which are also on IRWD property as shown in Exhibit 4.8-1, Explosive Safety Quantity-Distance Arcs, prepared as part of the Final Munitions Response Quality Assurance Project Plan and Military Munitions Response Program Remedial Investigation/Feasibility Study. Although exact areas of munitions and explosives of concern are not known, the areas noted on this exhibit include the actual Munitions Response Site (MRS), or the area known to require a munitions response action due to the potential for munitions or explosives of concern, as well as the Hazardous Fragment Distance Safety Arc and the Maximum Fragment Distance Horizontal Safety Arc. Therefore, based on this exhibit, the northernmost portion of the Project site has the potential to be impacted by potential for munitions or explosives of concern. However, the areas identified for potential impact have been subject to historical disturbance associated with construction and maintenance of the dam, access road, and associated structures, as well as installation of SCE power lines and power poles at the downstream toe of the dam.

In July 2023, IRWD subsequently met with USACE and DTSC. USACE has an on-going Formerly Used Defense Sites (FUDS) investigation at the Irvine Park – Army Camp location, which includes the Project site and the MRS discussed above and depicted in Exhibit 4.8-1. USACE's Remedial Investigation/Action will be completed in the next few years. USACE's FUDS is independent of DTSC's general decisions regarding Cortese List designations.

IRWD and DTSC will consult regarding inclusion of their owned parcel, which is within the Project site, in the Cortese List. According to USACE, IRWD's owned parcel likely only had "small arms" activity such as rifle range firing. However, according to USACE, undocumented activities including use of explosives could have been conducted on this property. As such, a discussion of the possibility of removing the parcel from the Cortese List following USACE's Remedial Investigation/Action completion will take place in the future.

The Project is scheduled to commence prior to completion of the USACE's FUDS. Given the timing of Project, IRWD will follow and implement the 3Rs of Explosives Safety – Recognize, Retreat, and Report as detailed in **MM HAZ-1** during construction.

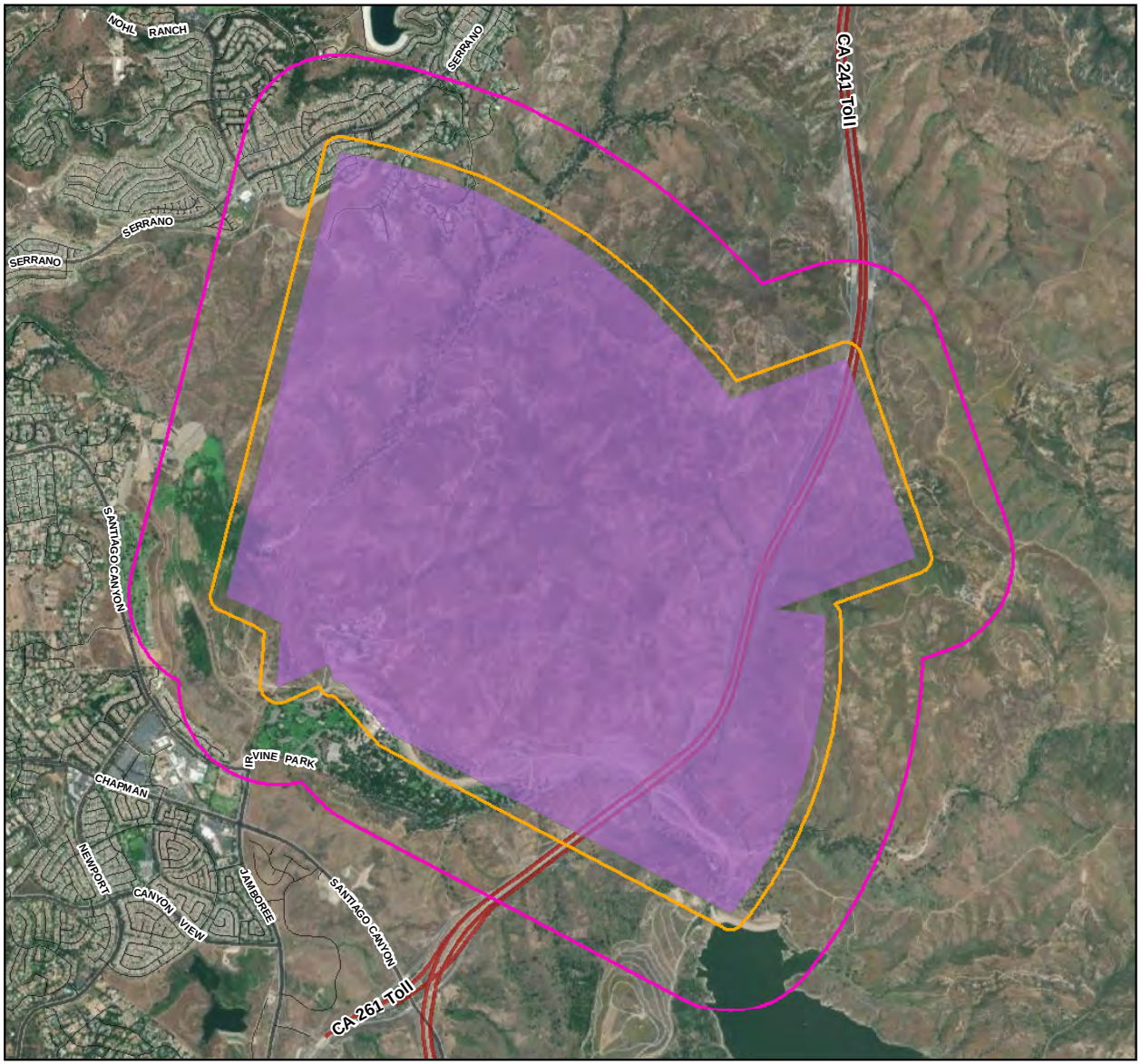
With implementation of **MM HAZ-1**, impacts related to known hazardous materials sites would be less than significant.

Impact Conclusion: *A portion of the Project site is located on the former Irvine Park-Army Camp and is currently designated on the Cortese List. With the implementation of **MM HAZ-1**, which requires IRWD to follow and implement the 3Rs of Explosives Safety – Recognize, Retreat, and Report, impacts would be less than significant.*

Threshold 4.8-2

Would the Project expose people or structure, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Less Than Significant Impact. As defined by the Public Resources Code (PRC) 4126, State Responsibility Areas (SRAs) are State- and privately-owned forest, watershed, and rangeland for which the primary financial responsibility of preventing and suppressing wildland fires rests with



Legend

- Minor Road
- Highway
- Major Road
- MRS Boundary *3,351.7 acres*

Exclusion Zones

Unintentional Detonations

- Hazardous Fragment Distance [HFD] Safety Arc (335 ft.[1])

Intentional Detonations

- Maximum Fragment Distance-Horizontal [MFD-H] Safety Arc (2,111 ft.[2])

Source: USACE 2022

Explosive Safety Quantity-Distance Arcs

Exhibit 4.8-1

Santiago Creek Dam Improvement Project

N W E S

Map not to scale

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_4.8-1.pdf

D:\Projects\3IRW\SantiagoCreek\Graphics\EIR\ex_4.8-1.ai

the State. State Responsibility Areas, by definition, do not include any lands within city limits. Within SRAs, CAL FIRE maps fire hazard severity zones based on factors such as fuel, slope, and fire weather to identify the degree of fire hazard throughout California (e.g., moderate, high, or very high). CAL FIRE also provides recommendations for fire hazard severity zones within Local Responsibility Areas (LRAs), but the responsibility for mapping Local Responsibility Areas lies within the local jurisdiction responsible for fire management and control within the Local Responsibility Area. While fire hazard severity zones do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe and therefore are of greater concern.

According to the California Fire Hazard Severity Zone Viewer, the Project site is located within a Very High Fire Hazard Severity Zones (FHSZ) in a SRA. The areas surrounding the Project site, which are primarily open space areas, are also located within a Very High FHSZ, with the exception of a portion of Irvine Lake, which is located within a High FHSZ within an SRA (CAL FIRE 2023). Development of the proposed Project would include construction and operation of a new outlet tower, spillway improvements and access road improvements, and improvements to the dam crest and embankment. The proposed access road improvements are proposed for Southern California Edison (SCE) utility line relocation, that would occur after completion of the Project and would go through a separate review process. The Project, similar to other such projects, has the potential to increase the risk associated with wildfires due to the presence of heavy construction equipment, including the use of flammable liquids and the presence of internal combustion engines, which could generate sparks or cause leaks that create fire risks, as discussed in further detail above. All infrastructure installed as part of the Project during operation and maintenance will adhere to California Code of Regulation (CCR) Title 24, the California Building Code (CBC), and County of Orange Safety Element. Therefore, with regulatory compliance measures incorporated, the proposed Project would not exacerbate wildfire risk and would not cause environmental impacts other than those analyzed throughout Section 4.0, Impact Analysis, of this EIR. Impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The Project site is located within a Very High FHSZ in a SRA. The areas surrounding the Project site are also located within a Very High FHSZ, with the exception of a portion of Irvine Lake, which is located within a High FHSZ within an SRA. With regulatory compliance measures incorporated, the proposed Project would not exacerbate wildfire risk and impacts would be less than significant. No mitigation is required.*

4.8.6 CUMULATIVE IMPACTS

The cumulative study area associated with hazardous materials is typically site-specific except where past, present, and/or proposed land uses would impact off-site land uses and persons or where past, present, or foreseeable future development in the surrounding area would cumulatively expose a greater number of persons to hazards (e.g., hazardous materials and/or waste contamination).

As discussed under Threshold 4.8-1, because explosive hazards associated with military munitions from past military training may remain on the former Multi-Range Training Complex, the USACE recommends that landowners and visitors follow the 3Rs of Explosives Safety – Recognize, Retreat, and Report (**MM HAZ-1**). With implementation of mitigation, impacts related to known hazardous materials sites would be less than significant. The proposed Project would not contribute to any potential significant cumulative impacts related to hazardous materials sites.

As discussed under Threshold 4.8-2, the Project site is located within a very high FHSZ in an SRA, and the areas surrounding the Project site are also located within a very high FHSZ. With regulatory compliance measures incorporated, implementation of the proposed Project would not exacerbate wildfire risk and would not cause environmental impacts. Therefore, the proposed Project would not contribute to any potentially significant cumulative impacts related to wildland fires.

4.8.7 MITIGATION PROGRAM

MM HAZ-1 IRWD will require that all construction contractor(s) and their personnel receive, review, and adhere to the guidance published in *3Rs Safety Guide, Former Irvine Park-Army Camp, California, Orange County*. IRWD will require its construction contractor to provide training to all construction personnel on the implementation and application of the Safety Guide, which includes 1) Recognize that munitions are dangerous; 2) Retreat – do not approach, touch, move or disturb it, but carefully leave the area; and 3) Report immediately what you saw and where you saw it to local law enforcement.

4.8.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the implementation of **MM HAZ-1**, impacts related to hazards and hazardous materials would be less than significant.

4.8.9 REFERENCES

California Department of Forestry and Fire Protection (CAL FIRE). 2023 (November 15, access date). Fire Hazard Severity Zone Viewer. Sacramento, CA: CAL FIRE. https://experience.arcgis.com/experience/03beab8511814e79a0e4eabf0d3e7247/.

Environmental Data Resources, Inc. (EDR). 2020 (September 17). The EDR Radius Map™ Report with GeoCheck®: Santiago Creek Dam Improvement, Silverado, Anaheim, CA 92808 (Inquiry Number 6196088.2s). Shelton, CT: EDR. Appendix F.

U.S. Army Corps of Engineers (USACE). 2022 (July). Final Munitions Response Quality Assurance Project Plan, Military Munitions Response Program Remedial Investigation/Feasibility Study, Irvine Park – Army Camp, Range Complex Munitions Response Site, Formerly Used Defense Site, Orange County, California. Washington D.C.: USACE.

———.2016. 3Rs Safety Guide, Former Irvine Park-Army Camp, California, Orange County. Washington D.C.: USACE.

U.S. Department of Defense. 2021 (February 11). Irvine Park Army Camp Range Complex Munitions Response Site #: J09CA712901, Irvine Park – Army Camp is located at the Irvine Regional Park in the City of Orange, CA. Los Angeles, CA: Department of the Army.

This page intentionally left blank

4.9 HYDROLOGY AND WATER QUALITY

This section of the Environmental Impact Report (EIR) discusses Project-related impacts to hydrology/drainage and water quality at the Project site.

4.9.1 REGULATORY SETTING

Federal, state, and regional laws, regulations, plans, and guidelines that are potentially applicable to the proposed Project are summarized below. They are established to achieve regional water quality objectives and to protect the beneficial uses of the region's surface and groundwater.

Federal

Clean Water Act

The federal Clean Water Act (CWA) and subsequent amendments, under the enforcement authority of the U.S. Environmental Protection Agency (USEPA), was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The purpose of the CWA is to protect and maintain the quality and integrity of the nation's waters by requiring States to develop and implement State water plans and policies. The CWA gave the USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. In California, implementation and enforcement of the National Pollutant Discharge Elimination System (NPDES) program is conducted through the California State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). The CWA also sets water quality standards for surface waters and established the NPDES program to protect water quality through various sections of the CWA, including Sections 401 through 404 and 303(d) that are implemented and regulated by the SWRCB and the nine RWQCBs. NPDES and Section 402 of the CWA would apply to the proposed Project because the Project would be required to control discharges of pollutants from point sources, as discussed below.

National Pollutant Discharge Elimination System (NPDES) Permit and Section 402

The NPDES permit system was established under the CWA to regulate municipal and industrial point discharges to surface waters of the U.S. Each NPDES permit for point discharges contains limits on allowable concentrations of pollutants contained in discharges. Section 402 of the CWA contains general requirements regarding NPDES permits.

The CWA was amended in 1987 to require NPDES permits for non-point source (i.e., stormwater) pollutants in discharges. Stormwater sources are diffuse and originate over a wide area rather than from a definable point. The goal of NPDES stormwater regulations is to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of structural and non-structural Best Management Practices (BMPs). BMPs can include the development and implementation of various practices including educational measures (workshops informing the public of what impacts result when household chemicals are dumped into storm drains), regulatory measures (local authority over drainage facility design), public policy measures, and structural measures (i.e., filter strips, grass swales, and detention ponds). In California, the stormwater portion of Section 402 is addressed through the state Construction General Permit, as described below.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) determines flood elevations and floodplain boundaries based on U.S. Army Corps of Engineers' studies. FEMA also distributes the Flood Insurance Rate Maps (FIRM) used in the National Flood Insurance Program. FIRMs identify the locations of special flood hazard areas, including 100-year floodplains. The proposed Project site is located in an identified FIRM flood hazard area. More specifically, the site is located within the FEMA 100-year flood zone (AECOM and GEI 2022).

Federal Guidelines for Dam Safety and Emergency Action Planning

The Water Resources Development Act of 1996 (Public Law 104-303) directed FEMA to establish a National Dam Safety Program and formally established the National Dam Safety Review Board and the Interagency Committee on Dam Safety as its authorized permanent advisory body. Through this Act, FEMA developed guidelines for dam owners to improve conditions for preparedness for foreseeable emergencies. These guidelines are intended to encourage development of comprehensive and consistent emergency action planning to protect lives and reduce property damage and involve participation of emergency management authorities and dam owners in emergency action planning (FEMA 2013). Emergency action plans (developed for a given dam location) outline actions to be taken to alleviate dam problems, outline responsibilities and procedures for warning/notification, and notably, provide for the development of inundation maps to identify critical infrastructure and at-risk population sites that may require protective measures, warning, and evacuation planning.

State

California Department of Water Resources, Division of Safety of Dams

The California Department of Water Resources (DWR), Division of Safety of Dams (DSOD), through Division 3 of the California Water Code, is entrusted with regulatory authority and oversight for dam safety. DSOD provides oversight of the design, construction, and maintenance of over 1,200 jurisdictional-sized dams in California. Jurisdictional dams are dams that are more than 6 feet high and impound 50 acre-feet or more of water, or 25 feet or higher and impound more than 15 acre-feet of water. The jurisdictional height of a dam, as determined by DSOD, is the vertical distance measured from the lowest point at the downstream toe of the dam to its maximum storage elevation, which is typically the spillway crest. The Santiago Creek Dam is a jurisdictional dam. DSOD ensures dam safety by:

- Reviewing and approving dam enlargements, repairs, alterations, and removals to ensure that the dam-appurtenant structures are designed to meet minimum requirements.
- Performing independent analyses to determine the performance of the dam and appurtenant structures. These analyses can include structural, hydrologic, hydraulic, and geotechnical evaluations.
- Overseeing construction to ensure that work is being done in accordance with the approved plans and specifications.
- Inspecting each dam on an annual basis to ensure it is safe, performing as intended, and is not developing issues. Roughly 1/3 of these inspections include in-depth instrumentation reviews of dam surveillance network data.
- Periodically reviewing the stability of dams and their major appurtenances in light of improved design approaches and requirements as well as new findings regarding earthquake hazards and hydrologic estimates in California.

The California Office of Emergency Services Dam Safety Program was enhanced though passage of Senate Bill 92 (2017) and detailed in the California Water Code Sections 6160 and 6161 and Government Code Section 8589.5. The bill required preparation of Emergency Action Plans (EAPs) (except for dams designated as low hazard) and brings inundation mapping under the jurisdiction of the California DWR. This legislation set forth additional requirements for EAPs including compliance requirements, implementation of the plan, and coordination with local public safety agencies.

EAPs are written documents that identify potential emergency conditions at a dam and specify actions to help minimize property damage and loss of life if these conditions occur. EAPs contain procedures and information that instruct dam owners to issue early warning and notification messages to downstream emergency management authorities. EAPs also provide assistance and guidance to local jurisdictions for their emergency planning for a dam failure event to ensure effective dam incident emergency response procedures and planning. Senate Bill 92 also requires EAPs be updated (at minimum) every 10 years or when there are significant changes to the dam, its critical appurtenant structures, or downstream hazard classification (DWR DSOD 2018).

Consistent with Federal Guidelines for Dam Safety, IRWD prepared an EAP for the Santiago Creek Dam, approved November 28, 2022 (Stetson Engineers 2022). The EAP was prepared to identify potential emergency conditions at Santiago Creek Dam, facilitate notification of affected parties, assign roles and responsibilities to involved agencies, and take mitigating actions in time to minimize loss of human life or injury and property damage. Emergency management authorities will use the information in this EAP to facilitate their performance of their responsibilities. Local, county, and state authorities have coordinating plans in place to address local emergency operations and/or warnings and evacuations.

According to the EAP, DSOD has rated the Santiago Creek Dam as having an “Extremely High” downstream hazard classification. Because of its hazard classification, IRWD developed its EAP in accordance with California Water Code Sections 6160 and 6161, Government Code Section 8589.5, and the FEMA Federal Guidelines for Dam Safety: “Emergency Action Planning for Dams.” Prior to approval, the Santiago Creek Dam EAP was circulated for review and comment to affected parties and all to emergency planning, law, and fire public safety agencies for all affected jurisdictions.

The EAP establishes IRWD as the “Dam Owner” and makes IRWD responsible for detecting and evaluating dam safety incidents, classifying the incident, notifying emergency management authorities, taking appropriate response actions, terminating the EAP, and performing follow-up tasks related to dam incidents. A safety incident at Santiago Creek Dam could impact 13 jurisdictions served by 18 public safety agencies.

A dam safety incident is reported through 911 or a direct phone call to Orange County Sheriff’s Department (OCSD). The emergency response through the public safety agencies would be coordinated by OCSD “Control One,” which is the central point of contact for interoperable communications between all law enforcement, fire, and public works agencies responding to a dam safety emergency at the Santiago Creek Dam. Upon notification of an incident, Control One would broadcast an emergency message to all dispatch centers at once via radio and would send messages via teletype over communications terminals. Once the incident is reported, a Unified Command is expected to be established. The Unified Command would include OCSD, Orange County Fire Authority, and representatives from IRWD (dam owners), plus representatives from all agencies of downstream jurisdictions, as necessary. The Unified Command will facilitate coordination among agencies and disciplines. An Incident Command Post (ICP) would be established in an area near the dam outside of the inundation zone. A possible ICP location for Santiago Creek Dam is at the parking lot for the Irvine Lake recreation area, located at 4621 E.

Santiago Canyon Road, Silverado, CA 92676. The County and Operational Area Emergency Operations Center is expected to be activated during emergencies at Santiago Creek Dam. The Emergency Operations Center would be established at the County Emergency Management office at 2644 E Santiago Canyon Rd, Silverado, California. The Unified Command will facilitate coordination among agencies and disciplines. Responsibilities consist of establishing the ICP, protecting life and property, controlling personnel and equipment resources, maintaining accountability for responder and public safety, and establishing and maintaining an effective liaison with outside agencies and organizations. The Unified Command is responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources.

NPDES Construction General Permit

Construction associated with the proposed Project would disturb more than one acre of land surface that has the potential to affect the quality of stormwater discharges into waters of the U.S. The proposed Project would, therefore, be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order WQ 2022-0057-DWQ, NPDES No. CAS000002). The Construction General Permit regulates discharges of pollutants into stormwater associated with construction activity to waters of the U.S. from construction sites that disturb one acre or more of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; the construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The Construction General Permit requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters' risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to the receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards;
- Good site management "housekeeping;"
- Non-stormwater management;
- Erosion and sediment controls;
- Run-on and runoff controls;
- Inspection, maintenance, and repair; and
- Monitoring and reporting requirements.

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific BMPs designed to prevent sediment and pollutants from contacting stormwater moving off site into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management, and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the Construction General Permit.

The SWPPP must be prepared before construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing, and fueling. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

In the proposed Project area, the Construction General Permit is implemented and enforced by the Santa Ana RWQCB, which administers the stormwater permitting program. Dischargers must electronically submit a notice of intent and permit registration documents to obtain coverage under this Construction General Permit. Dischargers are to notify the Santa Ana RWQCB of violations or incidents of noncompliance and submit annual reports identifying deficiencies in the BMPs and explaining how the deficiencies were corrected. The risk assessment and SWPPP must be prepared by a State Qualified SWPPP Developer, and implementation of the SWPPP must be overseen by a State Qualified SWPPP Practitioner. A legally responsible person, who is legally authorized to sign and certify permit registration documents, is responsible for obtaining coverage under the permit.

NPDES Municipal Separate Storm Sewer System Permit (MS4)

In 1987, amendments to the Clean Water Act expanded the NPDES permit program to regulate discharges from storm drains owned and operated by municipalities, such as the County of Orange. In November 1990, USEPA published regulations that established application requirements for stormwater permits for municipal stormwater discharges. In California, the NPDES stormwater permit program is administered and enforced by the SWRCB through the nine RWQCBs by issuing Waste Discharge Requirements and NPDES permits. These permits are reissued approximately every five years and include applicable provisions of the State Porter-Cologne Water Quality Control Act, which is the principal legislation for controlling stormwater pollutants in California. The permit establishes regulations covering discharge prohibitions, receiving water limitations, municipal operations, new development, construction site controls (construction site runoff), and other regulations for surface water quality.

The discharge prohibitions prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. The municipal operations regulations include a number of requirements to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure, such as the proposed Project. The requirements include source control, site design, and stormwater treatment requirements, such as minimizing disturbance of natural infiltration areas and the addition of impervious surfaces, controlling and directing runoff, and the use of infiltration and bioretention, among other measures. The MS4 Permit for the proposed Project area is discussed below in the section regarding local regulations.

Groundwater Dewatering for the Santa Ana Region

Discharges of groundwater are covered by the General Discharge Permit for Discharges to Surface Waters of Groundwater resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals, and/or Salts (Dewatering Permit for Santa Ana Region). As detailed in Section 3.0, Project Description, a subgrade dewatering system such as a dewatering well is proposed as part of the overall dewatering process. Encountered groundwater would be dewatered and conveyed to Santiago Creek. Before discharging to the creek in compliance with discharge permits, the water may be treated for total dissolved solids (TDS) if there are elevated levels of turbidity. If required, the subgrade dewatering system may discharge into the existing storm drain, if necessary, pursuant to the conditions and requirements in Order Number: R8-2020-0006; NPDES Number: CAG998001 (RWQCB 2020).

Local

Santa Ana Regional Water Quality Control Board

The proposed Project site is located within the region under the jurisdiction of the Santa Ana RWQCB, which establishes regulatory standards and objectives for water quality in the region in the *Water Quality Control Plan, Santa Ana River Basin*, commonly referred to as the Basin Plan. The Basin Plan identifies existing and potential beneficial uses for surface water and groundwater and provides numerical and narrative water quality objectives designed to protect those uses. Irvine Lake (Santiago Reservoir) has the following surface water beneficial uses:

MUN – Municipal and Domestic Supply waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.

AGR – Agricultural Supply waters are used for farming, horticulture or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.

REC1 – Water Contact Recreation (Primary Contact Recreation) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs. Although the Irvine Lake (Santiago Reservoir) is listed with a REC1 beneficial use, IRWD does not permit primary contact recreation because the reservoir waters are used for water supply.

REC2 – Non-contact Water Recreation (Secondary Contact Recreation) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing and aesthetic enjoyment in conjunction with the above activities.

WARM – Warm Freshwater Habitat waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

COLD – Cold Freshwater Habitat waters support cold water ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish and wildlife, including invertebrates.

WILD – Wildlife Habitat waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife.

RARE - Rare, Threatened or Endangered Species waters support the habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law as rare, threatened or endangered.

Orange County Municipal Storm Water Permit (MS4)

The Orange County Municipal Storm Water Permit (MS4) applies to the proposed Project (Municipal NPDES Permit No. CAS 618030, Order No. R8-2009-0030 - NPDES Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region, Areawide Urban Storm Water Runoff, Orange County ("Co-Permittees")). The NPDES municipal general permits issued by the RWQCB establish regulations covering discharge prohibitions, receiving water limitations, municipal operations (such as the proposed project), new development, construction site controls (construction site runoff), and other regulations to regulate surface water quality (RWQCB 2015). The discharge prohibitions prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses and includes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards. The receiving water limitations provide narrative and numeric water quality standards. The municipal operations regulations include a number of requirements to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure. The requirements include source control, site design, and stormwater treatment requirements, such as minimizing disturbance of natural infiltration areas and the addition of impervious surfaces, controlling and directing runoff, and the use of infiltration and bioretention measures, among other measures. To more efficiently address the requirements, the permittees within the County of Orange developed the Drainage Area Management Plan (DAMP), described below.

Drainage Area Management Plan (DAMP)

To implement the requirements of the Orange County MS4 Permit, the Co-Permittees developed the 2003 DAMP (Orange County Public Works [OCPW] 2003) to serve as the foundation of the model programs, local implementation plan, and watershed implementation plans. The DAMP provides a framework and a process for following the Orange County MS4 Permit requirements and incorporates watershed protection/storm water quality management principles into the Co-Permittees' General Plan process, the environmental review process, and the development permit approval process. Among others, the DAMP discusses the activities, practices, and programs being implemented by the various municipalities for reducing pollutant discharges into the MS4s. It includes a public education program to encourage the prevention of storm water pollution at the source. The DAMP also defines requirements for construction sites and for project-specific planning, selection, and design of BMPs in new development or significant redevelopment projects. Additionally, it includes the water quality monitoring programs being implemented in the County.

The 2007 DAMP (OCPW 2007) was developed in response to the updated Orange County MS4 Permit. This DAMP addresses the same storm water quality programs related to municipal activities; public education; requirements for new development and significant redevelopment projects (including the Model Water Quality Management Plan), construction sites, and existing development; discharge prohibitions; and the water quality monitoring program.

County of Orange

General Plan, Resources and Land Use Elements

The following goals and policies from the Resources Element of the Orange County General Plan are relevant to the proposed project's consideration of water resources (Orange County, 2012).

Goal 1 Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.

Policy 1 Water Supply – To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.

Policy 2 Conservation – To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.

Policy 3 Groundwater Sources – To support groundwater management efforts that are conducted by County water agencies.

Policy 4 Shortage Planning – To ensure that Orange County will not be severely impaired by any potential future water shortages.

Policy 5 Water Quality – Protect and improve water quality through continued management, enforcement, and reporting requirements. Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats.

Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles.

Consider implementation of LID principles to conserve natural features (e.g., trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils.

Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources.

The following policies from the Land Use Element of the Orange County General Plan (as updated in 2024) establish a framework for managing urban and stormwater runoff (Orange County 2024).

Encourage, support and require all new development and redevelopment projects to identify opportunities for implementation of Low Impact Development (LID) principles in the early stages of the development planning process.

Promote, support, and require innovative site planning and development techniques that allow for implementation of LID principles while taking into consideration specific hydrology and geology conditions.

Encourage, support and require the use of LID as art of an overall strategy to mitigate stormwater impacts from new development and redevelopment projects consistent with current NPDES permit requirements.

Encourage and support, where applicable, the use of buffer zones to protect natural water bodies, including but not limited to, wetlands and riparian corridors. Where infeasible, require other measures to protect natural water bodies.

Identify and evaluate potential changes to land use development regulations to support and promote stormwater management techniques and ensure regulations do not inhibit compliance with current NPDES permit requirements.

4.9.2 METHODOLOGY

The environmental analysis of potential impacts to hydrology and water quality is based on a review of regional literature and water resources data and the site-specific geotechnical investigation, including dam safety and inundation analysis, the feasibility study, design reports and constructability analysis prepared for the proposed Project.

The analysis assumes that the proposed Project would comply with the various laws and regulations pertaining to water quality, dam safety, and others described in Section 4.9.1, Regulatory Setting. For example, as the Project would disturb more than one acre, compliance with the Construction General Permit would be required along with implementation of BMPs and conditions of a SWPPP to limit impacts during construction.

Following consideration of the proposed Project, as described in the Project Description, and the Project's implementation of and compliance with regulatory requirements, this impact analysis evaluates whether a significant environmental impact would occur based on the CEQA Appendix G thresholds of significance outlined herein. For any potential impacts considered to be significant, mitigation is proposed to reduce the severity of such impacts to less than significant levels.

4.9.3 EXISTING CONDITIONS

Santiago Creek Dam was constructed in 1933 and the existing spillway is located along the western end of the dam. The spillway is approximately 180 feet wide and empties into a concrete-lined chute, which is approximately 80 feet wide at the end of the chute. The spillway is rated for 30,000 cubic feet per second (cfs) and has a total length of 310 feet. Stoplogs may be inserted at the spillway annually from April to September to raise the effective crest elevation by four feet, from 790 feet above mean sea level up to 794 feet (Stetson 2022).

Villa Park Dam, a jurisdictional dam owned by OCPW, is located approximately 3.5 river miles downstream of Santiago Creek Dam. A sudden and total failure of the Santiago Creek Dam may lead to a sequential failure at the downstream Villa Park Dam.

Santiago Creek Hydrology

Santiago Creek is on the western slope of the Santa Ana Mountains in southern California and is a tributary to the Santa Ana River (United States Geological Survey Hydrologic Unit Code 18070203). The Santiago Creek watershed has a total drainage area of about 90 square miles and is located in southern California in a mild, Mediterranean climate zone. The creek flows in a northwesterly direction for about 32 miles from its headwaters near Santiago Peak to its confluence with the Santa Ana River about 14.5 miles downstream of Santiago Creek Dam. Santiago Creek Dam drains about 63 square miles of the Santiago Creek watershed. The drainage basin upstream of the dam generally consists of steep and mountainous terrain, ranging in elevation from approximately 780 feet above mean sea level at the dam to 5,680 feet above mean sea level in the headwaters near Santiago Peak (AECOM and GEI 2022). The average

annual temperature is about 64 degrees Fahrenheit. Summers are warm and dry; winters are cool and mild. The majority of annual precipitation occurs during the months of November through April. Average annual precipitation is about 14 inches but varies greatly (Stetson 2022). Most of the basin soils are in the Natural Resources Conservation Service hydrologic group D, indicating a poor infiltration rate and high runoff potential when thoroughly wet, though there are pockets of more well-drained soils (AECOM and GEI 2022).

Drainage and Topography

The Santiago Creek watershed can be divided into three sub-watersheds based on the areas draining to the Santiago Creek and Villa Park Dams. The drainage area upstream of Santiago Creek Dam is 63.1 square miles and consists of steep canyons. These mountainous headwaters are mostly undeveloped, with elevations up to about 5,500 feet above mean sea level. Downstream of Santiago Creek Dam, Santiago Creek flows northwest for roughly 3.5 river miles, where it is impounded by Villa Park Dam. The drainage area between Santiago Creek and Villa Park Dams is 20 square miles, also mostly undeveloped. Downstream of Villa Park Dam, Santiago Creek flows through the Santiago Creek Recharge Basins and then continues for another 5.5 river miles before joining the Santa Ana River. At its point of discharge into the Santa Ana River, Santiago Creek drains a total area of 99 square miles. The Santa Ana River drains a total of 2,650 square miles and flows into the Pacific Ocean in Huntington Beach (Stetson 2022).

Surface Water

Santiago Creek Dam is a compacted earthfill embankment that impounds water for Irvine Lake from the Santiago Creek, local storm water runoff, and imported raw water from the Metropolitan Water District of Southern California (MWDSC) and serves as a domestic and irrigation water supply for various cities in Orange County. Santiago Creek is a tributary to the Santa Ana River.

Santiago Creek Historical Flood Events

Santiago Creek experienced a large flood event in February 1969, where a storm arrived in February after Irvine Lake was already full from a storm event that occurred in January. Severe flooding occurred on Santiago Creek and in the lower Santa Ana River watershed from February 22-25, 1969. The event is estimated to have been a 100-year flood. The United States Geological Survey gauge downstream of Villa Park Dam recorded a peak discharge of 6,600 cfs on February 25, 1969. This was the observed peak downstream of the two regulating reservoirs. During this event, both Santiago Creek Dam and Villa Park Dam discharged water over their respective spillways. A DSOD inspection report stated that during this event, outflow at the Santiago Creek Dam spillway peaked at about 7 feet, or 9,700 cfs, though it is uncertain whether the gage was accurate (Stetson 2022).

Groundwater

The Project site is located outside of the Orange County Groundwater Basin (County of Orange 2012).

4.9.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant hydrology and water quality impact if it would:

Threshold 4.9-1 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

Threshold 4.9-2 Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

Threshold 4.9-3 Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

- **(i)** result in substantial erosion or siltation on- or-off site;
- **(ii)** result in flooding on- or off-site;
- **(iii)** create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- **(iv)** impede or redirect flood flows.

Threshold 4.9-4 In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

Threshold 4.9-5 Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

4.9.5 IMPACT ANALYSIS

Thresholds 4.9-1

Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Short-Term Construction-Related Water Quality Impacts

Less Than Significant Impact. Potential impacts of construction activities on water quality focus on sediments, turbidity, and pollutants associated with sediments. Construction-related activities that are primarily responsible for sediment releases are related to exposing soils to potential mobilization by rainfall, runoff, and wind. These activities include grading and other earth-disturbance activities. Non-sediment-related pollutants that are also of concern during construction include waste construction materials and chemicals, liquid products, and petroleum products used in building construction or the maintenance of heavy equipment. Construction impacts from implementation of the proposed Project would be minimized through compliance with the Construction General Permit. This permit requires the development and implementation of a SWPPP for the proposed Project site, which must include erosion- and sediment-control BMPs that meet or exceed measures required by the NPDES Construction General Permit, as well as BMPs that control the other potential construction-related pollutants. A SWPPP would be developed, as required by and in compliance with, the NPDES Construction General Permit. Erosion-control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap sediment once it has been mobilized. The NPDES Construction General Permit requires the SWPPP to include BMPs to be selected and implemented based on the phase of construction and weather conditions.

The SWPPP would be designed and implemented to address site-specific conditions related to Project construction. The SWPPP would identify and describe the sources of sediment and other pollutants that may affect the quality of storm water discharges; it would also ensure the implementation and maintenance of BMPs to reduce or eliminate sediment, pollutants adhering to sediment, and other non-sediment pollutants in storm water and non-storm water discharges.

Compliance with the NPDES Construction General Permit and the preparation of a SWPPP would ensure that any impacts to downstream waters resulting from construction activities on the Project site would be less than significant. Erosion-control and treatment-control BMPs would be implemented per NPDES requirements.

Furthermore, the Project would comply with the General Waste Discharge Requirements issued by the Santa Ana Regional Water Quality Control Board (R8-2015-0004, NPDES No. CAG998001, General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant [De Minimis] Threat to Water Quality) (RWQCB 2015), including provisions requiring notification, testing, and reporting of dewatering and testing-related discharges, which would mitigate any impacts of such discharges. As such, the project would comply with applicable local, State, and federal regulations. Therefore, impacts related to construction-phase water quality impacts would not represent a significant impact.

Long-Term Water Quality Impacts

Less Than Significant Impact. Existing structures include the dam crest, intake tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, Irvine Lake pipeline and dam crest access road. The remaining portion of the site is covered with open water, fluctuating shoreline, vegetated fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas. Implementation of the proposed Project involves abandonment of the existing Santiago Creek Dam outlet tower, construction of a new inclined outlet structure located on the left abutment of the existing dam, structural improvements to the dam spillway, and improvements to the dam embankment. The Project would not introduce new uses to the site; as such, development of the Project would not introduce substantial amounts of urban pollutants to the storm water runoff beyond existing conditions. Therefore, impacts related to long-term operational water quality impacts would not be significant.

Impact Conclusion: *The proposed Project would not violate any water quality standards and waste discharge requirements, nor would it otherwise substantially degrade water quality, pursuant to Threshold 4.9-1. Water quality-related impacts would be less than significant. No mitigation is required.*

Threshold 4.9-2

Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

No Impact. The Project is not located above or within a groundwater recharge basin and the Project would not increase water demand. Implementation of the proposed Project would not substantially change the nature of the existing facilities. Therefore, no impacts would occur, and no mitigation is required.

Impact Conclusion: *The Project would not deplete groundwater supplies or interfere substantially with groundwater recharge. No impacts would occur, pursuant to Threshold 4.9-2. No mitigation is required.*

Threshold 4.9-3

Would the Project substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) result in substantial erosion or siltation on- or off-site;

ii) substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

iv) impede or redirect flood flows.

Less Than Significant Impact. Over the Project's approximate four-year construction schedule, Irvine Lake would be dewatered to accommodate demolition and construction activities which would temporarily modify the site's drainage patterns. Prior to the beginning of construction, IRWD would drawdown the reservoir water levels before the beginning of the dry season. As discussed in Section 3.0, Project Description, the dewatering process includes a combination of several efforts including opening the critical valve to Santiago Creek to allow water from Irvine Lake to naturally flow downstream, modifying the existing outlet tower to allow the water level in Irvine Lake to be lowered further, implementing a temporary pumping system once the temporary diversion berm is constructed, and installing a subgrade dewatering system, which may consist of dewatering wells. The subgrade dewatering wells would operate during the dry season to maintain a dry work environment but may operate during the wet season if the work requires the subgrade dewatering system to operate. Storm water flows would be controlled through construction of a temporary flood control berm and a temporary outlet conduit, bypass pumping, and piping for stream diversion. Due to these control measures, storm flows would be directed through the temporary piping systems and would not result in on- or off-site flooding. The temporary diversion and piping would also keep storm flows away from areas of exposed soil, thus reducing the potential for erosion or siltation. Additionally, the Project would comply with the State General Construction Permit which requires preparation of a SWPPP. The SWPPP would identify appropriate BMPs to control runoff, minimize erosion and siltation; thus, storm flows would not encounter areas of additional pollutant sources. The diversion and piping systems would not impede flood flows, and the temporary redirection of flows would be planned to avoid impacts related to flooding, erosion, and siltation, as discussed above.

Following construction, all temporary bypass measures would be removed, and the dam, spillway, and outlet tower would operate similar to existing conditions. Proposed improvements would include abandonment of the existing Santiago Creek Dam outlet tower, construction of a new inclined outlet structure located on the left abutment of the existing dam, structural improvements to the dam spillway, and improvements to the dam embankment. These improvements would accommodate peak reservoir inflow of 68,000 cfs and a peak outflow of 65,000 cfs and raise the maximum operational water level in Irvine Lake by 2 feet. Normal operation at Irvine Lake calls for the lake level to be kept lower in winter months to capture local runoff.

Implementation of the proposed Project would rehabilitate and replace the Santiago Creek Dam outlet works and spillway facilities, which would accommodate peak flows. However, rare hydrologic conditions may occur, such as sequential storm events, when the watershed is

saturated and runoff is increased. Under these conditions, known as the probable maximum flood (PMF), the reservoir may be full and storm runoff would be released over the spillway. Historically, this occurred in February 1969 as a result of a high-magnitude, low-probability storm event. Under an analysis of floods ranging from the two-year event to the PMF, for the two-year event Santiago Creek would be confined to the main channel. However, for larger events such as five-, ten-, 25-, 50-, and 100-year events, park facilities at Irvine Regional Park could be inundated. Under the PMF scenario, which is highly unlikely, the entire park area would be inundated (Stetson 2022). As stated above, the Project would raise the proposed spillway by two feet to a crest elevation of 796 feet, which is six feet higher than the current spillway without flashboard and specifically designed to pass the PMF per DSOD standards.

Although flooding is a possibility under these storm events with the proposed Project, the potential for on- or off-site flooding resulting from storm events would not be increased compared to existing conditions and the same areas would be subject to potential inundation. Furthermore, the Project would maintain the existing drainage pattern of the area and would increase overall capacity to accommodate updated peak flows. Therefore, Project implementation would not alter the existing drainage pattern by impeding or redirecting flood flows, substantially increasing the rate or amount of surface runoff, or altering the course of a stream or river.

As discussed under Threshold 4.9-1, implementation of the proposed Project would not introduce new uses to the site; as such, development of the Project would not introduce substantial additional amounts of polluted stormwater beyond existing conditions.

Impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The proposed Project would not alter the existing drainage pattern of the site or area, would not result in substantial erosion or siltation on or off-site, substantially increase the rate or amount of surface runoff in a manner in which would result in flooding on- or off-site, create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff, or impede or redirect flood flows. Impacts would be less than significant, and no mitigation is required.*

Threshold 4.9-4

Would the Project, in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less than Significant Impact. Santiago Creek Dam is located at the north end of Irvine Lake within a FEMA 100-year flood zone or High-Risk Area (1 percent annual chance of flooding) (FEMA 2009). The Project site is not located within a coastal zone and is not located near the ocean; therefore, it would not be subject to a tsunami. It is possible that a seiche, or standing wave, resulting from failure of the dam could impact the Project site. However, the likelihood of the seiche effects reaching the Project site is low. The proposed Project would not introduce any uses that would expose people or structures to hazards associated with a tsunami or seiche.

As discussed under Threshold 4.9-3, implementation of the proposed Project would rehabilitate and replace the Santiago Creek Dam outlet works, spillway facilities, and improvements to the dam embankment which would accommodate peak flows. Santiago Creek Dam is a jurisdictional dam subject to the regulatory authority of the California DSOD. Design of the Project would conform to applicable DWR statutes pertaining to dam appurtenant structures. As part of the design process, a review was performed of the DSOD guidance documents to determine

mandatory criteria for the project design. This review was supplemented by additional detailed design criteria derived from U.S. Army Corps of Engineers and U.S. Bureau of Reclamation publications. Specifically, the Project complies with all design criteria related to general structural considerations, seismic considerations, material properties, concrete hydraulic structures, and hydraulic steel structures. Additionally, the Project includes mechanical design features that would be integrated into the Project's supervisory control and data acquisition (SCADA) system. Operations staff would have the ability to remotely monitor various mechanical and physical elements and be able to respond in an emergency event.

As previously discussed, DSOD has rated the Santiago Creek Dam as "Extremely High" hazard classification for dam failure due to the downstream hazard classification. Because of its hazard classification, IRWD developed the EAP which identifies responsibilities of affected parties, notification flowcharts for each emergency level that could be activated, the EAP Response Process, General Responsibilities, Preparedness, and Plan Maintenance.

The EAP is a plan for early identification of potential dam safety incidents and specifies planned actions to help minimize risks to public safety should these conditions occur. The EAP contains procedures and exercises for dam operators to issue early warning and notifications to emergency management authorities. In accordance with the EAP, in the event there is any determination of a dam safety issue or incident at Santiago Creek Dam, the EAP notification, communication, and response responsibilities would be activated. As discussed previously, once the incident is reported, a Unified Command would be established, including OCSD, Orange County Fire Authority, representatives from IRWD, and representatives from all agencies of downstream jurisdictions. The Unified Command would facilitate coordination among agencies and disciplines. Responsibilities consist of establishing the Incident Command Post, protecting life and property, controlling personnel and equipment resources, maintaining accountability for responder and public safety, and establishing and maintaining an effective liaison with outside agencies and organizations. The Project's replacement outlet tower and spillway would meet or exceed the current safety, design and construction requirements established by the DSOD and would ensure the risks to public safety are minimized. The proposed Inlet/Outlet Works for the Santiago Creek Dam would consist of several interconnected facilities composed of the inclined inlet/outlet structure, emergency outlet pipe, Irvine Lake pipeline, bifurcation valve vault, emergency outlet valve vault, and dam control building. The vault will include valves to bifurcate the flow to either the Irvine Lake pipeline or the emergency outlet pipeline, thus reducing risk of downstream flooding.

The proposed Project would not introduce any new uses that would expose people or structures to hazards associated with the failure of this dam. With compliance with existing regulations for the design and operation of the dam, and adherence to the procedures in the EAP, the impacts relative to the release of pollutants during seiches and flooding due to breaches of the dam would be less than significant and would not require mitigation.

Impact Conclusion: *The proposed Project would not introduce any uses that would expose people or structures to the release of pollutants during seiches and flooding due to breaches of the dam. Impacts would be less than significant, and no mitigation is required.*

Threshold 4.9-5

Would the Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less Than Significant Impact. As discussed under Threshold 4.9-1 above, through conformance with applicable regulatory standards and implementation of applicable BMPs, the Project would not substantially degrade water quality; therefore, the Project would not conflict with or obstruct implementation of the applicable water quality control plan. In terms of sustainable groundwater management plans, as noted above under Threshold 4.9-2, the Project would not have the potential to adversely affect groundwater supplies or the management of groundwater basins in the area. As such, the Project would not result in any conflicts with or affect implementation of such plans. There would be less than significant impacts, and no mitigation is required.

Impact Conclusion: *The proposed Project would not conflict with or obstruct implementation of the applicable water quality control plan or sustainable groundwater management plan. Impacts would be less than significant, and no mitigation is required.*

4.9.6 CUMULATIVE IMPACTS

With the implementation of construction and operational BMPs by the proposed Project (e.g., SWPPP, structural- and non-structural BMPs), the anticipated quality of runoff would not contribute concentrations of pollutants of concern that would result in a violation of water quality standards and waste discharge requirements or the degradation of water quality in the Project's receiving waters. Any future development within the watershed must also comply with the NPDES Construction General Permit and Orange County MS4 Permit. Additionally, future developments in the County would conform with County regulations related to hydrology and water quality. Therefore, cumulative impacts on surface water quality would be less than significant.

Although the Project would involve improvements to existing uses, other future developments anticipated in the area may result in changes to some existing land uses, which would result in increased impervious surfaces and increases in the amount and velocity of surface runoff, along with decreases in the amount of natural groundwater recharge. However, all cumulative projects in the County and the watershed, including the proposed Project, would be subject to Orange County requirements related to hydrology, drainage, and water quality. Future development projects would also be required to prepare Water Quality Management Plans and implement structural and non-structural BMPs to control storm water flows, runoff volumes and rates, and drainage system improvements. As previously discussed, the Project's drainage pattern would be temporarily modified during construction and no off-site storm drainage improvements would be required. Furthermore, because the Project would not modify drainage patterns or overall hydrology, impacts related to on- and off-site flooding would be less than significant. Additionally, individual project impacts related to potential erosion and siltation, and flooding on and off site would be less than significant given the requirements to implement BMPs. Compliance with these regulations would also avoid cumulative impacts related to changes in drainage patterns, on-site and off-site flooding, capacity of storm-drain systems, and the need for improvements to storm drainage infrastructure.

The Project is not located above or within a groundwater recharge basin and the Project would not increase water demand. Thus, cumulative impacts on groundwater supplies and recharge would be less than significant.

Overall, cumulative impacts on hydrology and water quality would be less than significant, and no mitigation is required.

4.9.7 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant impacts to Hydrology and Water Quality; therefore, no mitigation measures are required.

4.9.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Less than Significant.

4.9.9 REFERENCES

AECOM and GEI Consultants (GEI). 2022 (July 15). *Santiago Creek Dam Outlet Tower and Spillway Improvements Project, PR 01813, Preliminary Design Report.* Orange, CA: AECOM. Rancho Cordova, CA: GEI.

California Department of Water Resources (DWR) Division of Safety of Dams (DSOD). 2022 (September). Dams within Jurisdiction of the State of California, Dams Listed Alphabetically by County. Sacramento, CA: DWR. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-Listed-Alphabetically-by-County-September-2022.pdf.

———. 2018 (September 28). DSOD Inspection and Reevaluation Protocols. Sacramento, CA: DWR. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/DSOD-Inspection-and-Reevaluation-Protocols_a_y19.pdf.

Federal Emergency Management Agency (FEMA). 2009 (December 3, date effective). FEMA Flood Map Service Center – Orange County Unincorporated (Flood Map No. 06059C0190J, effective on 12/3/2009). Washington, D.C.: FEMA. https://msc.fema.gov/portal/search?AddressQuery=santiago%20creek%20dam.

———. 2013 (July). Federal Guidelines for Dam Safety: Emergency Action Planning for Dams. FEMA 64. Washington, D.C.: FEMA. https://www.fema.gov/sites/default/files/2020-08/eap_federal_guidelines_fema_p-64.pdf.

OC Public Works (OCPW). 2007. Drainage Area Management Plan (DAMP) 2007. Santa Ana, CA: OCPW. https://www.waterboards.ca.gov/rwqcb8/water_issues/programs/stormwater/docs/ocpermit/2007/2007_damp.pdf.

———. 2003 (July). 2003 Drainage Area Management Plan (DAMP). Santa Ana, CA: OCPW. https://media.ocgov.com/gov/pw/watersheds/documents/damp/mapplan.asp.

Orange, County of. 2012. General Plan, Chapter VI. Resources Element, Figure VI-8, Orange County Groundwater Basin (pp. VI-51). Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/8630.pdf.

———. 2024 (June). General Plan, Chapter III. Land Use Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2024-07/Adopted%20Land%20Use%20Element%20Amendment%20-%20June%202024.pdf

Santa Ana Regional Water Quality Control Board (RWQCB). 2022. Order No. WQ 2022-0057-DWQ, NPDES No. CAS000002, Construction General Permit for Stormwater Discharges. Santa Ana, CA: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction/docs/2022-0057-dwq-with-attachments/cgp2022_factsheet.pdf.

———.2020 (June 19, adopted). Order No. R8-2020-0006 (NPDES No. CAG998001, General Waste Discharge Requirements For Discharges To Surface Waters That Pose An Insignificant (De Minimis) Threat To Water Quality. Riverside, CA: Santa Ana RWQCB.

https://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2020/R8-2020-0006.pdf.

———. 2019 (June 14, updated). Water Quality Control Plan, Santa Ana River Basin (8). Riverside, CA: Santa Ana RWQCB. https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/.

———. 2017 (October 3). Orange County Municipal NPDES Storm Water Permit. Riverside, CA: Santa Ana RWQCB. https://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/oc_permit.html

———. 2015 (June 19). Order No. R8-2009-0030 (NPDES No. CAS618030, as amended by Order No. R8-2010-0062, Waste Discharge Requirements For The County of Orange, Orange County Flood Control District and The Incorporated Cities of Orange County within the Santa Ana Region, Areawide Urban Storm Water Runoff, Orange County. Riverside, CA: Santa Ana RWQCB.

———. 2011a (May 19, approval date). Exhibit 7.II: Model Water Quality Management Plan (Model WQMP). Riverside, CA: Santa Ana RWQCB.

———. 2011b (May 19, approval date). Exhibit 7.III: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). Riverside, CA: Santa Ana RWQCB.

Stetson Engineers, Inc. (Stetson). 2022 (November 28). Emergency Action Plan (EAP) for Santiago Creek Dam Orange County, California 5305 E. Santiago Canyon Road, Orange CA 92869 Latitude: 33.7863; Longitude: -117.7252. Covina, CA: Stetson. https://www.irwd.com/images/pdf/construction/dam-emergency-action-plans/Redacted_Santiago_Creek_EAP_2022-11-28_Public_sm.pdf.

United States Environmental Protection Agency (USEPA). 2024 (November 6, last accessed). Summary of the Clean Water Act. https://www.epa.gov/laws-regulations/summary-clean-water-act.

This page intentionally left blank

4.10 LAND USE AND PLANNING

This section of the Environmental Impact Report (EIR) describes the existing land use conditions in the Project area and identifies associated potential land use impacts related to development of the proposed Project. Additionally, this section identifies the plans and policies of applicable planning documents and the Project's consistency with them.

4.10.1 REGULATORY SETTING

One aspect of land use planning considered under the California Environmental Quality Act (CEQA) is the consistency of the proposed Project with relevant planning documents, which include Southern California Association of Governments' (SCAG) 2024–2050 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (SCAG 2024) and the Regional Comprehensive Plan (RCP; SCAG 2008). The Project is also subject to the County of Orange's (County's) land use authority and is analyzed for consistency with the County's General Plan and Code of Ordinances.

Local

County of Orange General Plan

The first land use plan for Orange County, the Master Plan of Land Use, was adopted in 1946 and refined through the adoption of Area Plans for individual planning areas throughout the unincorporated area. In 1999, an administrative update to the General Plan was prepared to create a more current and readable document. This update incorporated new County programs, socioeconomic data, and revised charts, graphics, and maps. The most recent update to the County's General Plan occurred in June 2024, with the adoption of a new Land Use element.

A general plan functions as a guide for the type of community that is desired for the future and provides the means to achieve it. The *County of Orange General Plan* consists of an introductory chapter, a demographics chapter, and nine elements: Land Use, Transportation, Public Services and Facilities, Resources, Recreation, Noise, Safety, Housing, and Growth Management. A discussion of the Project's land use consistency with applicable goals and policies in the County's General Plan is provided later in this section.

Land Use Element

The *County of Orange General Plan* Land Use Element is one of nine elements of the General Plan and contains official policies on the location and character of land uses necessary for orderly growth and development within the County. The Land Use Element describes objectives, policies, and land use patterns for all unincorporated areas within Orange County. The Land Use Element also identifies policies and programs in other County General Plan elements that affect land use and provides guidance for future land use planning studies for the unincorporated areas of the County.

Transportation Element

The Transportation Element sets forth a comprehensive strategy for planning, developing, and maintaining a surface transportation system to serve existing and planned land uses in the unincorporated areas of Orange County. The primary goal of the Transportation Element, consistent with the State mandate, was originally adopted by the Orange County Board of Supervisors on May 10, 1972. On June 9, 1982, this goal was reaffirmed as follows: To develop an integrated transportation system consisting of a blend of transportation modes capable of

meeting the need to move people and goods by private and public means with maximum efficiency, convenience, economy, safety, and comfort and a system that is consistent with other goals and values of the County and the region. The Transportation Element provides a basis for transportation-related decisions and complements the other General Plan elements. Specifically, it clarifies and addresses transportation issues raised in the other General Plan elements and offers guidance toward solutions.

Public Services and Facilities Element

The Public Services and Facilities Element sets forth a comprehensive strategy for the planning, management, and implementation of public facilities that are necessary to meet Orange County's existing and future demands. The Public Services and Facilities Element focuses on publicly managed services and facilities which have a direct influence on the distribution and intensity of development that can be accommodated through the utilization of existing technologies and assumptions that are used to determine adequate service levels. These services include flood control, waste management, water and wastewater, transportation, and community services (fire protection, library, sheriff patrol, local special services districts, and public school facilities). The policies and programs of the Public Services and Facilities Element form an effective implementation plan to meet the established goals. Consequently, the Public Services and Facilities Element serves to guide and direct local government decision making in public facility-related matters and also fosters coordination with regional, State, and federal policies and programs.

Resources Element

The Resources Element sets forth a comprehensive strategy for the development, management, preservation, and conservation of resources that are necessary to meet Orange County's existing and future demands. This Element contains official County policies on the conservation and management of resources, including Natural Resources, Energy Resources, Water Resources, Air Resources, Open Space, and Cultural-Historical Resources. For each resource component, specific goals, objectives, and policies are identified. Additionally, the Element outlines implementation programs to address identified constraints associated with each component.

Recreation Element

The Recreation Element is mandated by Government Code Section 65303(a). The Recreation Element sets forth a comprehensive strategy for the acquisition, development, operation, maintenance, management, and financing of County recreation facilities which are necessary to meet Orange County's existing and future recreation needs. This strategy is expressed as an integrated framework of recreation goals, objectives, policies, and programs. The policies and programs of the Recreation Element form an effective implementation plan to meet the established goals. The Recreation Element serves to guide and direct local government decision-making regarding recreation issues and facilitates the coordination of local, regional, State, and federal efforts.

Noise Element

The Noise Element contains information that relates to the noise environment in the unincorporated sections of Orange County. Specifically, the General Plan's Noise Element responds to the requirements of Section 65302(f) of the California Government Code and adheres to the guidance provided by the State in "Guidelines for the Preparation and content of Noise Elements of the General Plan." The purpose of the Noise Element is to provide a statement of public policy and a decision framework for the maintenance of a quiet environment. The Noise

Element identifies the sources of noise, analyzes the extent of the noise intrusion, and estimates its potential impact upon the County.

Safety Element

A basic purpose of the County's Safety Element is to comprehensively inventory hazards which primarily impact persons and property in the unincorporated areas of Orange County. The scope of the Element also allows for a countywide perspective for other safety-related matters. This Element contains County policies on identified and potential hazards and safety considerations, their mitigation, and implications for development, including Crime, Fire, Hazardous Materials, Aircraft Environment, and Flood and Seismic/Geologic Hazards. The Safety Element identifies the type and location of hazards throughout the County, as well as policies and programs to minimize impacts.

Housing Element

The County of Orange is currently updating the Housing Element of the General Plan covering the planning period from 2021–2029. The Housing Element serves as a policy guide to address the comprehensive housing needs of the unincorporated areas within Orange County. The primary focus of the Housing Element is to ensure decent, safe, and sanitary housing for current and future residents of the unincorporated areas.

In the Housing Element, the County of Orange must identify land that is zoned to permit residential uses in order to meet the County of Orange's Regional Housing Needs Assessment (RHNA) allocation of 10,406 units within unincorporated areas of Orange County by October 2029. Additionally, the County of Orange must establish goals, policies, objectives, and implementation programs to meet the existing and projected housing needs of the unincorporated County of Orange.

Growth Management

The County's Growth Management Element contains policies on the planning and provision of traffic improvements and public facilities that are necessary for orderly growth and development. The Element presents policies and programs for traffic improvement phasing, facility and development phasing plans, and provides guidance for future facility implementation plans for the County.

County of Orange Code of Ordinances

The County of Orange Code of Ordinances is a compilation of the rules, regulations, or codes that were enacted into law by the County of Orange. The Code of Ordinances is divided into separate sections, of which Title 7, Land Use and Building Regulations is most applicable to this Project. Title 7 of the County Code of Ordinances contains building regulations which would apply to the Project. Also, Title 7, Division 9 contains planning-related rules and regulations, including the County of Orange Comprehensive Zoning Code. The Comprehensive Zoning Code includes regulations and site development standards for each zoning district, as well as general site development regulations applicable across zoning districts (County of Orange 2024).

Regional

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) for six counties: Orange, Los Angeles, San Bernardino, Riverside, Ventura, and Imperial. The SCAG region includes 191 cities in an area that encompasses more than 38,000 square miles. As the designated MPO, SCAG prepares plans for transportation, growth management, hazardous waste management, and air quality. Additionally, SCAG reviews environmental documents of projects of regional significance for consistency with regional plans. SCAG's responsibilities include the following:

- Maintaining a continuous, comprehensive, and coordinated planning process (the "3 Cs") resulting in a Regional Transportation Plan (RTP) and a Federal Transportation Improvement Program (FTIP);
- Developing a Sustainable Communities Strategy (SCS) to address greenhouse gas emissions as an element of the RTP;
- Developing demographic projections;
- Developing integrated land use, housing, employment, and transportation programs and strategies for the South Coast Air Quality Management Plan;
- Serving as co-lead agency for air quality planning in the Central Coast and Southeast Desert air basin districts;
- Developing and ensuring that the RTP and the FTIP conform to the purposes of the State Implementation Plans for specific transportation-related criteria pollutants, per the Clean Air Act;
- Serving as the authorized regional agency for intergovernmental review of proposed programs for federal financial assistance and direct development activities;
- Reviewing environmental impact reports for projects having regional significance to ensure they are consistent with approved regional plans;
- Developing an area-wide waste treatment management plan;
- Preparing the RHNA; and
- Along with the San Diego Association of Governments and the Santa Barbara County/Cities Area Planning Council, preparing the Southern California Hazardous Waste Management Plan.

SCAG has developed a number of plans in compliance with its responsibilities. Those that are relevant to the Project are discussed below.

Regional Comprehensive Plan

SCAG's Regional Comprehensive Plan (RCP) provides a policy framework for regional planning in Southern California. The RCP calls for city and county involvement and coordination in addressing regional issues related to growth management and development. However, the RCP serves only as a voluntary "toolbox" to assist local jurisdictions in making their General and Specific Plans and individual projects more sustainable. As identified in Resolution No. 08-502-1 (Resolution of the Southern California Association of Governments Accepting the 2008 Regional

Comprehensive Plan for the SCAG Region), given its advisory nature, the 2008 RCP is not used in SCAG's Inter-Governmental Review process (SCAG 2008).

SCAG Regional Transportation Plan/Sustainable Communities Strategy (Connect SoCal)

Every four years, SCAG updates Connect SoCal, the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) as required by federal and state regulations. The most recent RTP/SCS was approved by SCAG's Regional Council in April 2024.

Connect SoCal 2024 includes guidance for local agencies and direction for SCAG to implement a vision of "a healthy, prosperous, accessible and connected region for a more resilient and equitable future" across 22 strategies, including complete streets, housing the region, climate resilience and workforce development. Connect SoCal 2024 represents a newer version of the plan, building upon the policies established in 2020 while incorporating updated priorities like increased focus on equity, climate resilience, and economic development, reflecting on the changing needs to the region over time (SCAG 2024).

4.10.2 METHODOLOGY

Information presented in this section is based on field reconnaissance, review of aerial photographs, and review of the relevant planning documents identified in this section. Project consistency with existing and planned land uses in the vicinity is evaluated through review of the land use goals and policies contained in plans and programs including the *County of Orange General Plan* and planning programs prepared by SCAG (e.g., RTP/SCS Goals).

The threshold from the CEQA Guidelines' Appendix G Checklist is focused on planning and policy consistency. As part of the land use analysis, the CEQA Guidelines require an EIR to evaluate whether the Project would cause a significant environmental impact due to a conflict with a land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

A consistency analysis with the County's land use policies is presented in the Impact Analysis section. Although SCAG does not have direct approval authority over the Project, local agencies, including the County of Orange, strive to achieve consistency with regional planning programs. Therefore, these plans and policies including the RTP/SCS have been used as the basis of making a determination of whether or not there is a significant impact.

4.10.3 EXISTING CONDITIONS

Existing Land Uses Within the Project Site

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. Santiago Creek Dam impounds Irvine Lake. The Project is located south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, a portion of the Irvine Lake pipeline, dam keeper's house and dam access road.

The Project site is located on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle. It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. Irvine Lake (also called the Santiago Creek Reservoir) was originally constructed in 1933 to store water for the benefit of the surrounding communities.

The Project is within the Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) area. Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space," while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage[1] is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD[2] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement (IA). Santiago Dam predated the NCCP/HCP and is now a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP are required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

General Plan Designation and Zoning for the Project Site

The General Plan land use designation of the Project site is Open Space (OS) and the zoning designation is General Agricultural (A1). The OS General Plan designation provides for limited land uses that do not require a commitment of significant urban infrastructure. The Project site is also within an Open Space Reserve (OSR) overlay. The OSR designation is intended to reflect the Resources and Recreation Elements of the General Plan. It identifies major parks, beaches, forests, harbors and other territory that is to remain open space. It may also include recreational trails and similar facilities for alternative transportation.

Land Uses Surrounding the Project Site

Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

4.10.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant land use impact if it would:

Threshold 4.10-1 Physically divide an established community.

Threshold 4.10-2 Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

As stated in Section XI, Land Use and Planning, of the Initial Study, the Project would not divide an established community. As such, Threshold 4.10-1 will not be further evaluated in this Draft EIR.

[1] Special Linkage is located southeast of the lake.
[2] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

4.10.5 IMPACT ANALYSIS

Threshold 4.10-2

Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Less Than Significant Impact. The analysis of this threshold is broken down into two subtopics: (1) Project consistency with planning documents (e.g., plans, policies, programs, regulations, ordinances) and (2) Project compatibility with existing and planned land uses.

Project Compatibility with Planning Documents

As discussed above in Section 4.10.1, there are several applicable State, regional and local planning programs such as the County of Orange General Plan, County of Orange Code of Ordinances, and SCAG RTP/SCS. The Project's consistency with the plans is evaluated in this section.

County of Orange General Plan

The County of Orange General Plan was amended in 2012 and is organized into nine elements, as described above. Each element contains the County's goal(s), objectives, and policies related to that element. The Land Use Element in the County of Orange General Plan identifies the allowable land uses throughout the County. The current land use designation for the Project site is Open Space (OS); the Project is an allowed use under this designation.

The State's general rule for a General Plan consistency determination is that "an action, program, or project is consistent with the General Plan if, considering all its aspects, it will further the objectives and policies of the General Plan and not obstruct their attainment." Table 4.10-1 provides a policy consistency analysis related to the Project and to the objectives and policies of the County's General Plan that are considered applicable to the Project.

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Land Use Element	
Policy 9: Enhancement of Environment: To guide development so that the quality of the physical environment is enhanced.	**Consistent**. The Project purpose is to ensure new facilities associated with the existing lake and dam meet or exceed the current seismic safety and design requirements, improve water supply reliability, and minimize impacts to local environmental resources. As such, the Project is designed with protection of the physical environment in mind.
Policy 13: Recycling/ Materials Recovery. To encourage and facilitate establishment of recycling/materials recovery facilities to address the State mandate given through the California Integrated Waste Management Act of 1989 (AB 939).	**Consistent.** The Project would comply with all applicable recycling/materials recovery regulations. Although the site does not involve establishment of a recycling facility itself, the Project would comply with all regulations related to recycling during construction and operations. Further analysis related to solid waste (recycling) is provided in Section 4.16, Utilities and Service Systems.
Policy 14: Urban and Storm Runoff Regulations. To guide physical development within the County while protecting water quality through required compliance with urban and stormwater runoff regulations.	**Consistent.** The Project would comply with all applicable water quality and stormwater runoff regulations. During construction, the Project would comply with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit and the preparation of a Storm Water Pollution Prevention Plan (SWPPP), which would ensure that any impacts to downstream waters resulting from construction activities on the Project site would be less than significant. During operations, the Project would not introduce new uses to the site, including substantial amounts of urban pollutants to the storm water runoff beyond existing conditions. Further analysis related to water quality and stormwater is provided in Section 4.9, Hydrology and Water Quality.
Transportation Element	
Scenic Highway Plan	
Goal 1. Preserve and enhance unique or special aesthetic and visual resources through sensitive highway design and the regulation of development within the scenic corridor.	**Consistent.** Proposed visual changes associated with Project improvements would be consistent with the existing character of the Project site as no new or visually unique uses are proposed. Therefore, the Project would not conflict with long term aesthetics within the site vicinity. Further analysis related to aesthetics is provided in Section 4.1, Aesthetics.
Objective 1.1: Protect and enhance the County's beauty, amenities, and quality of life within the unincorporated areas.	
Circulation Plan	
Goal 5. Manage peak hour traffic congestion to achieve an acceptable level of service (LOS) on existing and future circulation plan facilities in the unincorporated areas of the County.	**Consistent.** During construction, a small number of vehicle trips are associated with routine inspection and maintenance at the existing dam. It is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of the proposed Project. Therefore, because there would be no increase in daily trips associated with daily operation of the Project components, no Project related traffic impacts are anticipated. Therefore, the Project would achieve an acceptable LOS and would not cause an impact related to vehicle miles travelled (VMT). Further analysis related
Objective 5.3. Reduce Vehicle Miles Traveled. In an effort to reduce greenhouse gas (GHG), pursuant to SB 743. See "Guidelines for Evaluating Vehicle Miles Traveled Under CEQA" and "2020 Updated Transportation Implementation Manual".	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
	to transportation is provided in Section 4.14, Transportation.
Public Services and Facilities Element	
Water System	
Goal 1: Encourage the planning and development of a water conveyance and distribution system to meet the County's future demand.	**Consistent.** The Project would construct water infrastructure associated with the existing Santiago Creek Dam, as described further in Section 3.0, Project Description. The Project's primary purpose is to improve water supply reliability and provide additional water capacity to serve IRWD customers' water needs. Further analysis related to water is provided in Section 4.16, Utilities and Service Systems.
Objective 1.1. To achieve desired water system service levels through the coordination of land use and water system planning.	
Objective 1.2. To implement State, regional, and local facility plans for water delivery to Orange County.	
Objective 1.3. To increase storage and delivery capacity for water supplies in Orange County.	
Policy 1. System Capacity and Phasing. To ensure the adequacy of water system capacity and phasing, in consultation with the service providing agency(ies), in order to serve existing and future development as defined by the General Plan.	
Policy 2. Water Delivery System. To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.	
Policy 3. Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and the water agencies through cooperative water facility planning and implementation efforts.	
Wastewater System	
Goal 1. Support the planning and development of a wastewater system to meet both the County's demand and attain water quality goals.	**Consistent.** The Project does not include construction or expansion of any wastewater facilities, as it would not result in an additional population with a demand for wastewater. As such, the Project would not impact wastewater systems within the County. Further analysis related to wastewater is provided in Section 4.16, Utilities and Service Systems.
Objective 1.1. To maintain wastewater system service levels through the coordination of land use and wastewater system planning.	
Objective 1.2. To implement wastewater agency facility and water quality plans for Orange County.	
Policy 1. Water Quality – To protect quality in both delivery systems and groundwater basins through effective wastewater system management.	
Policy 2. Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and wastewater agencies through cooperative wastewater studies, planning, and facility implementation efforts.	
Policy 3. System Capacity and Phasing – To ensure the adequacy of wastewater system capacity and phasing in consultation with the service providing agency(ies) in order to serve existing and future development as defined by the General Plan.	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Orange County Fire Authority	
Goal 1. Provide a safe living environment ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property from structural and wildland fire damages.	**Consistent.** The Orange County Fire Authority (OCFA) would provide fire protection services to the Project site and would be required to comply with all applicable codes, ordinances and regulations regarding fire prevention and suppression measures, fire hydrants and sprinkler systems, emergency access, and other similar requirements, which would minimize demand for fire protection services. In addition, the Project site plans would be subject to review and approval by the OCFA prior to Project approval which would ensure that adequate emergency access, fire hydrant availability, and sufficient capacity for fire flows would be provided in compliance with all applicable codes and standards. Although the remote location and restricted use of roads to the Project site may have an impact on the ability to respond within the OCFD service standards, the Project site is already within the existing OCFD service area, and would continue to operate as a dam, which is the same under existing conditions. Further analysis related to fire protection services are provided in Section 4.12, Public Services.
Objective 1. To achieve desired level of fire protection and paramedic service through coordinated land use and facility planning.	
Policy 1. Facility Siting. Fire/paramedic facilities shall be sited in locations so as to assure efficient fire rescue and paramedic response for the service area. General criteria for site selection shall include: a) Call response time: for 80 percent of the service area, first fire engine to reach the emergency scene within 5 minutes and paramedic to reach the scene within 8 minutes. b) Land use compatibility: stations shall be located in commercial or industrial, or open space zones in order to avoid the disturbance to residential areas wherever possible. c) Street access: stations shall be located adjacent to arterial highways with controlled traffic signalization.	
Policy 3 Site Design Criteria – Require all land use proposals to implement adequate site design so as to maximize fire protection and prevention in order to minimize potential damages. The site design criteria shall be established to reflect the levels of protection needed for projects in various fire hazard areas. Such criteria shall include consideration as to: structure type and density, emergency fire flow and fire hydrant distribution, street pattern and emergency fire access, fuel modification programs, automatic fire sprinkler systems, and other requirements as determined by the Fire Chief. In accordance with the Insurance Services Office (ISO) suggested standards, ultimate fire protection rating shall be maintained by General Plan land use categories as follows: (1) ISO 3 for all urban developments including Residential (1C and 1B), Commercial (2A and 2B), Employment (3.0), and Public Facilities (4.0), which are within 5 miles from a fire station and less than 1000 feet from a hydrant; and (2) ISO 4 for Rural Residential (1A) which are within 5 miles from a fire station and less than 100 feet from a hydrant. For areas greater than 5 miles or 1000 feet, the ISO suggested standard is 9.	
Orange County Sheriff-Coroner	
Goal 1. Assure that adequate Sheriff patrol service is provided to ensure a safe living and working environment.	**Consistent.** The Orange County Sheriff-Coroner Department (OCSD) provides police protection services to the Project site. The Project would result in temporary construction activities and periodic maintenance for inspections and material delivery and would not contribute to a residential population or permanent additional employment. Although the Project could potentially increase the demand on the OCSD personnel and resources during temporary construction activities
Objective 1.1. To maintain adequate levels of Sheriff patrol services through coordinated land use and facility planning efforts.	
Policy 1. Land Use Review — To continue to coordinate land use proposal reviews with the County Sheriff-Coroner	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Department to assure that Sheriff patrol service shall be adequately addressed.	and periodic operational maintenance, overall, the Project would replace and update existing uses and the demand is not sufficient that it would require the construction of new or alteration of existing police protection facilities (i.e., police stations) to maintain an adequate level of police protection service in the area. Further analysis related to police protection services are provided in Section 4.12, Public Services.
Resources Element	
Natural Resources Component	
Policy 5. Landforms. To protect the unique variety of significant landforms in Orange County through environmental review procedures and community and corridor planning activities.	**Consistent.** Proposed visual changes associated with Project improvements would be consistent with the existing character of the Project site as no new or visually unique uses are proposed. Therefore, the Project would not conflict with long term aesthetics within the site vicinity, including unique landforms. Further analysis related to aesthetics is provided in Section 4.1, Aesthetics.
Open Space Component	
Goal 1: Retain the character and natural beauty of the environment through the preservation, conservation, and maintenance of open space.	**Consistent.** Following construction, the Project area would be restored as a reservoir and OC Parks may choose to reopen the facility for fishing and other recreational purposes. Similar to current conditions, the recreational aspect of the facility is managed by OC Parks separate from the Project and IRWD's control. During operations, the Project would accommodate recreational use similar to current uses. The Project would not impact County open space areas, as Project uses would not change. Further analysis related to open space is provided in Section 4.13, Recreation.
Objective 1.1. To designate open space areas that preserve, conserve, maintain, and enhance the significant natural resources and physical features of unincorporated Orange County.	
Policy 1.1: To guide and regulate development of the unincorporated areas of the County to ensure that the character and natural beauty of Orange County is retained.	
Cultural Historic Resources Component	
Goal 1: To raise the awareness and appreciation of Orange County's cultural and historic heritage.	**Consistent.** One historic property/historical resource was identified within the Project site: the Santiago Dam Complex which currently has a status code of 2S2, indicating it has been determined eligible for the National Register of Historic Places (NRHP) and is listed in the California Register of Historical Resources (CRHR). The Dam is eligible for its important historical associations with water resources development in Orange County, as well as with the citrus agriculture industry. Although specific aspects of the Dam would be modified, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. Additionally, the record search for the South Central Coastal Information Center (SCCIC) qualifies the Project site and surrounding area as considered sensitive for archaeological resources, and MM CR-1, which requires archaeological monitoring during grading within previously undisturbed soils, and MM CR-2, which provides details for treatment of unanticipated discoveries, would be incorporated to ensure less than significant impacts to archaeological resources. Further
Goal 2: To encourage through a resource management effort the preservation of the county's cultural and historic heritage.	
Objective 2.1: Promote the preservation and use of buildings, sites, structures, objects, and districts of importance in Orange County through the administration of planning, environmental, and resource management programs.	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
	analysis related to open space is provided in Section 4.4, Cultural Resources.
Objective 2.2: Take all reasonable and proper steps to achieve the preservation of archaeological and paleontological remains, or their recovery and analysis to preserve cultural, scientific, and educational values. Paleontological Resources Policies: 1. To identify paleontological resources through literature and records research and surface surveys. 2. To monitor and salvage paleontological resources during the grading of a project. 3. To preserve paleontological resources by maintaining them in an undisturbed condition.	**Consistent.** The paleontological records search requested from the Natural History Museum (NHM) identified fossil localities that lie directly within the proposed Project site as well as numerous fossil localities nearby from sedimentary deposits that occur in the proposed Project area, either at the surface or at depth. The site history and geotechnical analysis indicates that earthmoving activities (i.e., grading and excavation) would take place in previously disturbed soils, which consist of artificial fill, embankment fill, older alluvium, and colluvium and lake deposits. As such, the Project would incorporate MM GEO-1, which requires retention of a qualified Paleontologist to observe grading activities within undisturbed soils, including geotechnical investigations, to ensure preservation of paleontological resources and MM GEO-2, which provides details for treatment of unanticipated discoveries. Further analysis related to paleontological resources is provided in Section 4.6. Geology and Soils.
Policy 1: Identification of resources shall be completed at the earliest stage of project planning and review such as general plan amendment or zone change.	**Consistent.** The record search for the SCCIC qualifies the Project site and surrounding area as considered sensitive for archaeological resources, and MM CR-1, which requires archaeological monitoring during grading within previously undisturbed soils, and MM CR-2, which provides details for treatment of unanticipated discoveries, would be incorporated to ensure less than significant impacts to archaeological resources. Further analysis related to open space is provided in Section 4.4, Cultural Resources.
Policy 2: Evaluation of resources shall be completed at intermediate stages of project planning and review such as site plan review, subdivision map approval, or at an earlier stage of project review.	
Policy 3: Final preservation actions shall be completed at final stages of project planning and review such as grading, demolition, or at an earlier stage of project review.	
Policy 4: To identify historic resources through literature and records research and/or onsite surveys. 1. To evaluate historic resources through comparative analysis or through subsurface or materials testing. 2. To preserve significant historic resources by one or a combination of the following alternatives, as agreed upon by RDMD and the project sponsor: a. Adaptive reuse of historic resource. b. Maintaining the historic resource in an undisturbed condition. c. Moving the historic resource and arranging for its treatment. d. Salvage and conservation of significant elements of the historic resources. e. Documentation (i.e., research narrative, graphics, photography) of the historic resource prior to destruction.	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Policy 5: To identify archaeological resources through literature and records research and surface surveys. 1. To evaluate archaeological resources through subsurface testing to determine significance and extent. 2. To observe and collect archaeological resources during the grading of a project. 3. To preserve archaeological resources by: a. Maintaining them in an undisturbed condition, or b. Excavating and salvaging materials and information in a scientific manner.	
Goal 3: To preserve and enhance buildings structures, objects, sites, and districts of cultural and historic significance.	**Consistent.** As stated above, the Santiago Creek Dam is considered a historic property eligible for the NRHP and is listed in the CRHR. Although specific aspects of the Dam would be modified, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. Therefore, the Project would continue to preserve the historic Dam as a whole and would not cause a significant impact related to historic resources. Additionally, the record search for the SCCIC qualifies the Project site and surrounding area as considered sensitive for archaeological resources, and MM CR-1, which requires archaeological monitoring during grading within previously undisturbed soils, and MM CR-2, which provides details for treatment of unanticipated discoveries, would be incorporated to ensure less than significant impacts to archaeological resources. Further analysis related to open space is provided in Section 4.4, Cultural Resources.
Objective 3.1: Undertake actions to identify, preserve, and develop unique and significant cultural and historic resources.	
Objective 3.3: To appraise, collect, organize, describe, preserve, and make available County of Orange records of permanent, historical value.	
Energy Resources Component	
Goal 1. Maximize the conservation and wise use of energy resources in all residences, businesses, public institutions, and industries in Orange County.	**Consistent.** Project construction would require the use of construction equipment for development of Project components, hauling, and demolition activities. Overall, **f**uel energy consumed during construction would be temporary in nature and would not represent a significant demand on energy resources. Energy consumption related to the Project's infrastructure improvements are necessary to meet the Project's objectives of meeting the seismic, safety, and design requirements; fulfill operational requirements; extend the useful life of the dam; and improve water supply reliability. In addition, the Project does not involve the development of renewable energy, nor is energy efficiency an issue related to the dam improvements. The Project would not create a significant impact related to energy resources or consumption. Further analysis related to energy is provided in Section 4.5, Energy.
Objective 1.1. Achieve a reduction in projected per capita energy demand and consumption by the year 2005.	
Goal 2. Encourage the utilization of existing energy resources to their highest potential and the development of alternative energy sources consistent with sound energy conservation practices and techniques to meet the County's future energy demand.	
Objective 2.1. Encourage the efficient development of local energy resources to supply a portion of the County's energy demand through the year 2005 in a manner which protects the environment.	
Policy 2. Energy Resource Development – To encourage and actively support the efficient use and optimum development of energy resources in the County consistent with sound resource management practices.	
Policy 3. Energy Conservation – To encourage and actively support the utilization of energy conservation measures in all new and existing structures in the County.	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Water Resources Component	
Goal 1: Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.	**Consistent.** The Project would construct local Orange County water infrastructure to improve water supply reliability, extend the useful life of water infrastructure facilities, and provide additional water capacity to serve future demand. In addition, IRWD, which owns and operates the Irvine Lake and Santiago Dam, conducted a water supply reliability analysis, which concluded IRWD's water supply is reliable throughout all conditions including normal, single dry year and multiple dry year and extended drought. As the Project would provide additional capacity and improve water supply reliability within IRWD, the Project would assist in ensuring adequate supply of water within the County. Further analysis related to water is provided in Section 4.16, Utilities and Service Systems.
Objective 1.1. To maintain the adequacy and dependability of imported water supplies.	
Objective 1.2. To achieve a reduction in per capita water consumption by the year 2020.	
Objective 1.3. To reduce dependence on imported water supplies through both conservation and local water resource development.	
Policy 1 – Water Supply. To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.	
Policy 2 – Conservation. To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.	
Policy 3 – Groundwater Sources. To support groundwater management efforts that are conducted by County water agencies.	
Policy 4 – Shortage Planning. To ensure that Orange County will not be severely impaired by any potential future water shortages.	
Policy 5 – Water Quality. Protect and improve water quality through continued management, enforcement, and reporting requirements. Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats. Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles. Consider implementation of LID principles to conserve natural features (trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils. Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources.	**Consistent.** The Project would comply with all applicable water quality and stormwater runoff regulations. During construction, the Project would comply with the NPDES Construction General Permit and the preparation of a SWPPP, which would ensure that any impacts to downstream waters resulting from construction activities on the Project site would be less than significant. During operations, the Project would not introduce new uses to the site, including substantial amounts of urban pollutants to the storm water runoff beyond existing conditions. IRWD would coordinate with the RWQCB, County, and any other related agencies in preparation of the SWPPP and NPDES compliance. Further analysis related to water quality and stormwater is provided in Section 4.9, Hydrology and Water Quality.
Policy 6 – Intergovernmental Coordination. To encourage and support a cooperative effort among all agencies towards the resolution of problems and the utilization of opportunities in the planning management and protection of water resources, including water quality.	
Recreation Element	
Regional Riding and Hiking Trails Component	
Goal 1. Provide a useful, enjoyable, safe, and efficient public regional riding and hiking trail system to meet the needs and desires of the citizens of the entire County.	**Consistent.** Although the Project would temporarily impact existing recreational uses related to hiking and fishing, the impacts would be short-term during certain phases of construction and full use of the area for recreational purposes would be restored following construction. Further analysis related to recreational facilities is provided in Section 4.13, Recreation.
Goal 2. Create trail linkages between open space and recreation facilities, between community, municipal, State, and federal trail systems, and between the trail systems of surrounding counties.	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Regional Recreational Facilities Component	
Goal 1. To provide a regional recreation network to meet the regional recreation needs of existing and future residents of the entire County.	**Consistent** The Project site itself is considered a regional recreational facility with shoreline fishing opportunities at Irvine Lake. Although the Project would temporarily impact existing recreational uses related to hiking and fishing, the impacts would be short-term during certain phases of construction and full use of the area for recreational purposes would be restored following construction. During operations, the proposed dam improvements and spillway would not impact the existing recreational facilities at Irvine Lake. Further analysis related to recreational facilities is provided in Section 4.13, Recreation.
Goal 2. To develop regional recreation facility park sites with recreation facilities designed to respond to the diverse regional recreation interests of the citizens of the County.	
Goal 3. To operate and maintain regional recreation facilities providing operation programs designed for the most effective use of each site at a minimum cost.	
Noise Element	
Policy 4 – Noise Monitoring and Abatement. To monitor noise levels, and adopt and enforce noise abatement programs.	**Consistent** Project construction activities would comply with the County Code of Ordinances, assuming that IRWD obtains a variance prior to construction. Additionally, the noise levels at the nearest sensitive residential use would not exceed the daytime or nighttime noise thresholds established by the Federal Transportation Administration (FTA). Operational noise impacts would be consistent with existing conditions, and no significant noise impacts would occur. Further analysis related to noise is provided in Section 4.11, Noise.
Objective 4.1. To enforce the County's Noise Ordinance to prohibit or mitigate harmful and unnecessary noise within the County.	
Objective 4.3. To develop and enforce standards in addition to those presently included in the Noise Ordinance to regulate noise from construction and maintenance activities and commercial public and industrial land uses.	
Objective 4.5. To require that noise from motors, appliances, air conditioners, and other consumer products does not disturb the occupants of surrounding properties.	
Policy 5 – Noise/Land Use Planning Integration. To fully integrate noise considerations in land use planning to prevent new noise/land use conflicts.	**Consistent** All construction equipment is anticipated to be fitted with the original equipment manufacturer's or manufacturer-approved equivalent mufflers or intake silencers to maintain, at a minimum, published noise emission levels used in the calculation of offsite noise exposure from construction activities. Project construction activities would comply with the County Code of Ordinances, assuming that IRWD would obtain a variance prior to construction. Additionally, noise levels at the nearest sensitive residential use would not exceed the daytime or nighttime noise thresholds established by the FTA. For the residential sensitive receptors located approximately two miles to the west, noise levels generated during Project construction would be attenuated by the substantial distances between the Project site and the aforementioned uses. Furthermore, Irvine Lake is surrounded by ridgelines, which would also attenuate noise levels, and nearby uses are not anticipated to be exposed to a substantial level of noise. Project construction would not exceed the 80 dBA Leq daytime and 70 dba Leq nighttime noise criteria and consequently would not expose Oak Canyon Park and Lakeview Park Camping Area to excessive levels of noise. No camping is allowed at Irvine Lake so there would be no nighttime noise exposure. No significant Project-related traffic noise impacts are
Objective 5.1 To utilize the criteria of acceptable noise levels for various types of land uses as depicted on Tables VIII-2 and VIII-3 in the review of development proposals.	
Objective 5.4 To stress the importance of building and design techniques in future site planning for noise reduction.	

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
	anticipated. Impacts related to stationary sources of noise would be less than significant. Operational noise impacts would be consistent with existing conditions, and no significant noise impacts would occur. Further analysis related to noise is provided in Section 4.11, Noise.
Policy 6 – Noise Sensitive Land Uses. To identify and employ mitigation measures in order to reduce the impact of noise levels and attain the standards established by the Noise Element, for both interior areas and outdoor living areas for noise sensitive land uses.	**Consistent** As stated above, the noise levels at the nearest sensitive residential use would not exceed the daytime or nighttime noise thresholds established by the FTA. For nearby public parks, the Project would result in less than significant noise impacts and would not require mitigation. Further analysis related to noise is provided in Section 4.11, Noise.
Objective 6.7. To apply noise standards as defined in the Noise Element for noise-sensitive land uses.	
Safety Element	
Public Safety Component	
Goal 1. Provide for a safe living and working environment consistent with available resources.	**Consistent.** One of the Project's primary purposes is to ensure that the dam's infrastructure meets current seismic safety standards as set by the Division of Safety of Dams (DSOD). As requested by the DSOD, IRWD performed a seismic analysis and found that the existing tower and spillway are reaching the end of their useful life and do not meet current seismic safety and design standards. The Project would rehabilitate and replace the outlet tower and spillway to ensure that all safety concerns are met as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. In addition, because the Project site is located on the former Irvine Park-Army Camp, which is currently designated on the Cortese List, the Project would comply with MM HAZ-1, which requires IRWD to follow and implement the 3Rs of Explosives Safety – Recognize, Retreat, and Report. Therefore, impacts related to hazards would be less than significant. With the incorporation of MM HAZ-1, Project impacts related to hazardous materials would be less than significant. Further analysis related to hazardous materials is provided in Section 4.8, Hazards and Hazardous Materials. With regard to natural hazards, the Project site is located within a Very High Fire Hazard Severity Zone (FHSZ) and would be required to comply with all applicable regulatory requirements including California Code of Regulations (CCR) Title 24, the California Building Code (CBC), and the County of Orange Safety Element. Further analysis related to wildfire hazards is provided in Section 4.17, Wildfire.
Objective 1.1. To identify natural hazards and determine the relative threat to people and property in Orange County.	
Goal 2. Minimize the effects of public safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property.	
Objective 2.1: To create and maintain plans and programs which mitigate the effects of natural hazards.	
Objective 2.2: To support the development and utilization of technologies, which minimize the effects of natural hazards.	
Goal 3. Raise the awareness of Orange County residences, workers, and visitors to the potential threat of public safety hazards.	
Flood Hazard Component	
Goal 2. Provide effective and efficient flood protection throughout Orange County.	**Consistent.** The Project itself is the Santiago Creek Dam, which provides flood control within the County. The Project would provide site improvements and updates to ensure the dam will continue to adequately operate in compliance with all applicable regulations.

TABLE 4.10-1
PROJECT POLICY CONSISTENCY WITH APPLICABLE COUNTY OF ORANGE GENERAL PLAN ELEMENTS

Applicable Goals and Policies	Project Consistency
Natural Hazards	
Goal 2. Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property.	**Consistent.** The Project would comply with all applicable regulations as set forth by the DSOD relating to seismic safety and IRWD's operational requirements. The Project would rehabilitate and replace the outlet tower and spillway to ensure all safety concerns are met and to minimize natural hazard impacts as well as to modify the embankment to permit operation of the facilities for a long-term water resource benefit.
County of Orange 2012.	

Project Compatibility with Existing and Planned Land Uses

The Project has also been analyzed for compatibility with existing adjacent land uses, including whether impacts would result from siting different and/or incompatible land uses near each other. The proposed Project site has a General Plan designation of Open Space and has a consistent zoning designation of OS FP-2 (Open Space), both of which are consistent with the existing uses on the Project site. Since the proposed Project does not include changes in the existing land use or zoning designations, and would not change the character or existing uses of the Project site, the proposed Project is consistent with both the Land Use Element of the County's General Plan and the County's Zoning Ordinance. No long-term direct or indirect impacts to surrounding uses would occur with the proposed Project. Potential short-term, construction-related compatibility issues related to aesthetics, air quality, and noise are discussed in Sections 4.1, Aesthetics, 4.2, Air Quality, and 4.11, Noise, respectively, of this EIR. Further, the proposed Project would not conflict with any other applicable land use plan, policy, or regulation. Therefore, the proposed Project would not result in significant impacts related to conflicts with any such plan, policy, or regulation that has been adopted for the purpose of avoiding or mitigating an environmental effect.

County of Orange Code of Ordinances

The County of Orange Code of Ordinances is a compilation of the rules, regulations, and codes that were enacted into law by the County of Orange, including Land Use and Building Regulations and the County of Orange Comprehensive Zoning Code. The Project would be designed to comply with the Code of Ordinances. In addition, as stated above, the Project would not conflict with the Zoning Code, as the Project would comply with the zoning designation of General Agricultural (A1). The Project would not provide any new uses; rather, it would improve the existing dam/water infrastructure and spillway to meet all current seismic and design standards. Therefore, the proposed Project would not result in significant impacts related to conflicts with any land use plan, policy, or regulation that has been adopted for the purpose of avoiding or mitigating an environmental effect.

SCAG RTP/SCS (Connect SoCal)

Recognizing the importance of resilience, SCAG's Regional Council adopted a Climate Change Action Resolution (Resolution No. 21-628-1) in January 2021 and resolved to develop a Regional Resilience Framework to "help the region plan and prepare for a changing climate, as well as potential near- and long-term disruptions to Southern California."

SCAG formally affirmed the drought and water-shortage emergency in Southern California (based on Executive Order N-5-23 issued by Governor Newsom in 2021) and called on local and regional partners to join together to adopt an "all of the above" approach to addressing the region's water challenges and catalyzing opportunities across a six-county region that's home to nearly 19 million people. Clean, safe, affordable and reliable water supply is central to Southern California's people, economy and natural systems—and necessary to support the region's projected growth. In an effort to support partners in tackling the region's deepening water crisis, SCAG's Regional Council unanimously adopted a Water Action Resolution (Resolution No. 22-647-3) in October 2022 to reduce water use; improve water conservation, reuse and efficiency; enhance water systems' health and resilience; pursue and potentially implement new water supply and storage opportunities; and support investments in water infrastructure and conservation practices that support the region's economic and population growth and foster planning for the region's housing needs. This resolution also called on SCAG to "identify, recommend and integrate into Connect SoCal 2024 policies and strategies to align investments in water infrastructure with housing needs and the adopted growth forecast and development pattern."

Building on SCAG's ongoing resilience efforts, its staff used a lens of resilience in the development of Connect SoCal to consider and address the shocks and stressors facing the region, including those currently present and those expected up to 2050 and beyond. (SCAG 2024).

The primary objective of the proposed Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities as well as to modify the embankment to permit operation of the facilities for a long-term water resource benefit. In implementing the proposed Project, IRWD would improve water supply availability and minimize impacts to local environmental resources. As such, the Project would be consistent with the assumptions utilized to develop Connect SoCal.

Impact Conclusion: *The Project would not conflict with any local applicable land use plan, policy, or regulation. Impacts would be less than significant.*

4.10.6 CUMULATIVE IMPACTS

Projects considered in the cumulative impact analysis consist of four projects within a one-mile buffer of the Project: three of which are located in the unincorporated County of Orange with the last one located in the City of Orange. These related projects are described in more detail in Table 4-1, Cumulative Projects List, which is provided in Section 4.0, Impact Analysis.

The Project is located at the existing Santiago Creek Dam at Irvine Lake, which is already developed. Surrounding land uses primarily consist of undeveloped open space, and residential development is located west of SR-241. Other cumulative projects in proximity of the site would be restricted to infill redevelopment type projects in the areas designated for development, outside the open space areas. As discussed previously, the Project would not involve any new development and, instead, would focus on improvements to the existing Santiago Creek Dam infrastructure. Additionally, the Project would improve infrastructure to fulfill the damand Irvine Lake's original purpose of water impoundment for IRWD's use for their existing and planned service populations; the Project itself would not result in an expansion of development in the area, either directly or indirectly. Therefore, the Project would not contribute to a cumulative impact relating to land use incompatibility through future development.

Additionally, future development of cumulative projects would be evaluated for compatibility with the surrounding uses and for consistency with the local and regional jurisdictions' land use plans, policies, and regulations, including the County General Plan and Zoning Code. Each proposed

development project would be subject to the development review and permit process, which would include determination of project conformity to applicable land use plans and policies. Thus, these projects would be approved in accordance with adopted land use plans and policies and would not lead to land use incompatibilities and conflict or inconsistency with the goals and policies. In light of the above, cumulative land use impacts and the Project's contribution to cumulative impacts would be less than significant.

4.10.7 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant impacts to land use and planning.

4.10.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project impacts related to land use and planning would be less than significant and mitigation is not required.

4.10.9 REFERENCES

Orange, County of. 2024 (October 29, online content updated). County of Orange Code of Ordinances. Santa Ana, CA: County of Orange. https://library.municode.com/ca/orange_county/codes/code_of_ordinances.

———. 2024 (updated June). General Plan, Chapter III Land Use Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2020a (November). General Plan, Chapter IV Transportation Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2020b (November). General Plan, Chapter XI Growth Management. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2013. General Plan, Chapter X Housing Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2012a. General Plan, Chapter V Public Services and Facilities. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2012b. General Plan, Chapter VI Resources Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2012c. General Plan, Chapter VII Recreation Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2012d. General Plan, Chapter VIII Noise Element Background for Planning (Demographics). Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

———. 2012e. General Plan, Chapter IX Safety Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

Southern California Association of Governments (SCAG). 2024 (April 4, adopted). *The 2024-2050 Regional Transportation Plan/Sustainable Communities Strategy—Connect SoCal*. Los Angeles, CA: SCAG. https://scag.ca.gov/sites/main/files/file-attachments/23-2987-connect-socal-2024-final-complete-040424.pdf?1714175547.

———. 2008. Final 2008 Regional Comprehensive Plan: Helping Communities Achieve a Sustainable Future. Los Angeles, CA: SCAG. https://scag.ca.gov/sites/main/files/file-attachments/f2008rcp_complete.pdf.

4.11 NOISE

This section discusses Project-related impacts to the human noise environment in the vicinity of the Project site. Information in this section is based upon the *Noise and Vibration Analysis Technical Memorandum for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project* prepared by Psomas (2024). The letter report is included in Appendix G of this EIR.

4.11.1 BACKGROUND

Noise and Vibration Basics and Terminology

Noise

"Sound" is a vibratory disturbance created by a moving or vibrating source that is capable of being detected. "Noise" is defined as a sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. Effects of noise on people can include general annoyance; interference with speech communication; sleep disturbance; and, in the extreme, hearing impairment (Caltrans 2013).

Sound pressure levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale. A doubling of the energy of a noise source (such as doubling of traffic volume) would increase the noise level by 3 dB. The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale was devised. The A-weighted decibel scale (dBA) approximates the frequency response of the average healthy ear when listening to most ordinary everyday sounds and is used in this analysis.

Human perception of noise has no simple correlation with acoustical energy. Due to subjective thresholds of tolerance, the annoyance of a given noise source is perceived very differently from person to person. The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at 3 feet is approximately 60 dBA, while loud jet engine noises at 1,000 feet equate to 100 dBA, which can cause serious discomfort. Table 4.11-1 shows the relationship of various noise levels in dBA to commonly-experienced noise events.

TABLE 4.11-1
NOISE LEVELS FOR COMMON EVENTS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet fly-over at 300 m (1,000 ft)	100	
Gas lawn mower at 1 m (3 ft)	90	
Diesel truck at 15 m (50 ft) at 80 km/hr (50 mph)	80	Food blender at 1 m (3 ft); garbage disposal at 1 m (3 ft)
Noisy urban area, daytime gas lawn mower at 30 m (100 ft)	70	Vacuum cleaner at 3 m (10 ft)
Commercial area, heavy traffic at 90 m (300 ft)	60	Normal speech at 1 m (3 ft)
Quiet urban daytime	50	Large business office, dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	30	Library
Quiet rural nighttime	20	Bedroom at night, concert hall (background)
	10	Broadcast/recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing
dBA: A-weighted decibels; m: meter; ft: feet; km/hr: kilometers per hour; mph: miles per hour Source: Caltrans 2013.		

Two equal noise sources, when heard together, do not "sound twice as loud" as one of the sources. As stated above, a doubling of noise sources results in a noise level increase of 3 dBA. It is widely accepted that (1) the average healthy ear can barely perceive changes of a 3 dBA increase or decrease, (2) a change of 5 dBA is readily perceptible, and (3) an increase (decrease) of 10 dBA sounds twice (half) as loud (Caltrans 2013).

From the source to the receiver, noise changes both in the level and frequency spectrum. The most obvious change is the decrease in noise level as the distance from the source increases. Sound from a small, localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. For point sources, such as heating, ventilation, and air conditioning (HVAC) units or construction equipment, the sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance (i.e., if the noise level is 70 dBA at 25 feet, it is 64 dBA at 50 feet). Vehicle movements on a road make the sources of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The sound level attenuates or drops off at a rate of 3 dBA per doubling of distance for line sources.

A large object in the path between a noise source and a receiver can significantly attenuate noise levels at that receiver's location. The amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain or landform features as well as man-made features (e.g., buildings and walls) can significantly alter noise exposure levels. For a noise barrier to work, it must be high enough and long enough to block the view from the receiver to a road or to the noise source. Effective noise barriers can reduce outdoor noise levels at the receptor by up to 15 dBA.

Several rating scales (or noise "metrics") exist to analyze effects of noise on a community. These scales include the equivalent noise level (L_{eq}), including L_{max} and L_{min}, which are respectively the highest and lowest A-weighted sound levels that occur during a noise event, and the Community Noise Equivalent Level (CNEL). Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, which is the equivalent noise level for that period of time. The

period of time averaging may be specified; for example, $L_{eq(3)}$ would be a three-hour average. Noise of short duration (i.e., substantially less than the averaging period) is averaged into ambient noise during the period of interest. Thus, a loud noise lasting many seconds may have minimal effect on the measured sound level averaged over a one-hour period.

To evaluate community noise impacts, CNEL was developed to account for human sensitivity to nighttime noise. CNEL represents the 24-hour average sound level with a penalty for noise occurring at night. The CNEL computation divides a 24-hour day into three periods: daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM). The evening sound levels are assigned an approximately 5-dBA penalty, and the nighttime sound levels are assigned a 10-dBA penalty prior to averaging with daytime hourly sound levels.

4.11.2 VIBRATION

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is described as the velocity, and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During the construction of a project, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure. Analysis of this type of vibration is best measured in velocity and acceleration.

The three main wave types of concern in the propagation of groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

- Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding cylindrical wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation (known as retrograde elliptical).
- Compression or P-waves are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.
- Shear or S-waves are also body waves, carrying their energy along an expanding spherical wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

The peak particle velocity (ppv) or the root mean square (rms) velocity is usually used to describe vibration amplitudes. The ppv is defined as the maximum instantaneous peak of the vibration signal and the rms is defined as the square root of the average of the squared amplitude of the signal. The ppv is more appropriate for evaluating potential building damage and also used for evaluating human response.

The units for ppv velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units in order to compress the range of numbers required to describe the vibration. In this study, all ppv velocity levels are in in/sec and all vibration levels are in dB relative to one microinch per second. The threshold of perception is approximately 0.3 ppv. Typically,

groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Even the more persistent Rayleigh waves decrease relatively quickly as they move away from the source of the vibration. Manmade vibration problems are, therefore, usually confined to short distances (500 feet or less) from the source.

Construction generally includes a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Heavy trucks can also generate groundborne vibrations, which vary depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, and other anomalies all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration of normal traffic on streets and freeways with smooth pavement conditions. Trains generate substantial quantities of vibration due to their engines, steel wheels, and heavy loads.

4.11.3 REGULATORY SETTING

Public agencies have established noise and vibration guidelines and standards to protect citizens from potential hearing damage and various other adverse physiological, structural, and social effects associated with noise and vibration. The Project is located within the County of Orange. For the evaluation of potential noise and vibration impacts, this analysis assumes compliance with the noise policies and regulations established by the County of Orange.

Federal Transit Administration

The Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual (FTA 2018) has developed construction impact guidelines shown in Table 4.11-2.

TABLE 4.11-2
CONSTRUCTION NOISE CRITERIA

1-Hour Criteria (L_{eq})		
Land Use	**Day**	**Night**
Residential	90	80
Commercial	100	100
Industrial	100	100
8-Hour Criteria (L_{eq})		
Land Use	**Day**	**Night**
Residential	80	70
Commercial	85	85
Industrial	90	90

There are no construction noise criteria for parks. Residential uses are considered to be the most noise sensitive land use.

County of Orange

Because the Project site is not owned or leased by the County, the County local noise requirements are applicable to this Project. In addition, the County noise standards are applicable to offsite noise-sensitive land uses that would potentially be impacted by noise from the Project construction and operations.

General Plan

The Noise Element, one of nine elements of the *County of Orange General Plan*, contains official County policies on the conservation and management of resources (County of Orange 2015). The Noise Element defines a Noise Referral Zone as "that area with a total noise environment of 60 decibels Community Noise Equivalent Level (CNEL) or more. The intent of the Noise Referral Zone is to act as a triggering mechanism or flag for development proposals in areas potentially adversely affected by high noise levels. [U]nless it can be shown with certainty that the project is outside the area that has a CNEL of 60 or more decibels, an acoustical analysis report will be required".

The Noise Element states, "A key objective of this Noise Element is to ensure that each County resident's quality of life is not affected adversely by high noise levels". The information from Tables VIII-2 and VIII-3 of the Noise Element, shown as Table 4.11-3, defines the County's land use/noise compatibility standards. The Noise Element states that these standards apply to "situations where a new use is being proposed that is impacted by an existing noise source" and also "when an existing use is impacted by a new or expanded source of noise". For the latter case, "the project proponent is obliged to mitigate the impacts of the new source of noise".

TABLE 4.11-3
ORANGE COUNTY COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS

Type of Use	65+ dB CNEL	60 to 65 dB CNEL
Residential	3a, b, e	2a, e
Commercial	2c	2c
Employment	2c	2c
Open Space		
Local	2c	2c
Community	2c	2c
Regional	2c	2c
Educational Facilities		
Schools (K through 12)	2c, d, e	2c, d, e
Preschool, college, other	2c, d, e	2c, d, e
Places of Worship	2c, d, e	2c, d, e
Hospitals		
General	2a, c, d, e	2a, c, d, e
Convalescent	2a, c, d, e	2a, c, d, e
Group Quarters	1a, b, c, e	2a, c, e
Hotel/Motels	2a, c	2a, c
Accessory Uses		
Executive Apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

TABLE 4.11-3
ORANGE COUNTY COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS

Type of Use	65+ dB CNEL	60 to 65 dB CNEL

dB: decibel; CNEL: Community Noise Equivalent Level

EXPLANATION AND DEFINITIONS

Action Required to Ensure Compatibility Between Land Use and Noise from External Sources

1 = Allowed if interior and exterior community noise levels can be mitigated.

2 = Allowed if interior levels can be mitigated.

3 = New residential uses are prohibited in areas within the 65-dB CNEL contour from any airport or air station; allowed in other areas if interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "infill" development within an established neighborhood.

Standards Required for Compatibility of Land Use and Noise

a = Interior Standard: CNEL of less than 45 dB (habitable rooms only).

b = Exterior Standard: CNEL of less than 65 dB in outdoor living areas.

c = Interior Standard: $L_{eq(h)}$ = 45 to 65 dB interior noise level, depending on interior use.

d = Exterior Standard: $L_{eq(h)}$ of less than 65 dB in outdoor living areas.

e = Interior Standard: As approved by the Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains.

Key Definitions

Habitable Room – Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

Interior – Spaces that are covered and largely enclosed by walls.

$L_{eq(h)}$ – The A-weighted equivalent sound level averaged over a period of "h" hours. An example would be $L_{eq(12)}$ where the equivalent sound level is the average over a specified 12-hour period (such as 7:00 AM to 7:00 PM). Typically, time period "h" is defined to match the hours of operation of a given type of use.

Outdoor Living Area – Outdoor living area is a term used by the County of Orange to define spaces that are associated with residential land uses typically used for passive private recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, and other outdoor areas associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are front yard areas, driveways, greenbelts, maintenance areas, and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Source: County of Orange 2005 (see Tables VIII-2 and VIII-3 of the Noise Element).

Noise Ordinance

The County Noise Ordinance is in Title 4, Division 6 of the Codified Ordinances of the County of Orange. The Noise Ordinance designates the entire County, including incorporated and unincorporated areas, as Noise Zone 1. The Noise Ordinance establishes exterior and interior standards for Noise Zone 1 as shown in Tables 4.11-4 and 4.11-5.

TABLE 4.11-4
ORANGE COUNTY EXTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBA	7:00 AM–10:00 PM
	50 dBA	10:00 PM–7:00 AM
dBA: A-weighted decibels Source: County of Orange 2015		

TABLE 4.11-5
ORANGE COUNTY INTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBA	7:00 AM–10:00 PM
	45 dBA	10:00 PM–7:00 AM
dBA: A-weighted decibels Source: County of Orange 2015		

With respect to exterior noise levels, the Noise Ordinance states the following:

(a) In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

(b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, either incorporated or unincorporated, to exceed:

(1) The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or

(2) The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or

(3) The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or

(4) The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or

(5) The noise standard plus twenty (20) dB(A) for any period of time.

(c) In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

With respect to interior standards, the Noise Ordinance states the following:

(a) In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

(b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, either incorporated or unincorporated, to exceed:

(1) The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

(2) The interior noise standard plus five (5) db(A) for a cumulative period of more than one (1) minute in any hour; or

(3) The interior noise standard plus ten (10) db(A) for any period of time.

(c) In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

Section 4-6-7 of the Noise Ordinance exempts the following activities:

(a) Activities conducted on the grounds of any public or private nursery, elementary, intermediate, or secondary school or college.

(b) Outdoor gatherings, public dances and shows, provided such events are conducted pursuant to a license issued by the County of Orange pursuant to Title 5 of the Codified Ordinances of the County of Orange.

(c) Activities conducted on any park or playground, provided such park or playground is owned and operated by a public entity.

(d) Any mechanical device, apparatus or equipment used, related to, or connected with emergency machinery, vehicle, or work.

(e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

(i) Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a federal holiday.

(j) Any activity to the extent regulation thereof has been preempted by State or federal law.

4.11.4 METHODOLOGY

Psomas prepared a *Noise and Vibration Analysis Technical Memorandum for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project* in December 2024 (Psomas 2024). This letter report presents the results of the noise and vibration analysis for the proposed Project. The analysis also addresses the potential noise and vibration impacts associated with the Project in accordance with the California Environmental Quality Act (CEQA) (*California Public Resources Code* §21000 et seq.) and the CEQA Guidelines (*California Code of Regulations*, Title 14, §15000 et seq.).

4.11.5 EXISTING CONDITIONS

Due to the undeveloped nature of the area proximate to the Project site, the existing noise environment at the Project Site is primarily influenced by traffic noise on nearby roads as well as activities occurring at the site. The nearest roadways that affect ambient noise levels at the Project site are the Eastern Transportation Corridor Toll Road (State Route 241), State Route 261 (SR-261), and Santiago Canyon Road. At its closest point, the nearest road (SR-241) is more than half a mile from Irvine Lake. As such, ambient noise levels are low and characteristic of rural areas.

Orange County Fire Authority (OCFA) currently uses portions of the proposed Project staging area for helicopter takeoffs and landings associated with training and operational activities. During the construction of the proposed Project, HeloPods would be installed and operational near the lake, resulting in a similar anticipated noise level. In addition, Oak Canyon Park hosts a number of events, including graduation nights, picnics, concerts, athletic events, and shows that may include crowds, music, and amplified sound. Noise from these existing activities would intermittently contribute to the ambient noise levels within the area.

Sensitive Noise Receptors

The State of California defines noise-sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions (State of California 2015). Noise-sensitive land uses typically include residences, hospitals, religious facilities, schools, and libraries, which could all be adversely affected by an increase in noise levels. Noise-sensitive receptors in the vicinity of the proposed Project Site include residential land uses located approximately 9,500 feet to the west. There are nearby parks which include Oak Canyon Park, Irvine Regional Park, and Irvine Lake.

4.11.6 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant noise impact if it would:

Threshold 4.11-1 Result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance, or applicable standards of other agencies.

Threshold 4.11-2 Result in generation of excessive groundborne vibration or groundborne noise levels.

Threshold 4.11-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of

a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

4.11.7 IMPACT ANALYSIS

Threshold 4.11-1

Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

Less Than Significant Impact.

Construction Noise

Construction is anticipated to start in 2027, and the Project is expected to be completed within four years. During construction, concrete crushing would occur in one of the staging areas, which may include the primary staging area. Concrete crushing would be expected to occur intermittently 20 hours per day for approximately three weeks during the existing spillway demolition phase of the Project.

The Project requires that some of the existing site improvements be demolished, or removed and relocated, prior to construction. The following existing features would be demolished or removed:

- Vertical outlet tower and portions of 60-inch outlet conduit
- Significant portions (or possibly all) of the spillway chute and walls
- Spillway bridge and piers
- Portions of the upstream dam embankment concrete facing
- Storage building on dam crest
- Outlet works control building and valve vault
- Outlet works energy dissipator vault
- Portions of the Irvine Lake pipeline
- Catwalk and stair assembly across Santiago Creek
- Piezometers Monitoring wells
- Other ancillary equipment, utilities, and facilities

The Project involves construction of multiple components that include:

- Inlet/Outlet Works
    - Inclined Inlet/Outlet Structure
    - Intake Risers and Platforms
- Downstream Outlet Works
    - Bifurcation Valve Vault
    - Emergency Outlet Valve Vault
- Spillway

- Pipelines
    - Irvine Lake pipeline Relocation
    - Ancillary site improvements
- Inclined Inlet/Outlet Structure Access Roadway and Bridge
- Dam Control Building
- Existing Dam Crest Raise and Widening
- Emergency Access Walkway and Stairs
- Vehicle Bridge
- Utility Relocation
- Embankment Enhancements

Primary construction access would be from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area, as well as the required conventional concrete batch plant and construction trailers, would be located in the large, flat plateau area at the upstream end of the reservoir. The primary onsite construction access/haul road (Blue Diamond) would connect the staging area to the toe of the existing dam within the lakebed after the lake is dewatered. An earthen ramp would be constructed up the right abutment of the existing dam to provide access for construction vehicles to the downstream area to construct the outlet works and spillway stilling basin facilities. To facilitate the construction of the downstream features, a secondary staging area would be located on the downstream toe of the dam near the existing outlet structure building.

Construction of the Project would occur 10 hours per day during the wet season (October-April) and 20 hours per day during the dry season (April to November). The County's Code of Ordinances states that noise sources associated with construction, repair, remodeling, or grading of real property may take place so long as "said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday." Because construction activities would occur outside of the hours allowed within the County's Code of Ordinances, IRWD would need to obtain a variance for this work prior to the start of the construction activities.

Construction noise levels for individual construction equipment reported in the Federal Highway Administration's Roadway Construction Noise Model (RCNM) were used to estimate future construction noise levels for the Project (FHWA 2008). Noise levels of construction activities from each component of the Project were assessed based on types, quantity, timeframe, and distance relative to noise receptor locations. All construction equipment is anticipated to be fitted with the original equipment manufacturer's or manufacturer-approved equivalent mufflers or intake silencers to maintain, at minimum, published noise emission levels. These levels were used to calculate offsite noise exposure from construction activities.

Typically, estimated construction noise levels are primarily influenced by the equipment that produces the highest noise levels, and those activities located closest to the receptor of interest. The Project consists of numerous structures that would be distributed over a large Project site. The distance between construction activities and any natural or manmade barriers provides noise attenuation for noise-sensitive receptors. Noise levels during construction of each distinct Project component would vary due to the different numbers and types of construction activities occurring and the equipment used. Table 4.11-6, Estimated Construction Noise Levels at Receptors, shows noise exposure levels for each of the four main activity areas associated with the Project. These

include the dam area to the northwest of the Project site where the proposed upgrades to the infrastructure would occur, the primary staging area located to the southeast, the Blue Diamond haul route which runs along the southern and western perimeters of the Project's construction area, and the lakebed haul route that extends through the western portion of the lake. Each of these areas was assessed for noise exposure levels at offsite residential areas, nearby parks, and habitats that may contain protected nesting areas. The range in noise exposure levels is due to the varying construction phases and associated distances of these activities that would occur between the Project and each respective noise sensitive receptor.

TABLE 4.11-6
ESTIMATED CONSTRUCTION NOISE LEVELS AT RECEPTORS

Construction Phase	Distance from Construction Activities (feet)	Noise Exposure Level (dBA L_{eq})
Construction of Main Dam Structures		
Irvine Regional Park	5,070	31-46
Residences Along Jamboree Road	9,785	25-41
Oak Canyon Park	9,035	41-57
Lakeview Park Camping Area	7,640	42-58
Sensitive Habitat to the South of Dam	140-1300	49-86
Sensitive Habitat to the North of the Dam	150-1370	63-84
Sensitive Habitat Near Primary Staging Area	8,300	42-57
Primary Staging Area		
Irvine Regional Park	12,700	32
Residences Along Jamboree Road	16,130	30
Oak Canyon Park	1,000	69
Lakeview Park Camping Area	1,000	69
Nearest Sensitive Habitat to the Staging Area[a]	239	79
Blue Diamond Haul Route		
Nearest Sensitive Habitat	100	61
Lakebed Haul Route		
Nearest Sensitive Habitat	41	68

dBA: A-weighted decibels; L_{eq}: Equivalent Noise Level; ft: feet

[a] Sensitive habitat includes habitat for noise-sensitive special status species such as coastal California gnatcatcher and least Bell's vireo. See Section 4.3, Biological Resources, for additional information.

Source: Noise calculations in Attachment B.

Noise Exposure at Residential Uses

Estimated noise levels at the nearest noise-sensitive uses attributable to the Project are shown in Table 4.11-5. As shown in this table, Project-related construction activities would occur at distances of approximately two miles from existing residential uses located to the west of the Project site. In addition to the substantial distances between the Project site and the nearest developed noise-sensitive land uses, Irvine Lake is surrounded by ridgelines which attenuate noise levels. Irvine Lake is located at an elevation of approximately 780 feet above sea level (asl), while many of the downstream components of the Project are located at elevations of 660 feet asl. Intervening ridgelines to the east of the dam site rise to elevations of greater than 1,000 feet asl. Noise generated by Project construction would be attenuated by these ridgelines. As shown in Table 4.11-5, noise levels are expected to range from 25-41 dBA L_{eq} at the building façades of the nearest noise sensitive residential uses. Noise level exposure from Project construction activities would occur during both daytime and nighttime activities. Noise generated during Project

construction would be below the FTA's daytime and nighttime Leq criteria and the County's interior and exterior daytime and nighttime Leq thresholds for residential land uses. Interior noise exposure levels at these residences would be further reduced by approximately 20 dBA under a windows-closed condition and 12 dBA under a windows-open condition, resulting in interior noise levels less than 45 dBA CNEL. In addition, construction noise from the Project site may not be discernible with traffic noise occurring along the SR-261 and SR-241. As such, noise impacts from Project-related daytime and nighttime construction activities would result in less than significant noise impacts.

Noise Exposure at Nearby Park Uses

The nearest parks located proximate to the Project's construction activities include Oak Canyon Park, Irvine Lake, and Irvine Regional Park. Irvine Regional Park is located approximately one mile northwest of the northernmost Project construction activities. Irvine Regional Park is also located such that intervening ridgelines with elevations greater than 1,000 feet provide substantial noise attenuation from the Project's construction activities. As shown in Table 4.11-5, construction noise exposure levels are anticipated to range from 31 to 46 dBA L_{eq} at Irvine Regional Park and are not anticipated to result in a substantial level of noise exposure due to attenuation facilitated by spreading loss and obstruction of the line-of-sight between the Project site and the aforementioned receptors.

A portion of the recreational area surrounding Irvine Lake would remain open, with select areas proximate to the Project construction closed for safety reasons. Irvine Lake would also be affected by noise occurring at the Project's construction areas. Noise exposure levels throughout the large park would be affected by proximity to construction activities. The degree of noise exposure is highly dependent on the proximity of park users relative to the Project's construction activities.

Oak Canyon Park is located approximately 1.7 miles from the Project's dam activities. As shown in Table 4.11-5, construction noise levels from activities occurring at the dam would be substantially attenuated due to the distance between the dam and the park with noise exposure levels of 43 to 60 dBA L_{eq}. However, Oak Canyon Park (shown on Exhibit 3-1 in Section 3.0, Project Description) is located adjacent to the proposed primary staging area. The primary staging area is anticipated to be used for staging construction management trailers, materials, equipment, conventional concrete batch plant, and the concrete crushing operation. The concrete crushing operation involves the delivery of aggregates that would be crushed for use in the concrete batch plant. The concrete batch plant would be supported by haul trucks transporting cement and aggregates as well as concrete trucks transporting concrete for use in the dam improvements. Concrete crushing would be expected to occur intermittently up to 20 hours per day for approximately three weeks (sometime between the months of April and November), during the existing spillway demolition phase of the Project. The park would mostly be exposed to noise associated with activities occurring at the staging area, where equipment and materials will be stored, and concrete batching and rock crushing activities would occur. Equipment staging is expected to occur during the beginning and end of each work shift when equipment would be either taken out of or returned to the staging area. Material staging would involve the temporary storage of building materials, excavated aggregates, and soil. The delivery and removal of materials in the staging area would occur throughout the day and would involve haul trucks transporting these materials. With the exception of rock crushing activities, construction-related activities associated with the staging area would occur intermittently. Rock crushing activities could occur for up to 20 hours a day and would be based on the need to reduce the size of excavated aggregates. Rock crushing activity would be the loudest Project construction activity, generating noise levels of 95 dBA L_{eq} at a distance of 50 feet (DEC 2001) before sound barriers are installed. Assuming that the rock crusher is located at least 1,000 feet away (this distance has been confirmed by IRWD), noise exposure levels at Oak Canyon Park are estimated to be 69

dBA L_{eq}. The County has established noise compatibility standards for open space of between 60-65 dBA CNEL and 65+ dBA CNEL and allows noise levels within these ranges if interior noise levels can be mitigated. Considering that there are no interior areas for park uses, the FTA 8-hour construction L_{eq} noise limits of 80 dBA during daytime hours and 70 dBA during nighttime hours have been applied as significance thresholds for Project construction. Noise levels of 69 dBA L_{eq} from the staging area would not exceed the 80 dBA L_{eq} daytime and 70 dBA L_{eq} nighttime noise criteria and consequently would not expose Oak Canyon Park to significant levels of noise.

The Lakeview Park Camping Area (shown on Exhibit 3-1 in Section 3.0, Project Description) would be exposed to similar levels of noise as those at Oak Canyon Park due to the large distance from the dam site and its proximity to the primary staging area. Noise levels from construction activities at the dam site range from 44 to 61 dBA L_{eq}. This park is proximate to construction activities occurring at the primary staging area and would likewise be exposed to daytime noise from these activities. Noise levels are estimated to be 69 dBA L_{eq} from the primary staging area. Daytime noise exposure to this level would not exceed the daytime noise criterion of 80 dBA L_{eq} established by the FTA. No camping is allowed at Irvine Lake (OC Parks 2023) so there would be no nighttime noise exposure. Noise from project-related construction noise would result in less than significant noise impacts at the Oak Canyon Park and Lakeview Park Camping Area.

Operational Noise

During the operations phase of the Project, dam operations would continue consistent with the types of operations performed before the infrastructure improvements. Under existing conditions, a small number of vehicle trips are associated with routine inspection and maintenance of the existing dam. It is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of the proposed Project. Therefore, because there would be no increase in daily trips associated with the daily operation of the Project components, no Project-related traffic noise impacts are anticipated. New stationary sources of noise would be created by small pumps used for aeration within the reservoir. Due to the very large distances between these pumps and offsite noise-sensitive land uses, noise related to these pumps would be inaudible at the offsite noise-sensitive land uses Impacts would be less than significant, and no mitigation is necessary.

Impact Conclusion: *Noise generated during Project construction would not exceed the daytime or nighttime noise thresholds established by the FTA. For the residential sensitive receptors located approximately two miles to the west, noise levels generated during Project construction would be attenuated by the substantial distances between the Project site and the aforementioned uses. Furthermore, Irvine Lake is surrounded by ridgelines which would attenuate noise levels. As shown in Table 4.11-5, noise exposure levels are anticipated to range from 31 to 46 dBA L_{eq} at Irvine Regional Park and are not anticipated to result in a substantial level of noise exposure. Additionally, Project construction would not exceed the 80 dBA L_{eq} daytime and 70 dba L_{eq} nighttime noise criteria and consequently would not expose Oak Canyon Park and Lakeview Park Camping Area to excessive levels of noise. No camping is allowed at Irvine Lake (OC Parks 2023) so there would be no nighttime noise exposure. No Project-related traffic noise impacts are anticipated. Impacts related to stationary sources of noise would be less than significant, and no mitigation is necessary pursuant to Threshold 4.11-1.*

Threshold 4.11-2

Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. As is typical of most cities and counties in California, there are no applicable County standards for vibration-induced annoyance or structural damage from vibration. The California Department of Transportation (Caltrans) has adopted vibration damage thresholds, which are shown in Table 4.11-7, to assess the potential for structural damage from vibration. The structural damage threshold for "older residential structures" of 0.3 peak particle velocity (ppv) inch per second (in/sec) for continuous/frequent (i.e., intermittent) sources is most applicable to this analysis.

TABLE 4.11-7
VIBRATION DAMAGE THRESHOLD CRITERIA

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

PPV: peak particle velocity; in/sec: inch(es) per second

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans 2013.

The Caltrans vibration annoyance thresholds are shown in Table 4.11-8. These thresholds are used to assess the potential for a significant vibration impact for human annoyance; and annoyance is evaluated within occupied buildings.

TABLE 4.11-8
VIBRATION ANNOYANCE THRESHOLDS

Average Human Response	ppv
Severe	2.0
Strongly perceptible	0.9
Distinctly perceptible	0.24
Barely perceptible	0.035

ppv: peak particle velocity; in/sec: inch(es) per second
Source: Caltrans 2013.

Demolition activities, excavation, infrastructure development, and repaving would occur at the Project site around Irvine Lake. Vibration annoyance and building damage from typical construction activities have the potential to be excessive at nearfield distances of 100 feet or less. Because of the very substantial distances between the Project site and the nearest buildings, vibration-induced annoyance and building damage would not occur. The operations phase of the Project would not involve machinery or activities that generate perceptible levels of vibration. There would be a less than significant impact, and no mitigation is required.

Impact Conclusion: *Vibration annoyance and building damage from typical construction activities have the potential to be excessive at nearfield distances of 100 feet or less. Because of the very substantial distances between the Project site and the nearest buildings, vibration-induced annoyance and building damage would not occur. The operations phase of the Project would not involve machinery or activities that generate perceptible levels of vibration. There would be a less than significant impact, and no mitigation is required pursuant to Threshold 4.11-2.*

Threshold 4.11-3

For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the project area to excessive noise levels?

No Impact. The Project Site is not located within two miles of a public or private airport. The Project site is located approximately 10 miles northeast of John Wayne Airport. Helicopter operations have historically been conducted at Irvine Lake. Noise associated with these activities are intermittent and generally a substantial distance from workers at the dam. As such, the Project would not result in exposure of people residing or working in the Project area to excessive noise levels. Therefore, there would be no significant impact related to excessive aircraft noise exposure.

Impact Conclusion: *The Project would not result in exposure of people residing or working in the Project area to excessive aircraft noise levels. Pursuant to Threshold 4.11-3, there would be no impact related to excessive aircraft noise exposure.*

4.11.8 CUMULATIVE IMPACTS

Cumulative Short-term (Construction) Noise and Vibration Impact

Adverse noise and vibration impacts during construction of the proposed Project would be localized and would occur intermittently for varying periods throughout the construction phase. Short-term cumulative impacts related to ambient noise and vibration levels could occur if construction associated with the proposed Project as well as surrounding current and future development were to occur simultaneously. Noise or vibration associated with construction of the proposed Project in combination with another project within approximately 500 feet of the Project site boundaries could adversely impact sensitive receptors in the vicinity of the site with a cumulative noise level greater than the noise generated solely at the Project site. Due to the remote nature of the Project site, it is unlikely that construction activities from other projects within 500 feet of the Project site would occur concurrently with those of the Project. As such, cumulative noise impacts related to construction activities would result in less than significant noise impacts.

Cumulative Long-Term (Operation) Noise Impact

Cumulative traffic noise impacts would not occur due to the minimal vehicle trips required for maintenance of Project facilities and equipment. Stationary sources of machinery noise are minimal and would not result in a substantial increase in ambient noise levels in the local area. Additionally, noise produced during long-term operations would be regulated under the County's Code of Ordinances. Lastly, the Project's operations are located at such distances that there would not be a substantial increase in noise due to cumulative contributions from other sources. As such, impacts associated with cumulative long-term noise would be less than significant, and no mitigation is required.

4.11.9 MITIGATION PROGRAM

Mitigation Measures

No significant impacts would occur for noise or vibration from either the construction or operations phases of the Project. As such, no mitigation measures are necessary or recommended. Regarding impacts to sensitive biological resources, mitigation has been included in Section 4.3, Biological Resources, that would reduce potential impacts to nearby species and habitat.

4.11.10 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project-specific and cumulative noise impacts would be less than significant. No significant unavoidable impacts would occur.

4.11.11 REFERENCES

California Department of Transportation (Caltrans). 2013 (September). *Technical Noise Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA: Caltrans. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.

———. June 2016. Technical Guidance for Assessment and Mitigation of the Effects of Traffic Noise and Road Construction Noise on Birds. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/noise-effects-on-birds-jun-2016-a11y.pdf

County of Orange. 2005. General Plan. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan
Federal Highway Administration. 2008. Federal Highway Administration's Roadway Construction Noise Model Software Version 1.1. Prepared by US Department of Transportation Research and Innovative Technology Administration John A Volpe National Transportation Systems Center Environmental Measurement and Modeling Division. https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/

Federal Transit Administration. 2018 (September). Transit Noise and Vibration Impact Assessment. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

New York State Department of Environmental Conservation (DEC). "Assessing and Mitigating Noise Impacts" 2001.
https://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf

Orange County Department of Parks (OC Parks). 2023 (accessed November). Irvine Lake. Irvine, CA: OC Parks. www.ocparks.com/parks-trails/irvine-lake

Psomas. 2024 (December). *Noise and Vibration Analysis Technical Memorandum for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project*. Pasadena, CA: Psomas. Appendix G.

4.12 PUBLIC SERVICES

This section of the Environmental Impact Report (EIR) describes existing public services in the Project area and identifies associated potential fire and police protection impacts related to development of the proposed Project.

Existing parks and potential Project impacts on parks are addressed in Section 4.13, Recreation, of this EIR. Schools and Libraries will not be addressed in this Draft EIR as discussed in Section 2.0, Introduction, Project History, and Setting, as the Project would not contribute to an increase in the residential population, and no impacts would occur.

4.12.1 REGULATORY SETTING

Fire Protection

California Fire Code

The 2022 California Fire Code, California Code of Regulations, Title 24, Part 9, effective January 1, 2020, is based on the 2021 International Fire Code. Typical fire safety requirements of the California Fire Code include requirements for the installation of fire sprinklers; appropriate building materials and particular types of construction; and the clearance of debris and vegetation within a prescribed distance from occupied structures within wildfire hazard areas. In addition, the California Fire Code addresses fire flow requirements, fire hydrant spacing, and access road specifications.

Cal/Occupational Safety and Health Administration (OSHA) Regulations (CCR Title 8)

The California Division of Occupational Safety and Health Administration (Cal/OSHA) has primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally-approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations. Cal/OSHA standards are generally more stringent than federal regulations. The use of hazardous materials in the workplace requires employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.

California Public Resources Code

The California Public Resources Code (PRC) regulates natural resources and the conservation, utilization, and supervision of these resources; as well as mines and mining, oil and gas, and forestry. The following sections of the PRC are relevant to the proposed Project:

PRC 4427: During any time of the year when burning permits are required in an area pursuant to this article, construction personnel are prohibited from using or operating any motor, engine, boiler, stationary equipment, welding equipment, cutting torches, tarpots, or grinding devices from which a spark, fire, or flame may originate, which is located on or near any forest-covered land, brush--covered land, or grass-covered land, without first clearing all flammable materials within 10 feet of the operation and maintaining a water-type fire extinguisher equipped and ready for use.

PRC 4428: No person, except any member of an emergency crew or except the driver or owner of any service vehicle owned or operated by or for, or operated under contract with, a publicly or privately owned utility, which is used in the construction, operation, removal, or repair of the

property or facilities of such utility when engaged in emergency operations, shall use or operate any vehicle, machine, tool or equipment powered by an internal combustion engine operated on hydrocarbon fuels, in any industrial operation located on or near any forest, brush, or grass--covered land between April 1 and December 1 of any year, or at any other time when ground litter and vegetation will sustain combustion permitting the spread of fire, without providing and maintaining, for firefighting purposes only, suitable and serviceable tools in the amounts, manner and location prescribed in this section.

PRC 4431: During any time of the year when burning permits are required in an area pursuant to this article, no person shall use or operate or cause to be operated in the area any portable saw, auger, drill, tamper, or other portable tool powered by a gasoline-fueled internal combustion engine on or near any forest-covered land, brush-covered land, or grass-covered land, within 25 feet of any flammable material, without providing and maintaining at the immediate locations of use or operation of the saw or tool, for firefighting purposes one serviceable round point shovel, with an overall length of not less than 46 inches, or one serviceable fire extinguisher. The Director of Forestry and Fire Protection shall by administrative regulation specify the type and size of fire extinguisher necessary to provide at least minimum assurance of controlling fire caused by use of portable power tools under various climatic and fuel conditions.

The required fire tools shall at no time be farther from the point of operation of the power saw or tool than 25 feet with unrestricted access for the operator from the point of operation.

PRC 4442:

a. Except as otherwise provided in this section, no person shall use, operate, or allow to be used or operated, any internal combustion engine which uses hydrocarbon fuels on any forest-covered land, brush-covered land, or grass-covered land unless the engine is equipped with a spark arrester, as defined in subdivision (c), maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire pursuant to Section 4443.

b. Spark arresters affixed to the exhaust system of engines or vehicles subject to this section shall not be placed or mounted in such a manner as to allow flames or heat from the exhaust system to ignite any flammable material.

c. A spark arrester is a device constructed of nonflammable materials specifically for the purpose of removing and retaining carbon and other flammable particles over 0.0232 of an inch in size from the exhaust flow of an internal combustion engine that uses hydrocarbon fuels or which is qualified and rated by the United States Forest Service.

d. Engines used to provide motive power for trucks, truck tractors, buses, and passenger vehicles, except motorcycles, are not subject to this section if the exhaust system is equipped with a muffler as defined in the Vehicle Code.

e. Turbocharged engines are not subject to this section if all exhausted gases pass through the rotating turbine wheel, there is no exhaust bypass to the atmosphere, and the turbocharger is in effective mechanical condition.

f. Motor vehicles when being operated in an organized racing or competitive event upon a closed course are not subject to this section if the event is conducted under the auspices of a recognized sanctioning body and by permit issued by the fire protection authority having jurisdiction.

County of Orange General Plan

Public Services & Facilities Element

The Public Services and Facilities Element, one of nine elements of the General Plan, sets forth a comprehensive strategy for the planning, management, and implementation of public facilities that are necessary to meet Orange County's existing and future demands. The Public Services and Facilities Element focuses on those publicly-managed services and facilities which have a direct influence on the distribution and intensity of development that can be accommodated through the utilization of existing technologies and assumptions that are used to determine adequate service levels. These services include community services, such as fire protection.

The Community Facilities section of the Public Services & Facilities Element specifically discusses the Orange County Fire Authority (OCFA), fire protection services, and fire station locations.

The following goals and objectives of the Public Services & Facilities Element pertaining to fire services are applicable to the Project:

Goal 1: Provide a safe living environment ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property from structural and wildland fire damages.

Objective 1: To achieve desired level of fire protection and paramedic service through coordinated land use and facility planning.

Policy 3: Site Design Criteria – Require all land use proposals to implement adequate site design so as to maximize fire protection and prevention in order to minimize potential damages. The site design criteria shall be established to reflect the levels of protection needed for projects in various fire hazard areas. Such criteria shall include consideration as to: structure type and density, emergency fire flow and fire hydrant distribution, street pattern and emergency fire access, fuel modification programs, automatic fire sprinkler systems, and other requirements as determined by the Fire Chief.

In accordance with the Insurance Services Office (ISO) suggested standards, ultimate fire protection rating shall be maintained by General Plan land use categories as follows: (1) ISO 3 for all urban developments including Residential (1C and 1B), Commercial (2A and 2B), Employment (3.0), and Public Facilities (4.0), which are within five miles from a fire station and less than 1000 feet from a hydrant; and (2) ISO 4 for Rural Residential (1A) which are within 5 miles from a fire station and less than 100 feet from a hydrant. For areas greater than 5 miles or 1000 feet, the ISO suggested standard is 9.

Safety Element

The Safety Element, one of nine elements of the General Plan, contains County policies on identified and potential hazards and safety considerations, their mitigation (i.e., reduction in damage and loss to real and personal property and minimization of adverse social and economic impacts) and implications for development.

The Fire section of the Safety Element examines the threat of fire to urban areas, wildlands, and the urban/wildlands interface. Fire is a constant threat in all parts of the County. It is the responsibility of the OCFA to meet the fire threat challenge for present and future development and residents (County of Orange 2012).

The following goal of the County of Orange General Plan Safety Element pertaining to public safety and wildfire is applicable to the Project:

Public Safety Component

Goal 2: Minimize the effects of public safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property.

Police Protection

County of Orange General Plan

Public Services & Facilities Element

As indicated above, the Public Services and Facilities Element focuses on those publicly-managed services and facilities, which include community services, such as sheriff patrol. The Community Facilities section of the Public Services & Facilities Element specifically discusses the Orange County Sheriff Department and sheriff protection services. Additionally, the sheriff patrol service is funded by sales tax revenue generated by the Local Public Safety Protection and Improvement Act of 1993 (Proposition 172) and City contracts.

The following goals and objectives of the Public Services & Facilities Element pertaining to sheriff patrol services are applicable to the Project:

Goal 1: Assure that adequate Sheriff patrol service is provided to ensure a safe living and working environment.

Objective 1.1: To maintain adequate levels of Sheriff patrol services through coordinated land use and facility planning efforts.

Policy 1: Land Use Review —To continue to coordinate land use proposal reviews with the County Sheriff-Coroner Department to assure that Sheriff patrol service shall be adequately addressed.

4.12.2 METHODOLOGY

Fire Protection

The OCFA was contacted to determine if the Project would significantly impact OCFA's ability to provide fire protection services. The analysis is based on information reviewed and provided by OCFA.

Police Protection

The Orange County Sheriff-Coroner Department (OCSD) was contacted to determine if the proposed Project would significantly impact its ability to provide services. The analysis is based on information and input reviewed by the OCSD.

4.12.3 EXISTING CONDITIONS

Fire Protection

The OCFA provides regional fire protection, emergency medical services, and rescue services to the unincorporated areas of Orange County plus 22 cities, including the Project site. Resources are deployed based upon a regional service delivery system that assigns personnel and equipment to emergency incidents without regard to jurisdictional boundaries. The equipment used by the department has the versatility to respond to both urban and wildland emergency conditions.

In addition to these fire suppression and emergency services, the OCFA provides fire prevention services. These duties are the responsibility of the Fire Prevention Department and include regular inspections of public assemblies and hazardous materials and operations pursuant to the Uniform Fire Code. Fire prevention and public education programs include fire prevention education for all fifth-grade students. The OCFA receives property tax revenue, known as the Structural Fire Fund, as its primary source of funding. Additionally, the Department of Forestry maintains a contract with the County Fire Authority for wildland firefighting protection in State responsibility areas (County of Orange 2012). Impacts related to wildfires are addressed in Section 4.17, Wildfire, of this Draft EIR.

The OCFA Operations Department is comprised of seven divisions and eleven battalions that include 77 fire stations. The Project site is located within Division 4, Battalion 3 (OCFA 2024a). Most divisions are divided into two battalions under the command of field Battalion Chiefs. Within these battalions are 77 fire stations (5–10 stations per battalion) that provide regional emergency response to all fires, medical aid, rescues, hazardous materials incidents, wildland fire, aircraft fire and rescue services to John Wayne Airport, and other miscellaneous emergencies.

In addition, the OCFA Operations section includes the emergency medical services section, which manages the delivery of medical services by OCFA medical technicians and paramedics; operations training and safety section, which supports the safety and training of all operations personnel; California Urban Search and Rescue Task Force 5, which is a State task force that responds as a Federal Emergency Management Agency (FEMA) or California Governor's Office of Emergency Services resource during national or regional emergencies such as earthquakes, hurricanes, or other natural and manmade disasters; Emergency Planning and Coordination section, which provides emergency management planning, agreement coordination, and homeland security grand coordination; and investigations section, which conducts fire investigation and evaluation and initiates early intervention strategies (OCFA 2024b).

The nearest OCFA Station is Station No. 8, which is located at 10631 Skyline Drive, Santa Ana, approximately 5.7 miles west of the Project site (OCFA 2024c). In addition, the nearest fire station outside of the OCFA jurisdiction is the Orange City Fire Department Station 7, located at 8501 E. Fort Road, Orange, approximately 3 miles west of the Project site, which would be able to respond, if necessary, in the event of an emergency. Table 4.12-1, Fire Stations Serving the Project Site, below describes the types and locations of existing fire department facilities serving the Project area. In addition, the table describes staffing and equipment at each existing station.

TABLE 4.12-1
FIRE STATIONS SERVING THE PROJECT SITE

Fire Station	Address	Apparatus	Station Staffing	Daily Staffing	Distance from the Project Site
OCFA 8	10631 Skyline Drive Santa Ana, California 92705	Paramedic Engine	3 Fire Captains, 3 Engineers, 6 Firefighters	1 Fire Captain, 1 Engineer, 2 Firefighters	5.7
OCFA 43	11490 Pioneer Way Tustin, California 92782	Paramedic Engine	3 Fire Captains, 3 Engineers, 6 Firefighters	1 Fire Captain, 1 Engineer, 2 Firefighters	6.5
OCFA 55	4955 Portola Parkway Irvine, California 92620	Paramedic Engine	3 Fire Captains, 3 Engineers, 6 Firefighters	1 Fire Captain, 1 Engineer, 2 Firefighters	8.8
OCFA 23	5020 Santiago Canyon Road Orange, California 92869	Paramedic Engine	3 Fire Captains, 3 Engineers, 6 Firefighters	1 Fire Captain, 1 Engineer, 2 Firefighters	6.4
Source: Rivers 2023.					

Current OCFA Standards are:

- A 5:00-minute first-due travel time standard and an 8:00-minute First Alarm travel standard.
- A total response time that includes 1:30 minutes for call processing and 2:00 minutes for turnout.
- A total response time as follows:
    - First due at 8:30 minutes.
    - Effective Response Force (First Alarm) at 11:30 minutes, with an initial response of three engines, one ladder truck, and one Battalion Chief (Rivers 2023).

Police Protection

The OCSD provides police patrol and investigative services to the unincorporated areas of Orange County, including the Project site. The OCSD consists of nearly 4,000 sworn and professional staff through six organizational Commands comprised of 23 Divisions. Together, these Commands and Divisions provide services including land, air and sea-based patrol, custody operations, investigative services, emergency management, coroner services, forensics and specialty operations, among an extensive list of other public safety services (County of Orange 2012).

The OCSD's patrol functions are both organized geographically and by service type into five divisions: North, South, and West Operations Divisions are geographically based, while the Airport and Harbor Patrol divisions are geared towards service type for the contracting entity receiving the services (County of Orange 2012).

The North Operations Division, which serves the Project site, is stationed in the Sheriff's permanent headquarters in the City of Santa Ana, located at 550 North Flower Street. The service territory of this division covers the unincorporated North County islands, Bolsa Chica, areas north of Brea and Yorba Linda, foothill areas east of Orange and north of Tustin, Irvine Coastal area north of Laguna Beach, the City of Villa Park, the communities of Midway City, Rossmoor, and

Sunset Beach, and Orange County Transit Authority (OCTA) police services (County of Orange 2012).

The North Division headquarters is located approximately 12.2 miles by road from the Project site, and primary response to the Project site would be by patrol vehicles that are assigned geographically throughout the County. Response time to calls for service may vary depending upon their location at the time of dispatch; however, the response goal for priority or emergency calls is to respond as immediately as possible. Non-priority calls are triaged based on importance. Non-priority calls will be responded to; however, they may not require an immediate dispatch based on the level of importance relative to other calls within the same time frame (Patella 2023).

Orange County Sheriff's Department's Emergency Management Division is another entity performing emergency planning and response in the County, and aims to promote, facilitate, and support the County of Orange and the Operational Area efforts to prepare for, respond to and recover from disasters. The Emergency Management Division provides emergency management and preparedness services to the unincorporated areas of Orange County and supports the efforts of the Orange County Operational Area. There are currently over 100 jurisdictions in the Operational Area encompassing all County departments and agencies, public and private organizations, and the general population within the boundaries of Orange County.

Additionally, the sheriff patrol service is funded by sales tax revenue generated by the Local Public Safety Protection and Improvement Act of 1993 (Proposition 172) and City contracts.

4.12.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant public services impact if it would:

Threshold 4.12-1 Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

(i) Fire protection

(ii) Police protection

(iii) Schools

(iv) Parks

(v) Other public facilities

This Draft EIR Section only addresses fire protection and police protection, as no residential or permanent employee population would be generated as a result of the Project. Impacts related to parks and recreation are discussed further in Section 4.13, Recreation, of this Draft EIR.

4.12.5 IMPACT ANALYSIS

Threshold 4.12-1(i)

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

(i) Fire protection?

The proposed Project would involve improvements to the Santiago Creek Dam outlet works and spillway facility improvements in order to address specific seismic safety concerns as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit and meet all applicable requirements as an existing public facility. The proposed Project would replace and update existing uses, which may currently generate demand for fire protection services during routine operation-related activities. The Project's structural and geotechnical design has been prepared consistent with the Division of Safety of Dams (DSOD) and U.S. Army Corps of Engineers (USACE) requirements and standards, respectively, based on site-specific geologic conditions and applicable safety requirements of the 2022 California Building Code (CBC).

During construction, equipment and on-site diesel fuel could generate an additional demand for fire protection services in the area with possible ignition sources such as internal combustion engines, gasoline-powered tools, and equipment that could produce a spark, fire, or flame. The use of spark-producing construction machinery within or adjacent to fire risk areas such as the surrounding open space areas, could expose temporary project workers and contractors to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire, resulting in a potentially significant impact. However, all personnel on the Project site would have to comply with PRC Sections 4427, 4428, 4431, and 4442, which include provisions relating to the handling of combustible fuels and equipment that can exacerbate fire risks. During construction, strict adherence to these PRC sections would ensure that contractors are responsible for all monitoring and safety measures ensuring that any risk to exacerbate wildfire would be reduced. Additionally, all construction must comply with fire protection and prevention requirements specified by the California Code of Regulations (CCR) and Cal/OSHA. This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use.

Operation-related activities would involve a limited number of maintenance trucks for inspections and material delivery. These trucks would be limited to established access roads and would have a low potential of producing sparks, fire, or flame, that could result in uncontrolled spread of wildfire. Nevertheless, due to the site's topography and wildfire risk, operators of the proposed Project site would comply with PRC Sections 4427, 4428, 4431, and 4442, which include provisions relating to the handling of combustible fuels and equipment that can exacerbate fire risks.

As stated above, the OCFA established the following response time goals: first response due at 8:30 minutes and effective response force at 11:30 minutes with an initial response of three engines, one ladder truck and one Battalion Chief. The Project is located approximately 5.7 miles northeast of Station No. 8, the nearest OCFA station, which is also about 18 driving miles away using access from Irvine Park Lane. The remote location and restricted use of roads to the Project site may have an impact on OCFD's ability to respond within its service standards (Rivers 2023). However, the Project site is already within the existing OCFD service area and would continue to

operate as a dam, which is the same as under existing conditions. As such, the Project would not create an increased impact to response time goals over existing conditions.

Although the Project could potentially increase the demand on the OCFA personnel and resources during temporary construction activities and periodic operational maintenance, the Project would replace and update existing uses and the demand is not sufficient that it would require the construction of new or alteration of existing fire protection facilities (i.e., fire stations) to maintain an adequate level of fire protection service in the area. In addition, the OCFA does not anticipate the Project would require a need to construct or expand OCFA facilities (Rivers 2023).

Additionally, the proposed Project would be required to comply with all applicable codes, ordinances, and regulations regarding fire prevention and suppression measures, fire hydrants and sprinkler systems, emergency access, and other similar requirements. This would also minimize demand for fire protection services. The Project site plans would be subject to review and approval by the OCFA prior to project approval, which would ensure that adequate emergency access, fire hydrant availability, and sufficient capacity for fire flows would be provided in compliance with all applicable codes and standards. Thus, no physical impacts associated with the provision of fire protection services would occur as result of the Project, and no mitigation is required. Therefore, impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The Project's temporary construction activities and periodic maintenance activities would only cause an incremental increase in demand on County fire services. No new or physically-altered fire facilities that would result in substantial adverse physical impacts would be required as a result of the Project. Therefore, the impact is less than significant, and no mitigation is required.*

Threshold 4.12-1(ii)

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically-altered governmental facilities, need for new or physically-altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

(ii) Police protection?

The proposed Project would involve improvements to the Santiago Creek Dam outlet/inlet works and spillway facility in order to address specific seismic safety concerns as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit and meet all applicable requirements as an existing public facility. The proposed Project would replace and update existing uses, which may generate demand for police protection services during routine operation-related activities.

The Project would result in temporary construction activities and periodic maintenance for inspections and material delivery and would not contribute to a residential population or permanent additional employment. Although the Project could potentially increase the demand on OCSD personnel and resources during temporary construction activities and periodic operational maintenance, the Project would replace and update existing uses and the demand is not sufficient that it would require the construction of new or alteration of existing police protection facilities (i.e., police stations) to maintain an adequate level of police protection service in the area.

During temporary construction activities, the Project may increase number of calls to the area due to theft or vandalism of construction equipment on-site. The Project would include security measures such as cameras, directional lighting, etc., to prevent theft and vandalism, and therefore reduce the number of service provider calls during construction activities.

The Project would comply with the County's discretionary review process and standard conditions of approval, which would ensure that Project implementation would result in a less than significant impact to police protection services.

The current police facilities are adequate to handle the existing personnel and equipment that are employed and utilized by the Department. As the OCSD does not foresee significant police service issues due to the Project's size, location, and type of development (Patella 2023), the Project would not create a demand for additional officers or resources to provide adequate service to the Project. Therefore, impacts related to police protection would be less than significant, and no mitigation measures are either required or recommended.

Impact Conclusion: *The Project would not result in an increased demand for police protection services or result in a significant impact to police response. The Project would replace an existing use that is generating demand for police protection services. The Project would not result in the need for construction of new or physically-altered police facilities to maintain adequate levels of service. Therefore, the impact is considered less than significant, and no mitigation is required.*

4.12.6 CUMULATIVE IMPACTS

Projects considered in the cumulative impact analysis consist of four projects within a one-mile buffer of the Project, three of which are located in the unincorporated County of Orange with one located in the City of Orange. These related projects are described in more detail in Table 4-1, Cumulative Projects List, which is provided in Section 4.0, Impact Analysis.

Fire Protection

The geographic area for the cumulative analysis of fire protection services is the service territory for OCFA. Future development in the County is expected to increase demand for fire protection services and would contribute to the need for additional equipment and personnel to meet the demand. All new development in the County, including the proposed Project, would be required to comply with all applicable codes, ordinances, and regulations (including the Orange County Municipal Code, which adopts by reference the California Fire Code and the 2021 International Fire Code) regarding fire prevention and suppression measures, fire hydrants and sprinkler systems, emergency access, and similar requirements. Such compliance would minimize demand for fire protection services. The Project as well as other future development in the County would require the payment of taxes and appropriate fees that would be used for future facility improvements necessary to ensure adequate levels of service from these public service providers. Therefore, impacts related to the provision of new or physically- altered fire facilities would not result in a significant cumulative impact, and no mitigation measures are either required or recommended.

Police Protection

The geographic area for the cumulative analysis of police protection services is the service territory for the OCSD. As with fire protection services, future projects in the County, including the proposed Project, are expected to increase demand for police protection services and would

contribute to the need to expand facilities and operate such services. Police staffing levels are in constant need of evaluation as the County's population grows. Individual projects may not result in the need to increase staffing levels; however, combined developments may result in a cumulative increase in police protection service requirements. Project development would not require construction of new or physically-altered police protection facilities to maintain an adequate level of service to the Project site and surroundings. Additionally, the Project would comply with the County's discretionary review process and standard conditions of approval, which would ensure that Project's implementation would result in a less than significant impact to police protection services. Therefore, the Project's demand for police protection services would not result in a significant cumulative impact.

4.12.7 MITIGATION PROGRAM

Mitigation Measures

No significant impacts pertaining to public services were identified; therefore, no mitigation measures are required.

4.12.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project impacts on fire and police protection services would be less than significant and mitigation is not required.

4.12.9 REFERENCES

Orange, County of. 2012. General Plan, Chapter V. Public Services & Facilities Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/8639.pdf.

Orange County Fire Authority (OCFA). 2024a (November 11, access date). Operations Division 4. Irvine, CA: OCFA. https://ocfa.org/AboutUs/Departments/OperationsDirectory/Division4.aspx.

———. 2024b (November 11, access date). About Us - Operations. Irvine, CA: OCFA. https://ocfa.org/AboutUs/Departments/Operations.aspx.

———. 2024c (November 11, access date). Find Closest Fire Stations in Orange County. Irvine, CA: OCFA. https://ocfa.org/aboutus/StationLocator/stationlocator-map.html.

Patella, AJ. 2023 (July 21). Personal Communication. Email from A. Patella (OCSD) to J. Hitchcock (Psomas) titled Police Services Inquiry for the Proposed Santiago Creek Dam Outlet and Spillways Project.

Rivers, Tamy. 2023 (October 10). Personal Communication. Email from T. Rivers (OCFD) to J. Hitchcock (Psomas) titled Fire Services Inquiry for the Proposed Santiago Creek Dam Outlet and Spillways Project.

4.13 RECREATION

This section discusses the existing recreational uses in the Project's surrounding area and assesses the proposed Project's potential impacts to recreational amenities and facilities. The analysis in this section is based on existing regulatory documents and a literature search.

4.13.1 REGULATORY SETTING

Federal

No federal regulations related to recreation are applicable to the proposed Project.

State

No State regulations related to recreation are applicable to the proposed Project.

Local

County of Orange General Plan

Land Use Element

The Land Use Element included in the County of Orange General Plan contains official County policies on the location and character of land uses necessary for orderly growth and development. The Land Use Element has a 2025 horizon year and describes objectives, policies, and land use patterns for all unincorporated territory in the County of Orange. The Land Use Plan further establishes development criteria and standards including population density and building intensity. The Land Use Element complements the Recreation Element by incorporating its land use recommendations in policies and programs; however, the Land Use Element does not supersede the Recreation Element (County of Orange 2024).

The General Plan land use designation of the Project site is Open Space (OS), and the zoning designation is General Agricultural (A1). The OS General Plan designation provides for limited land uses that do not require a commitment of significant urban infrastructure. The Project site is also within an Open Space Reserve (OSR) overlay. The OSR designation is intended to reflect the Resources and Recreation Elements of the General Plan. It identifies major parks, beaches, forests, harbors, and other territory that is to remain open space. It may also include recreational trails and similar facilities for alternative transportation.

Recreation Element

The Recreation Element outlines a comprehensive strategy for meeting Orange County's existing and future recreation needs, set forth in an integrated framework of recreation goals, objectives, policies and programs, as well as a "master plan" for each of three components: The Local Parks Component, the Regional Riding and Hiking Trails Component, and the Regional Recreation Facilities Component (County of Orange 2012). Goals and objectives that are applicable to existing and planned recreation facilities that are in the proposed Project area are as follows:

Regional Riding and Hiking Trails Component

Goal 1: Provide a useful, enjoyable, safe, and efficient public regional riding and hiking trail system to meet the needs and desires of the citizens of the entire County.

Goal 2: Create trail linkages between open space and recreation facilities, between community, municipal, state, and federal trail systems, and between the trail systems of surrounding counties.

Regional Recreation Facilities Component

Goal 1: To provide a regional recreation network to meet the regional recreation needs of existing and future residents of the entire County.

Goal 2: To develop regional recreation facility park sites with recreation facilities designed to respond to the diverse regional recreation interests of the citizens of the County.

Goal 3: To operate and maintain regional recreation facilities providing operation programs designed for the most effective use of each site at a minimum cost.

OC Parks Strategic Plan

The 2018 OC Parks Strategic Plan was approved by the Orange County Board of Supervisors on December 4, 2018. The plan compiles research, outreach, and discussions with the public, stakeholders, the County Board of Supervisors, and OC Community Resources/OC Parks employees. The resulting document highlights OC Parks' core identity and values: Community, Commitment to Excellence, Service, Stewardship; provides a clear set of objectives to guide planning and decision-making processes; and better positions OC Parks to take on the challenges and opportunities of the present and future. OC Parks' Goals in the 2018 Strategic Plan include the following:

- Understanding the park visitors' needs, promote OC Parks;
- Protecting the parks in perpetuity, together;
- Serving as stewards of OC Parks' assets;
- Practicing sustainable financial management;
- Ensuring responsible park development and expansion;
- Implement thriving resilient ecosystems for emergency management; and
- Cultivating an effective dynamic workforce (OC Parks 2018).

4.13.2 METHODOLOGY

Recreation information for the proposed Project area was derived from various sources and compiled in this chapter to develop a comprehensive understanding of existing park and recreational opportunities as well as constraints that could occur as a result of the proposed Project. Information sources include the County of Orange General Plan.

4.13.3 EXISTING CONDITIONS

The proposed Project site is located in unincorporated County of Orange. The County recreational facilities below characterize the environmental setting of the proposed Project area.

Local Park Facilities

Unincorporated Orange County has 63 developed local parks and 20 additional parks that have been offered to and accepted by the County but are not yet developed (as of 2012). Almost 25 percent of the local parks that have been accepted by the County remain undeveloped.

Similarly, approximately 25 percent of the net local park acreage is undeveloped (116.56 net acres). Approximately 63 percent of the total gross acres accepted by the County are "usable" as defined by the Local Park Code.

Local parks are generally improved with sports fields, open play areas, play equipment, landscaped areas, trails, etc., to enhance and intensify outdoor recreational opportunities. They fulfill the specialized role of meeting neighborhood and community recreation needs and, in doing so, contribute to the County's comprehensive recreation planning efforts. Also, local parks preserve sites of archaeological/paleontological, historical, cultural, or natural resource significance, and provide views. The local park types recognized in the General Plan are as follows:

- **Community Park.** A community park is typically a 20- to 50-acre local park generally designed to meet the active recreational needs of several neighborhoods. These parks are intended to serve drive-to clientele within a radius of up to three miles. They contain facilities which require more space than neighborhood parks and which may include but not be limited to: extensive landscaping; nature areas; multipurpose playfields for softball, baseball, soccer, and football; court sport facilities for basketball, racquetball/handball, and tennis; swimming pools; and community centers with adequate off-street parking. Community parks provide the greatest economy of scale in terms of active and passive recreation potential and cost of maintenance and operation, and are generally included within large, planned communities.
- **Mini Park.** Mini parks are small, passive local parks, generally of 2,500 square feet to one acre in size. While some are preplanned as structured urban open spaces in the fabric of new developments, others are developed on vacant lots in older neighborhoods that have been combined and converted to recreation use. Size and location are usually determined by the availability of vacant land. Mini parks are essentially substitutes for backyards and are normally provided in higher-density areas. They are expensive to maintain and difficult to administer but serve an important function, especially in highly urbanized areas. These parks may serve any age group, depending on the characteristics of the neighborhood. They usually feature play apparatus and a paved area for wheeled toys, benches, and landscape treatment. They may also feature children's play areas, quiet game areas, and some sports activities such as multi-purpose courts, if space allows. Some mini parks are natural areas with minimal improvements (e.g., benches) which safeguard identified archaeological/paleontological sites, other natural resources, or serve as viewpoints.
- **Neighborhood Park.** A neighborhood park is any general use local park developed to serve the active recreation needs of a particular neighborhood within a community. The size of the park depends on the population within its service area and the extent of desired amenities but usually ranges from two to 20 acres. Typically, neighborhood parks have a maximum service radius of one-half mile and are within walking or bicycling distance of park patrons. They may feature such amenities as landscaping, children's play area, active ball fields, multipurpose playfields, game courts, open turf areas, and lighting for night use. In some cases, a neighborhood park may provide off-street parking and restrooms.
- **View/Lookout Park.** View/lookout parks are generally small (under two acres) passive sites, either natural or landscaped, provided to take advantage of a specific site opportunity from which unique views can be enjoyed.

Regional Riding and Hiking Trails

Orange County's network of regional riding and hiking trails link the harbors, beaches, parks, and other open space and recreation lands together. The Countywide regional trail network has 348 miles of existing and proposed trails. Many trails or trail segments are located in areas regulated by governmental entities other than the County of Orange, i.e., cities, State agencies, and federal agencies (County of Orange 2012).

Many regional parks are connected to each other by a network of regional riding and hiking trails and Class I (paved off-road) bikeways. Riding and hiking trails have a soft surface, typically composed of native soil or decomposed granite (DG). Trails are used by equestrians, pedestrians, and mountain bicyclists. Class I bikeways are paved with asphalt or concrete and are used by bicyclists and pedestrians (OC Parks 2024a).

According to the Orange County Regional Trails Master Layout, there are both proposed riding and hiking trails and off-road paved bikeways along Santiago Creek in the vicinity of the Project site (OC Parks 2021).

Regional Recreation Facilities

Orange County's regional recreation facilities encompass parks, nature preserves, beaches, historic parks, and harbors totaling over 60,000 existing acres. Almost all of the facilities are managed by Orange County Parks (OC Parks), the successor department to Harbors, Beaches, and Parks.

Orange County's regional recreation facilities are varied and offer a wide spectrum of activities. Regional parks offer recreational or scenic attractions that are of countywide significance and not generally available in local and municipal parks. They provide a spaciousness which the typical neighborhood or municipal park does not provide.

Regional parks offer extensive trail systems and facilities for family and group picnicking, camping, nature study, and limited active recreation areas for all age groups. They may accommodate active recreation facilities such as swimming pools, athletic fields, bowling greens, water-oriented facilities, and golf courses (where size permits), when special funding mechanisms, such as concessionaire or municipal financing, are available for construction and ongoing maintenance of the facilities (County of Orange 2012).

OC Park Facilities

Table 4.13-1, OC Parks Facilities, lists OC Parks facilities, distance from the Project site, and amenities offered at the facility.

TABLE 4.13-1
OC PARKS FACILITIES

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Aliso and Wood Canyons Wilderness Park	28373 Alicia Parkway Laguna Niguel, California	23 miles	Bike Trails, Bird Watching, Equestrian Trails, Hiking Trails, Interpretive Programs, Picnic Areas, Restrooms, Scenic Overlook
Carbon Canyon Regional Park	4442 Carbon Canyon Road Brea, California	16 miles	Ball Fields, Barbeques, Bike Trails Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Fishing, Hiking Trails, Historic Dam, Nature Center, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds Shelters, Tennis Courts, Volleyball Courts
Ronald W. Caspers Wilderness Park	33401 Ortega Highway San Juan Capistrano, California	36 miles	Amphitheater, Barbeques Bike Trails, Bird Watching, Camping, Corral, Dump Station Equestrian Camping, Equestrian Trails Fire Rings, Gazebo, Hiking Trails, Historic Windmill, Horseshoe Pits, Interpretive Programs Center, Nature Center, Picnic Areas (Tables, Restrooms), Restrooms, RV Camping, Scenic Overlook, Shelters
Ralph B. Clark Regional Park	8800 Rosecrans Avenue Buena Park, California	23 miles	Amphitheater, Ball Fields, Barbeques, Dogs Permitted on Leashes, Fishing, Hiking Trails Horseshoe Pits, Interpretive Programs Center, Model Boats, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation Playgrounds, Tennis Courts, Volleyball Courts, Weddings Special Events
Ted Craig Regional Park	3300 State College Boulevard Fullerton, California	19 miles	Ball Fields, Barbeques, Basketball Courts, Bike Trails, Bird Watching, Dogs Permitted on Leashes, Fishing, Hiking Trails, Interpretive Programs Center, Model Boats Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Racquetball Courts, Weddings Special Events
Featherly Regional Park	24001 Santa Ana Canyon Road Anaheim, California	14 miles	RV Camping, Wilderness Area
Irvine Lake	4621 E Santiago Canyon Road Silverado, California	0 miles Project site	Shoreline Fishing
Irvine Ranch Open Space	13333 Black Star Canyon Road Silverado, California	6 miles	Biking, Equestrian Activities, Hiking, Wilderness Area (Includes Fremont Canyon Nature Preserve, Limestone Canyon, and Black Star Canyon Wilderness)
Irvine Regional Park	1 Irvine Park Road California Orange, California	3 miles	Ball Fields, Barbeques, Bike Rentals Bike Trails, Boarding Stables Dogs Permitted on Leashes, Equestrian Trails Fishing, Food Concessions, Hiking Trails, Interpretive Programs Center, Paddle Boat Rentals, Picnic Areas, Picnic Shelters for Reservation, Playgrounds, Pony Rides, Train Rides

TABLE 4.13-1
OC PARKS FACILITIES

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Laguna Coast Wilderness Park	18751 Laguna Canyon Road Laguna Beach, California	20 miles	Bike Trails, Bird Watching, Equestrian Trails, Hiking Trails, Interpretive Programs, Nature Center, Picnic Areas (Tables, Restrooms), Restrooms, Scenic Overlook
Laguna Niguel Regional Park	28241 La Paz Road Laguna Niguel, California	24 miles	Amphitheater, Barbeques, Bike Trails Dogs Permitted on Leashes, Fishing Gazebo, Hiking Trails, Horseshoe Pits, Model Glider Area, Pickleball, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Scenic Overlook, Tennis Courts, Volleyball Courts, Weddings Special Events
William R. Mason Regional Park	18712 University Drive Irvine, California	15 miles	Amphitheater, Ball Fields, Bike Trails Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Fitness Par Course Gazebo, Hiking Trails, Horseshoe Pits Interpretive Programs, Model Boats, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playground Tot Lot, Playgrounds, Restrooms, Shelters, Volleyball Courts
Mile Square Regional Park	16801 Euclid Street Fountain Valley, California	18 miles	Archery, Ball Fields, Barbeques, Bike Rentals, Bike Trails, Camping, Dogs Permitted on Leashes, Fishing, Fitness Par Course, Interpretive Programs, Paddle Boat Rentals, Picnic Areas, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Restrooms, Shelters, Soccer Field, Volleyball Courts, Weddings Special Events
O'Neill Regional Park	30892 Trabuco Canyon Road Trabuco Canyon, California	19 miles	Amphitheater, Bike Trails, Camping Conference Rooms, Dump Station, Equestrian Trails, Hiking Trails, Horseshoe Pits, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Playgrounds, RV Camping, Scenic Overlook, Showers
Thomas F. Riley Wilderness Park	30952 Oso Parkway Coto de Caza, California	25 miles	Amphitheater, Bike Trails Corral, Equestrian Trails, Hiking Trails, Interpretive Programs Center, Restrooms, Scenic Overlook
Peters Canyon Regional Park	8548 E. Canyon View Avenue Orange, California	7 miles	Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Scenic Overlook
Santiago Oaks Regional Park	2145 North Windes Drive Orange, California	6 miles	Barbeques, Bird Watching, Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Historic Dam, Interpretive Programs Center, Picnic Areas (Tables, Restrooms), Playgrounds, Scenic Overlook, Weddings Special Events
Talbert Regional Park	1298 Victoria Avenue Costa Mesa, California	20 miles	Bike Trails, Dogs Permitted on Leashes, Hiking Trails, Picnic Areas (Tables, Restrooms), Restrooms, Scenic Overlook

TABLE 4.13-1
OC PARKS FACILITIES

Name	Location	Distance from Site Boundary (driving miles)	Amenities
Whiting Ranch Wilderness Park	26701 Portola Parkway Foothill Ranch, California	16 miles	Bike Trails, Equestrian Center, Equestrian Trails, Hiking Trails, Restrooms
Tri-City Regional Park	2301 Kraemer Boulevard Placentia, California	15 miles	Barbeques, Dogs Permitted on Leashes Fishing, Picnic Shelters for Reservation, Restrooms
Upper Newport Bay Nature Preserve	2301 University Drive Newport Beach, California	18 miles	Amphitheater, Bike Trails, Classroom Conference Center, Dogs Permitted on Leashes, Equestrian Trails, Gift Shop, Hiking Trails, Interpretive Programs Center, Restrooms, Scenic Overlook
Harriett M. Wieder Regional Park	19251 Seapoint Avenue Huntington Beach, California	26 miles	Dogs Permitted on Leashes, Equestrian Trails, Hiking Trails, Picnic Areas (Tables, Restrooms), Playgrounds
Yorba Regional Park	7600 East La Palma Avenue Anaheim, California 92807	15 miles	Ball Fields, Barbeques, Bike Rentals, Bike Trails, Dogs Permitted on Leashes, Equestrian Trails, Fishing, Fitness Par Course, Hiking Trails, Horseshoe Pits, Kite Flying Area, Model Boats, Paddle Boat Rentals, Picnic Areas (Tables, Restrooms), Picnic Shelters for Reservation, Playgrounds, Volleyball Courts
Source: OC Parks 2024b.			

Other Park Facilities

The Project would also be located adjacent to other park facilities run by separate jurisdictions from OC Parks, as shown in Table 4.13-2, Other Park Facilities within the Project Vicinity.

TABLE 4.13-2
OTHER PARK FACILITIES WITHIN THE PROJECT VICINITY

Name	Location	Distance from the Nearest Site Boundary	Amenities
Oak Canyon Park	5305 Santiago Canyon Road, Silverado, California	0.4 miles	Privately leased park by James Event Productions
Saddleback Motocross Park	Santiago Canyon Road, Orange, California	1.1 miles	Motor playground/motocross
OCMA (Orange County Modelers Association) Bob Swenson Flying Site	Blue Diamond Haul Road, Silverado, California	0.8 miles	Model aircraft flying

Other nearby Park facilities include smaller neighborhood and community parks within the adjacent City of Irvine, located to the southwest of the Project site.

4.13.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant recreation impact if it would:

Threshold 4.13-1 Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

Threshold 4.13-2 Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

4.13.5 IMPACT ANALYSIS

Threshold 4.13-1

Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Less Than Significant Impact. The Project would improve the existing Santiago Creek Dam and spillway to ensure structural elements are adequate during seismic events and meet current standards as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. Construction activities would include demolition of the current silt line and replacement of a new outlet structure, a raised spillway to allow for additional reservoir capacity, construction of a new bifurcation valve vault and emergency outlet downstream of the existing dam, an upsized and relocated Irvine Lake pipeline, creation of a crest control structure and embankment enhancements, addition of a stilling basin, ancillary site improvements, and access road improvements for Southern California Edison (SCE) utility line relocation. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide to accommodate a wider access road, and protective railings would be installed on both sides of the access road. See Section 3.0, Project Description, for a full description of the proposed construction and demolition activities.

Temporary Construction Impacts

During construction activities, portions of Irvine Lake will be temporarily closed and drained in order to complete the dam and spillway improvements on-site. As Irvine Lake experiences high community use, especially for shoreline fishing purposes, the Project would have a temporary adverse impact during construction, which is anticipated to occur over approximately three years.

As such, other nearby parks within the County would serve community residents' recreational needs while Irvine Lake is temporarily under construction, as shown in Table 4.13-1, above. The nearest public recreational facilities to the proposed Project include Oak Canyon Park, Saddleback Motocross Park, Irvine Regional Park, OCMA flying site, Fremont Canyon Nature Preserve, Black Star Canyon Wilderness Park, Limestone Canyon Regional Park, and Peters Canyon Regional Park. The nearby facilities within the Project area would be able to support an increase in hikers, bikers, and RVs temporarily during the construction duration, as there is a wide array of recreational facilities with varied amenities that would be able to serve the population during construction. In addition, construction access for the Project would occur via Blue Diamond Haul Road and would not interfere with the OCMA site's access.

In addition, the Project would result in temporary impacts related to shoreline fishing during construction. Other OC Parks facilities include fishing amenities, such as Carbon Canyon Regional Park, Ralph B. Clark Regional Park, Ted Craig Regional Park, Mile Square Regional Park, Tri-City Regional Park, and Yorba Regional Park. Community residents would be able to temporarily utilize other OC Parks facilities within the site vicinity during construction. The Project would ultimately result in a temporary loss of fishing capabilities at the site, but other facilities within the site vicinity would be available to meet the community residents' recreational needs. In addition, the temporary loss of fishing on-site is within a coordinated agreement with the County of Orange, which is the entity responsible for maintaining and restocking fish within Irvine Lake. Although the Project would increase the use of nearby recreational facilities within the Project vicinity, the construction activities would be temporary in nature and would not create a significant long-term impact.

Operational Impacts

The proposed Project does not include any increase in residential units that would increase the permanent residential base of the County. Since demand for parks is typically based on the permanent residential population, and because no population increase would occur as part of the proposed Project, the proposed project would not result in an increase in demand/use on existing parks that could result in substantial physical deterioration during operations.

Following construction, the area would be restored as a reservoir and OC Parks may choose to reopen the facility for fishing and other recreational purposes. Similar to current conditions, the recreational aspect of the facility is managed by OC Parks separate from the Project and IRWD's control. Therefore, future use as a recreational facility is not an element of this Project; however, the Project would accommodate future use as a recreational facility, similar to current conditions. Additionally, under current conditions, OC Parks has the ability to close Irvine Lake to recreational activities at any time, but other recreational facilities throughout the County would continue to serve the public without necessary physical expansion of or improvements to facilities. As a result, impacts related to physical deterioration of nearby recreational facilities would be less than significant.

Impact Conclusion: *The proposed Project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. Less than significant impacts would occur.*

Threshold 4.13-2

Would the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact. The proposed Project involves abandonment of the existing Santiago Creek Dam outlet tower, construction of a new inclined outlet structure located on the left abutment of the existing dam, structural improvements to the dam spillway, and modifications and enhancements to the dam embankment to permit operation of the facilities for a long-term water resource benefit. As discussed previously, the Project is not anticipated to induce population growth; therefore, it would not directly or indirectly impact any local recreational facilities through increase of use. In addition, the Project would not result in the construction or expansion of recreational facilities beyond the proposed Project, which would create improvements to Irvine Lake. No impacts related to demand or use of recreational facilities would occur, and no mitigation is required.

Impact Conclusion: *The proposed Project would not include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment. No impact would occur.*

4.13.6 CUMULATIVE IMPACTS

The proposed Project does not have a residential component that would generate population and significantly increase demand for recreational facilities. While other projects in the area with residential elements would result in increased demand on existing parks and recreation related facilities and services, the proposed Project would not contribute to the cumulative impact on existing facilities or require construction of facilities that would impact the environment. The proposed Project would result in temporary construction activities that may have a short-term increase in the surrounding parks; however, this would not create long-term impacts or significantly contribute to cumulative impacts.

All cumulative projects that would likely result in increased population would therefore also result in the increased use of local and regional recreational amenities. However, these cumulative projects would either include recreational facilities and amenities for use by future residents of the proposed communities or would meet their fair share requirement by paying in- lieu fees, which would minimize both the potential for substantial physical deterioration of recreational facilities by improving existing County parks and the need to provide local and regional recreation facilities that would serve the increased population. As cumulative projects provide for the construction or expansion of recreational facilities, the potential impacts associated with development of the facilities would be addressed and mitigation measures proposed, which would serve to minimize impacts on the environment. Therefore, the Project's contribution to the cumulative physical impact on local and regional recreational facilities would be less than significant.

4.13.7 MITIGATION PROGRAM

Mitigation Measures

No mitigation is required.

4.13.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Less than significant impact.

4.13.9 REFERENCES

OC Parks. 2024a (November 11, access date). Regional Trails. Irvine, CA: OC Parks. https://ocparks.com/parks-trails/regional-trails.

———. 2024b (November 11, access date). Parks and Trails. Irvine, CA: OC Parks. https://ocparks.com/parks-trails.

———. 2021. Major Riding and Hiking Trails and Off-Road Paved Bikeways. Irvine, CA: OC Parks. https://www.ocparks.com/sites/ocparks/files/2021-04/Orange%20County%20Regional%20Trails%20Master%20Layout.pdf.

———. 2018 (December 4, approved). OC Parks Strategic Plan. Irvine, CA: OC Parks. https://www.ocparks.com/sites/ocparks/files/import/data/files/82682.pdf.

Orange, County of. 2024 (June, updated). General Plan, Chapter III. Land Use Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2024-07/Adopted%20Land%20Use%20Element%20Amendment%20-%20June%202024.pdf.

———. 2012. General Plan, Chapter VII. Recreation Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/24960.pdf.

This page intentionally left blank

4.14 TRANSPORTATION

This section of the Environmental Impact Report (EIR) describes the existing transportation conditions in the Project area, identifies associated potential transportation impacts related to development of the proposed Project, and sets forth measures designed to mitigate identified significant adverse impacts.

4.14.1 REGULATORY SETTING

Federal

There are no federal regulations applicable to the proposed Project.

State

California Department of Transportation (Caltrans)

The California Department of Transportation (Caltrans) manages interregional transportation, including management and construction of the California highway system. In addition, Caltrans is responsible for permitting and regulation of the use of State roadways. The Project area includes four highways that fall under Caltrans' jurisdiction: State Route (SR) 261 and SR-241.

Caltrans' construction practices require temporary traffic control planning "when the normal function of a roadway, or private road open to public travel, is suspended" (FHWA 2012). In addition, Caltrans requires that permits be obtained for transportation of oversized loads and licenses be obtained for transportation of certain materials.

Senate Bill No. 743

Approved in 2013, Senate Bill (SB) 743 amended the California Environmental Quality Act (CEQA) Guidelines to provide an alternative to level of service (LOS) for evaluating transportation impacts. In accordance with Senate Bill (SB) 743, the new CEQA Guidelines Section 15064.3, subdivision (b) was adopted in December 2018 by the California Natural Resources Agency. These revisions to the CEQA Guidelines' criteria for determining the significance of transportation impacts are primarily focused on projects within transit priority areas and shift the focus from automobile delay to reduction of greenhouse gas emissions, creation of multimodal networks, and promotion of a mix of land uses. Automobile delay, as measured by LOS and other similar metrics, generally no longer constitutes a significant environmental effect under CEQA. The intent of this legislation was to balance the need for traffic LOS standards with the need to build infill housing and mixed-use commercial developments within walking distance of mass transit facilities, downtowns, and town centers. In doing so, this legislation aims to provide greater flexibility to local governments to balance these sometimes-competing needs. However, a jurisdiction may still adopt LOS as a performance standard for analyzing traffic conditions and maintaining throughput on its highway system. The Governor's Office of Planning and Research (OPR) has adopted changes to the CEQA Guidelines that identify vehicle miles traveled (VMT) as the most appropriate metric to evaluate a project's transportation impacts. VMT is a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person. OPR determined that lead agencies must, by July 1, 2020, implement the new VMT requirements. With the adoption of SB 743, the State of California changed the method of traffic analysis required by CEQA for projects. The law changed the way local jurisdictions analyze transportation impacts from development projects and identify mitigation measures to reduce those impacts. SB 743 became effective on July 1, 2020. The previous practice of evaluating traffic transportation impacts used vehicular LOS on the local roadway system. SB 743 requires

that the amount of driving and length of trips — as measured by VMT — be used to assess transportation impacts under CEQA. These impacts would be reduced or "mitigated" by options such as increasing transit, providing for active transportation such as walking and biking, and participating in mitigation banks. All jurisdictions have the option to tailor requirements to their unique communities.

Regional

Southern California Association of Governments (SCAG)

Under federal law, Southern California Association of Governments (SCAG) is designated as a Metropolitan Planning Organization and under State law as a Regional Transportation Planning Agency and a Council of Governments for Orange County and the Project site. The SCAG region encompasses six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura) and 191 cities in an area covering more than 38,000 square miles. The agency develops long-range regional transportation plans, including sustainable communities' strategies and growth forecast components, regional transportation improvement programs, regional housing needs allocations, and a portion of the South Coast Air Quality management plans (SCAG 2024b).

Connect SoCal

On April 4, 2024, SCAG's Regional Council unanimously voted to approve and fully adopt Connect SoCal (2024–2050 Regional Transportation Plan/Sustainable Communities Strategy; [RTP/SCS]) (SCAG 2024a). Connect SoCal is a long-range plan that builds upon and expands land use and transportation strategies established over several planning cycles to increase mobility options and achieve a more sustainable growth pattern. It charts a path toward a more mobile, sustainable, and prosperous region by making connections between transportation networks, between planning strategies, and between the people whose collaboration can improve the quality of life for Southern Californians. Connect SoCal outlines more than $751 billion in transportation system investments through 2050. It was prepared through a collaborative, continuous, and comprehensive process with input from local governments, county transportation commissions, tribal governments, non-profit organizations, businesses, and local stakeholders within the region's counties (SCAG 2024c).

Master Plan of Arterial Highways

The Master Plan of Arterial Highways (MPAH) was initially established by the County of Orange in 1956 to ensure that a regional arterial highway network would be planned, developed, and preserved, in order to supplement the County's developing freeway system. This vision has withstood the test of time and is consistent with the U.S. Department of Transportation's view today "that multiagency collaboration is a critical element in developing 21st century solutions for 21st century transportation challenges, such as reducing traffic congestion". Arterial highways are shown on the MPAH map as either: (1) established alignments depicted by solid lines on the map, including existing highways where the centerline is the precise centerline; and (2) future highways where the Board of Supervisors, a City Council, or the subdivision process has established a precise alignment; and conceptually proposed alignments, defined by intermittent lines indicating future facilities whose precise alignment has not yet been determined (OCTA 2017).

Local

Orange County Congestion Management Program

The Orange County (County) Congestion Management Program (CMP) was originally adopted in 1991 and updated in November 2023. The goals of the Orange County CMP are to support regional mobility and air quality objectives by reducing traffic congestion, to provide a mechanism for coordinating land use and development decisions that support the regional economy, and to determine gas tax fund eligibility. To meet these goals, the CMP contains a number of policies designed to monitor and address system performance issues. The Orange County Transportation Authority (OCTA) was designated as the Congestion Management Agency (CMA) for the County. As a result, the OCTA is responsible for developing, monitoring, and updating (biennially) Orange County's CMP (OCTA 2023).

A key element of the CMP's current Land Use Analysis Program is the preparation by local jurisdictions of a traffic impact analysis. The traffic impact analysis reports are designed to provide an improved basis for assessing the impacts of land use decisions on the regional transportation system, both within and outside the permitting jurisdiction, by providing a consistent format to identify impacts and mitigation and by evaluating mitigation costs. A CMP traffic impact analysis includes additional requirements and evaluations as compared to a typical traffic study. A traffic impact analysis report helps to determine appropriate mitigation measures and financial responsibilities for resolving CMP system impacts and for developing appropriate mitigation for future development projects.

Orange County Bikeways Strategic Plan

OCTA adopted the 2009 Commuter Bikeways Strategic Plan (CBSP) on May 22, 2009 to encourage the enhancement of Orange County's regional bikeways network in order to make bicycle commuting a more viable and attractive travel option. The CBSP is intended to create a comprehensive blueprint of the existing bikeways in the county as well as to propose new facilities to complete a network of bikeways. The projects described in the CBSP are a compilation of projects planned by Orange County cities and the County of Orange. The CBSP is a long-range, financially unconstrained planning document (OCTA 2012).

Southern California Association of Governments

In September 2020, SCAG's Regional Council adopted Connect SoCal (2020–2045 RTP/SCS), and the addendum to the Connect SoCal Program EIR.

Connect SoCal is a long-range visioning plan that builds upon and expands land use and transportation strategies established over several planning cycles to increase mobility options and achieve a more sustainable growth pattern. It charts a path toward a more mobile, sustainable, and prosperous region by making connections between transportation networks, between planning strategies, and between the people whose collaboration can improve the quality of life for Southern Californians.

Connect SoCal outlines more than $638 billion in transportation system investments through 2045. It was prepared through a collaborative, continuous, and comprehensive process with input from local governments, county transportation commissions, tribal governments, non-profit organizations, businesses, and local stakeholders within the region's counties (SCAG 2020).

County of Orange General Plan

Recreation Element

The Recreation Element outlines a comprehensive strategy for meeting Orange County's existing and future recreation needs, set forth in an integrated framework of recreation goals, objectives, policies and programs, as well as a "master plan" for each of three components: The Local Parks Component, the Regional Riding and Hiking Trails Component, and the Regional Recreation Facilities Component (County of Orange 2012). Goals and objectives that are applicable to the proposed Project are as follows:

Regional Riding and Hiking Trails Component

Goal 1: Provide a useful, enjoyable, safe, and efficient public regional riding and hiking trail system to meet the needs and desires of the citizens of the entire County.

Goal 2: Create trail linkages between open space and recreation facilities, between community, municipal, state, and federal trail systems, and between the trail systems of surrounding counties.

Transportation Element

The Transportation Element, sets forth the County's strategy for planning, developing, and maintaining a surface transportation system to serve unincorporated areas of the County. Goals and objectives that are applicable to the proposed Project are as follows:

Goal 5: Manage peak hour traffic congestion to achieve an acceptable level of service (LOS) on existing and future circulation plan facilities in the unincorporated areas of the County.

Objective 5.3: Reduce Vehicle Miles Traveled in an effort to reduce greenhouse gas (GHG), pursuant to SB 743. See "Guidelines for Evaluating Vehicle Miles Traveled Under CEQA" and "2020 Updated Transportation Implementation Manual".

4.14.2 METHODOLOGY

Transportation information for the proposed Project area was derived from various sources and compiled in this chapter to develop a comprehensive understanding of existing transportation and circulation conditions as well as constraints that could occur as a result of construction and operation of the proposed Project. Information sources include Caltrans and OCTA.

4.14.3 EXISTING CONDITIONS

Regional Setting

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. The Project is located south of SR-261 and east of SR-241 and Santiago Canyon Road. The regional transportation system is comprised of an interconnected network of roadways, local transit systems, and pedestrian and bicycle facilities. Freeways and toll roads in the general vicinity of the proposed Project site include the Eastern Transportation Corridor (SR-261) to the southwest and the Foothill Transportation Corridor (SR-241) to the north, west, and southwest. Santiago Canyon Road is a primary arterial highway located to the west of the Project site (OCTA 2024a).

SR-261 is a 6-mile-long north–south State highway that provides regional access to the Project area, running between Anaheim Hills and Irvine in the vicinity of the proposed Project. SR-261 has an on- and off-ramp at Santiago Canyon Road/Chapman Avenue approximately 1.3 miles west of the proposed Project site.

SR-241 is a 24-mile-long north–south State highway that provides regional access to the Project area, running between Ladera Ranch and Irvine in the vicinity of the proposed Project. SR-241 has an on- and off-ramp at Santiago Canyon Road/Chapman Avenue approximately 1.3 miles southwest of the proposed Project site.

Local Roadways

The proposed Project site is located on the eastern side of Santiago Canyon Road. The following roadway provides both local access to the proposed Project site and connects to the regional arterials and highways described above:

Santiago Canyon Road is a two-lane roadway classified as a primary arterial highway with rural characteristics. The roadway is curved with several steep grade changes. Numerous trees and utility poles are located along the sides of the road. The road has multiple intersections and driveways serving residences, local businesses, and recreational destinations. Santiago Canyon Road changes its name to Chapman Avenue in Orange Hills and to El Toro in Mission Viejo. The travel lanes are generally 12 feet in width with bike lanes adjacent to the travel lanes.

Existing Transit Service

The County of Orange is served by Metrolink train service and the OCTA bus service. Metrolink is a commuter rail service operated by the Southern California Regional Rail Authority. Multiple stops during the morning and evening commuting period are provided at stations located in Irvine, Laguna Niguel, Tustin, and San Juan Capistrano. The nearest train station to the proposed Project site is the Tustin Metrolink, approximately 7 miles southwest of the proposed Project site (Metrolink 2024). There are currently no bus routes in the vicinity of the Project site (OCTA 2024b).

Existing Bicycle and Pedestrian Facilities

Many regional parks are connected to each other by a network of regional riding and hiking trails and Class I (paved off-road) bikeways. Riding and hiking trails have a soft surface, typically composed of native soil or decomposed granite (DG). Trails are used by equestrians, pedestrians, and mountain bicyclists. Class I bikeways are paved with asphalt or concrete and are used by bicyclists and pedestrians.

According to the Orange County Regional Trails Master Layout, there are both proposed riding and hiking trails and off-road paved bikeways along Santiago Creek in the vicinity of the Project site (OC Parks 2021).

4.14.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, a project would result in a significant transportation impact if it would:

Threshold 4.14-1 Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

Threshold 4.14-2 Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).

Threshold 4.14-3 Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Threshold 4.14-4 Result in inadequate emergency access.

4.14.5 IMPACT ANALYSIS

Threshold 4.14-1

Would the Project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Less Than Significant Impact. Implementation of the proposed Project is expected to generate short-term traffic impacts generated during the construction period. Vehicle trips would be generated by trucks hauling soil from the borrow sites along the access road to the work area and to the dam as well as potential import and export of material periodically over the four-year construction period, and workers commuting to and from the Project site. It is anticipated that these trips would be concentrated internally to the Project site, and external trips related to employee commutes and potential import and export of soil would be nominal would not be concentrated during traffic peak hours.

To facilitate the movement of construction traffic including worker commutes and to minimize potential disruptions, a Traffic Control Plan would be prepared in accordance with County requirements and followed during construction. The Traffic Control Plan would include measures such as requiring an encroachment permit for work in the public right-of-way, limiting heavy truck activity during peak hours, using flaggers to manage short-term traffic control, requiring a formal traffic control plan for lane closures, limiting time and duration of closures, and/or requiring a minimum number of lanes to be open for travel during peak hours. Compliance with the Traffic Control Plan and County requirements would prevent any conflict between the Project and applicable plans, ordinances, or policies; and the Project's impact would be less than significant.

Under existing conditions, a small number of vehicle trips are associated with routine inspection and maintenance of the existing dam. It is anticipated that routine inspection and maintenance trips would continue and that no new operational trips would occur with implementation of the proposed Project. Therefore, because there would be no increase in daily trips associated with daily operation of the Project components, no Project related traffic impacts are anticipated.

The proposed Project would not result in any long-term trip generation or associated traffic impacts because the proposed Project involves abandonment of the existing Santiago Creek Dam outlet tower and construction of a new inclined outlet structure located on the left abutment of the existing dam in addition to structural improvements to the dam spillway and enhancements to the dam embankment. Additionally, the proposed Project does not involve any activities that would conflict with non-vehicular modes of transportation. Impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *Project construction and operation would not result in a significant impact. Based on the above evaluation, with compliance with the Traffic Control Plan and County requirements, Project construction impacts would be less than significant. Additionally, it is anticipated that routine inspection and*

maintenance trips would continue, and no new operational trips would occur with implementation of the proposed Project. Therefore, the potential operation impacts would be less than significant, and no mitigation is required.

Threshold 4.14-2

Would the Project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

No Impact. The nearest intersection to the proposed Project that has been designated by OCTA as a Congestion Management Program intersection is Irvine Boulevard and Jamboree Drive. This intersection is approximately 5 miles southwest of the Project site (OCTA 2017). Due to the nominal amount of traffic generated by the proposed Project and its distance from the designated intersection, no impact would occur at the intersection, and no mitigation is required.

Impact Conclusion: *The Project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b), pursuant to Threshold 4.14-2. No impact would occur, and no mitigation is required.*

Threshold 4.14-3

Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The proposed Project would involve improvements to the Santiago Creek Dam outlet works and spillway facility improvements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. The Project does not propose any modifications to the existing circulation system in the Project's vicinity. The Project would not implement any sharp curves or dangerous intersections and would not create incompatible uses as the Project would continue operation as an existing dam and spillway. Although construction would occur over an extended duration (approximately four years), the construction traffic would still be temporary. In addition, because the Project would not alter the existing roadways, no impact would occur, and no mitigation is required.

Impact Conclusion: *No impact would occur related to hazards due to a design feature or incompatible uses, pursuant to Threshold 4.14-3. No mitigation is required.*

Thresholds 4.14-4

Would the Project result in inadequate emergency access?

Less Than Significant Impact. The proposed Project would involve improvements to the Santiago Creek Dam outlet works and spillway facility improvements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. During construction, existing access routes would be maintained at the Project site. Furthermore, emergency access routes are already in place at the Project site, and proposed Project actions would not alter access. Therefore, no impact to local or regional emergency access routes would occur, and no mitigation is required.

Impact Conclusion: *No impact to local or regional emergency access routes would occur, pursuant to Threshold 4.14-4. No mitigation is required.*

4.14.6 CUMULATIVE IMPACTS

As discussed above, the proposed Project would not result in any impacts to transportation and circulation in the area. Given the small number of vehicle trips that are associated with routine inspection and maintenance at the existing dam, it is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of the proposed Project. Therefore, because there would be no increase in daily trips associated with daily operation of the Project components, no Project-related traffic impacts are anticipated. Similarly, given no increase in daily trips, the Project would not contribute to cumulative impacts to local and regional transportation facilities or circulation in the area. No cumulative impacts would result, and no mitigation is required.

Additionally, the Project does not propose relocation of the access or entry to the site such that it would create a design hazard. The Project would not result in any deviation from the County of Orange standards. Therefore, no contribution to a cumulative physical impact pertaining to a hazard due to a design feature or inadequate emergency access would occur, and no mitigation is required.

4.14.7 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant transportation impacts; therefore, no mitigation measures are required.

4.14.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed Project would result in any project-specific and cumulative impacts to transportation or circulation in the area. No impacts would occur, and no mitigation is required.

4.14.9 REFERENCES

OC Parks. 2021. Major Riding and Hiking Trails and Off-Road Paved Bikeways. Irvine, CA: OC Parks. https://www.ocparks.com/sites/ocparks/files/2021-04/Orange%20County%20Regional%20Trails%20Master%20Layout.pdf.

Federal Highway Administration (FHWA). 2012 (May, revised). Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways 2009 Edition Including Revision 1 dated May 2012 and Revision 2 Dated May 2012. Washington, D.C.: FHWA. https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/mutcd2009r1r2edition.pdf.

Metrolink. 2024 (November 6, date accessed). Find the Nearest Station. Los Angeles, CA: Metrolink. https://metrolinktrains.com/rider-info/general-info/stations/?gclid=CjwKCAjwyNSoBhA9EiwA5aYlb1sr6b5AD0Hv9GyhB6qce4r4ZOU_N2wL1D4UL5Zr72rckeaoI5wCKxoCphkQAvD_BwE.

Orange, County of. 2012. General Plan, Chapter VII. Recreation Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/24960.pdf.

Orange County Transportation Authority (OCTA). 2024a (November 6, date accessed). Master Plan of Arterial Highways Overview. Orange, CA: OCTA. https://www.octa.net/programs-projects/projects/streets-projects/master-road-plan/.

———. 2024b (November 6, date accessed). System Map. Orange, CA: OCTA. https://www.octa.net/getting-around/bus/oc-bus/routes-and-schedules/system-map/.

———. 2023 (November, adopted). 2023 Orange County Congestion Management Program Report. Orange, CA: OCTA. 2023 Orange County Congestion Management Program Report.

———. 2012 (May 14). Addendum to the 2009 OCTA Commuter Bikeways Strategic Plan (CBSP). Orange, CA: OCTA. https://www.octa.net/pdf/2009CommuterBikewaysStrategicPlanAddendum.pdf.

Southern California Association of Governments (SCAG). 2024a (April 4, adopted). The 2024-2050 Regional Transportation Plan/Sustainable Communities Strategy—Connect SoCal. Los Angeles, CA: SCAG. https://scag.ca.gov/sites/main/files/file-attachments/23-2987-connect-socal-2024-final-complete-040424.pdf?1714175547.

———. 2024b (November 6, date accessed). About Us. Los Angels, CA: https://scag.ca.gov/about-us.

———. 2024c (November 6, date accessed). Connect SoCal: A Plan for a Brighter Future. Los Angels, CA: https://scag.ca.gov/connect-socal.

This page intentionally left blank

4.15 TRIBAL CULTURAL RESOURCES

This section of the Environmental Impact Report (EIR) describes the existing tribal cultural resources setting in the Project area, identifies associated potential tribal cultural resources impacts related to development of the proposed Project, and sets forth measures designed to mitigate identified significant adverse impacts. Information in this section is based on the *Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California* (Report) completed by Psomas in February 2024 (Appendix D), the *Historical Resources Assessment, Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California*, prepared by South Environmental in November 2023 and included as an attachment to the Report, and the results of consultation with California Native American Tribes conducted by Irvine Ranch Water District (IRWD) for the Project, as required by the California Environmental Quality Act (CEQA) per the recent amendment by Assembly Bill (AB) 52.

4.15.1 REGULATORY SETTING

Federal

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, promotes the preservation, enhancement, and productive use of historic resources. The NHPA established the Advisory Council on Historic Preservation (ACHP) and provided procedures for the ACHP and federal agencies in promoting historic preservation.

Section 106 of the NHPA, which is included in 36 Code of Federal Regulations (CFR) Part 800, requires that federal actions and uses of federal funds be accompanied by analysis of their potential effects on historic properties or those listed in or eligible for listing in the National Register of Historic Places (NRHP, National Register).

National Register of Historic Places

The National Historic Preservation Act of 1966 established the National Register as “an authoritative guide to be used by federal, State, and local governments, private groups and citizens to identify the Nation’s historic resources and to indicate what properties should be considered for protection from destruction or impairment.” The National Register recognizes a broad range of historical and cultural resources that are significant at the national, State, and local levels and can include districts, buildings, structures, objects, prehistoric archaeological sites, historic-period archaeological sites, traditional cultural properties, and cultural landscapes. Within the National Register, approximately 2,500 (3 percent) of the more than 90,000 districts, buildings, structures, objects, and sites are recognized as National Historic Landmarks or National Historic Landmark Districts as possessing exceptional national significance in American history and culture.

While individual historic properties derive their significance from one or more of the criteria discussed in the next section, a historic district derives its importance from being a unified entity, even though it is often composed of a variety of resources. With a historic district, the historic resource is the district itself. The identity of a district results from the interrelationship of its resources, which can be an arrangement of historically or functionally-related properties. A district is defined as a geographic area of land containing a significant concentration of buildings, sites, structures, or objects united by historic events, architecture, aesthetic, character, and/or physical development. A district’s significance and historic integrity determine its boundaries.

A resource that is listed in or eligible for listing in the National Register is considered an "historic property" under Section 106 of the NHPA.

Criteria

To be eligible for listing in the National Register, a resource must be at least 50 years of age, unless it is of exceptional importance as defined in Title 36 CFR, Part 60, Section 60.4(g). In addition, a resource must be significant in American history, architecture, archaeology, engineering, or culture. Four criteria for evaluation have been established to determine the significance of a resource:

A. Are associated with events that have made a significant contribution to the broad patterns of our history;

B. Are associated with the lives of persons significant in our past;

C. Embodies the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Have yielded, or may be likely to yield, information important in prehistory or history.

Historic Districts

The National Park Service defines a historic district as "a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development." A district must be "a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures, and objects, or by documented differences in patterns of historic development or associations." Boundaries must be based upon a shared relationship among the properties constituting the district.

Within a historic district, a building, structure, or feature is considered a contributor if it was constructed during the period of significance, contributes to the property's historic significance and character, and retains sufficient integrity to convey that significance. Non-contributors are those buildings that were constructed outside of the period of significance, do not contribute to the property's historic significance and character, and/or do not retain sufficient integrity.

Period of Significance

According to the National Park Service, in addition to the above criteria, significance is defined by the area of history in which the property made important contributions and by the period of time when these contributions were made. This is referred to as the period of significance. The period of significance is the length of time when a property was associated with important events, activities or persons, or attained the characteristics which qualify it for listing. The period of significance usually begins with the date when significant activities or events began giving the property its historic significance; this is often a date of construction. The period of significance can be as brief as a single year; many, however, span many years and consist of beginning and closing dates. Identification and definition of the period of significance is based on "specific events directly related to the significance of the property," for example, the date of construction, years of ownership, or length of operation as a particular entity.

Integrity

In addition to meeting one or more of the criteria of significance, a property must have integrity, which is defined as "the ability of a property to convey its significance." The National Register recognizes seven qualities that, in various combinations, define integrity. The seven factors that define integrity are location, design, setting, materials, workmanship, feeling, and association. To retain historic integrity, a property must possess several, and usually most, of these seven aspects. Thus, the retention of the specific aspects of integrity is paramount for a property to convey its significance. In general, the National Register has a higher integrity threshold than State or local registers.

The National Register recognizes seven aspects or qualities that comprise integrity: location, design, setting, materials, workmanship, feeling, and association. These qualities are defined as follows:

- *Location* is the place where the historic property was constructed or the place where the historic event took place.
- *Design* is the combination of elements that create the form, plan, space, structure, and style of a property.
- *Setting* is the physical environment of a historic property.
- *Materials* are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- *Workmanship* is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- *Feeling* is a property's expression of the aesthetic or historic sense of a particular period of time.
- *Association* is the direct link between an important historic event or person and a historic property.

State

California Register of Historical Resources

The California Register of Historical Resources (CRHR) program encourages public recognition and protection of resources of architectural, historical, archaeological, tribal cultural resources, and cultural significance; identifies historical resources for State and local planning purposes; determines eligibility for State historic preservation grant funding; and affords certain protections under CEQA. The criteria established for eligibility for the CRHR are directly comparable to the national criteria established for the National Register (as discussed in Section 4.4, Cultural Resources).

In order to be eligible for listing in the CRHR, a building, object, or structure must satisfy at least one of the following four criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States;
2. It is associated with the lives of persons important to local, California, or national history;
3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or

4. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Archaeologists and Tribal Representatives assess sites based on all four of the above criteria but usually focus on the fourth criterion provided above. Historical resources eligible for listing in the CRHR must also retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. For the purposes of eligibility for the CRHR, integrity is defined as "the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance". This general definition is generally strengthened by the more specific definition offered by the NRHP—the criteria and guidelines on which the CRHR criteria and guidelines are based upon.

California Environmental Quality Act

Archaeological and Historical Resources

CEQA requires a lead agency to determine whether a project would have a significant effect on the environment, including historical resources. CEQA Guidelines Section 15064.5, Determining the Significance of Impacts to Archeological and Historical Resources, requires that all private and public activities not specifically exempted should be evaluated against the potential for environmental damage, including effects to historical resources. Historical resources are recognized as part of the environment under CEQA. According to Section 5020.1 of the Public Resources Code, historical resources are defined as "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California". An archeological site may be considered an historical resource if it is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California (Public Resource Code § 5020.1(j)) or if it meets the criteria for listing on the California Register (14 California Code of Regulations § 4850).

Lead agencies must evaluate historical resources against the CRHR criteria before making a finding as to a proposed project's impacts to historical resources. Mitigation of adverse impacts is required if the proposed project would cause substantial adverse change to a historical resource. Substantial adverse change includes demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired. While demolition and destruction are fairly obvious significant impacts, it is more difficult to assess when change, alteration, or relocation crosses the threshold of substantial adverse change. The CEQA Guidelines provide that a project that demolishes or alters those physical characteristics of a historical resource that convey its historical significance (i.e., its character-defining features) can be considered to materially impair the resource's significance. The CRHR is used in the consideration of historical resources relative to significance for purposes of CEQA. The CRHR includes resources listed in, or formally determined eligible for listing in, the NRHP, as well as some California State Landmarks and Points of Historical Interest. Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise.

Generally, a resource shall be considered by the lead agency to be a "historical resource" if it:

1. Is listed in or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources (California Public Resources Code Section 5024.1, Title 14 California Code of Regulations, Section 4850, *et seq.*).
2. Is included in a local register of historical resources or is identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code.
3. Is a building or structure determined to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.

Tribal Cultural Resources/Assembly Bill 52

In September 2014, Governor Brown signed AB 52 (Chapter 532, Statutes of 2014), which creates a new category of environmental resources that must be considered under CEQA: "tribal cultural resources." The legislation imposes new requirements for offering to consult with California Native American tribes regarding projects that may affect a tribal cultural resource, emphasizes a broad definition of what may be considered to be a tribal cultural resource, and includes a list of recommended mitigation measures (MMs).

Recognizing that tribes may have expertise regarding their tribal history and practices, AB 52 requires lead agencies to provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project if they have requested notice of projects proposed within that area. MMs agreed upon during consultation will be considered for inclusion in the environmental document.

AB 52, which became effective on July 1, 2015, and codified in Public Resources Code section 21080.3 et seq., requires lead agencies to provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project, if they have requested such notice in writing. Once Native American tribes receive a project notification, they have 30 days to respond and identify if they wish to initiate consultation regarding the project on subjects such as mitigation for any potential project impacts to tribal cultural resources. A tribal cultural resource is defined as either a site, feature, place, or cultural landscape that is geographically defined in terms of size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is eligible for the CRHR or a local historic register. If a tribe requests consultation and the lead agency and the tribe ultimately agree on mitigation to address any potentially significant impacts to tribal cultural resources, the mitigation measures agreed upon during consultation must be recommended for inclusion in the environmental document.

Native American Historic Resource Protection Act

Established in 2002, the Native American Historic Resource Protection Act, establishes a misdemeanor for unlawfully and maliciously excavating upon, removing, destroying, injuring, or defacing a Native American historic, cultural, or sacred site that is listed or may be eligible for listing in the CRHR. The focus of this legislation was to provide additional legal protection for Native American historical and cultural sites, art, and other cultural artifacts found at those sites. The Act also encourages collaborative relationships for the protection of Native American cultural resources between Native Americans and landowners. Funding and other State assistance should be encouraged for support of voluntary agreements to conserve, maintain, and provide physical access for Native Americans to these cultural resources.

California Health and Safety Code (Sections 7050.5, 7051, and 7054)

These sections of the California Health and Safety Code collectively address the illegality of interference with human burial remains (except as allowed under applicable sections of the California Public Resources Code). These sections also address the disposition of Native American burials found in archaeological sites and protect such remains from disturbance, vandalism, or inadvertent destruction. Procedures to be implemented are established for (1) the discovery of Native American skeletal remains during construction of a project; (2) the treatment of the remains prior to, during, and after evaluation; and (3) reburial.

Section 7050.5 of the *California Health and Safety Code* specifically provides for the disposition of accidentally discovered human remains. Section 7050.5 states that if human remains are found, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County Coroner has determined whether the human remains are likely of Native American origin, and, if so, the most likely descendant is given the opportunity to suggest appropriate treatment and disposition of the human remains pursuant to California Public Resources Code Section 5097.98, discussed below.

California Public Resources Code (Section 5097.98)

Section 5097.98 of the Public Resources Code states that, if remains are determined by the Coroner to be of Native American origin, the Coroner must notify the Native American Heritage Commission (NAHC) within 24 hours. When the NAHC receives this notification from a County Coroner, it shall immediately notify those persons it believes to be most likely descended from the deceased Native American. The descendants may, with the permission of the owner of the land or his or her authorized representative, inspect the site of the remains and may recommend to the owner or the person responsible for the excavation work means for treatment or disposition, with appropriate dignity, of the human remains and any associated grave goods. The descendants shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site. This regulation also requires that, upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations and all reasonable options regarding their preferences for treatment. This section of the Public Resources Code has been incorporated into Section 15064.5(e) of the CEQA Guidelines.

4.15.2 METHODOLOGY

Native American Consultation

On September 11, 2020, Psomas requested that the NAHC conduct a search of its Sacred Lands File (SLF) to determine if cultural resources important to Native Americans have been recorded in the Project site or in the immediate vicinity. For the purposes of AB 52, a tribal cultural resource is considered a site, feature, place, cultural landscape, sacred place, or object which is of cultural value to a California Native American Tribe and is either eligible for the CRHR or a local register.

The results of the NAHC SLF search were received on October 9, 2020, and were positive for sacred lands in the vicinity of the Project site. The NAHC recommended contacting the Juaneño Band of Mission Indians Acjachemen Nation – Belardes for more information. As a result, Joyce Perry, Tribal Representative, Cultural Resources Director, of the Juaneño Band of Mission Indians was copied on all correspondence from the NAHC.

The results letter also included a list of tribes affiliated with the Project site (see Table 4.15-1). Consultation pursuit to AB 52 was conducted by IRWD.

TABLE 4.15-1
NAHC TRIBAL REPRESENTATIVES CONTACT LIST

Tribal Organization	Indigenous Affiliation	Contact(s)
Campo Band of Diegueno Mission Indians	Diegueno	Ralph Goff
Ewiiaapaayp Band of Kumeyaay Indians	Diegueno	Robert Pinto; Michael Garcia
Gabrieleno Band of Mission Indians – Kizh Nation	Gabrieleno	Andrew Salas
Gabrieleno/Tongva San Gabriel Band of Mission Indians	Gabrieleno	Anthony Morales
Gabrielino/Tongva Nation	Gabrielino	Sandonne Goad
Gabrielino Tongva Indians of California Tribal Council	Gabrielino	Robert Dorame
Gabrielino-Tongva Tribe	Gabrielino	Charles Alvarez
Juaneño Band of Mission Indians Acjachemen – Belardes	Juaneño	Matias Belardes
La Posta Band of Diegueno Mission Indians	Diegueno	Gwendolyn Parada; Javaughn Miller
Manzanita Band of Kumeyaay Nation	Diegueno	Angela Elliott
Mesa Grande Band of Diegueno Mission Indians	Diegueno	Michael Linton
Pala Band of Mission Indians	Cupeno; Luiseno	Shasta Gaughen
Santa Rosa Band of Cahuilla Indians	Cahuilla	Lovina Redner
Soboba Band of Luiseno Indians	Cahuilla; Luiseno	Scott Cozart
Sycuan Band of the Kumeyaay Nation	Kumeyaay	Cody Martinez

On April 22, 2022, Andrew Salas (Gabrieleno Band of Mission Indians – Kizh Nation) sent a letter to Kellie Welch (IRWD) responding to IRWD's AB 52 notification letter. Mr. Salas stated that the Project is located within their ancestral tribal territory, and their tribal government requested consultation with IRWD. The SCCIC records search files were sent to Kizh Nation on August 17, 2022. Brandy Salas, Admin Specialist with the Kizh Nation confirmed receipt of files for consultation on August 17, 2022. Consultation between the Gabrieleno Band of Mission Indians – Kizh Nation and IRWD was conducted on October 19, 2022. As a follow-up to consultation, Brandy Salas sent supplemental materials and proposed mitigation measures to Andy Uk (IRWD) via email on June 27, 2023. On August 29, 2023, Andy Uk sent an email to Brandy Salas with mitigation measures prepared by IRWD. Brandy Salas responded in an email on September 6, 2023, stating that the tribe respectfully disagreed with the proposed mitigation measures and provided alternative mitigation measures. IRWD closed consultation with the Kizh Nation on November 5, 2024 via email. IRWD also sent a follow-up email to the Kizh Nation on November 19, 2024, to reiterate that IRWD made a good faith effort to consult and reach mutually agreed-upon mitigation measure(s) and that the AB 52 consultation process was closed.

On May 18, 2022, Joyce Perry (Juaneño Band of Mission Indians, Acjachemen Nation) sent an email to Marina Lindsay and Kellie Welch (IRWD) responding to IRWD's AB 52 notification letter. Ms. Perry stated that the Project is located within their territory, and a sensitive area to their tribe. The tribe requested to consult on this Project and to review the Tribal Cultural Resources section of the EIR. Consultation between the Juaneño Band of Mission Indians, Acjachemen Nation and IRWD was conducted on August 23, 2022. Additionally, the tribe reconfirmed their recommendation made to IRWD on September 22, 2022, for native monitoring by representatives of the Juaneño Band of Mission Indians during ground disturbance in the vicinity of

Santiago Canyon Road and Haul Road with nearby resources P-30-001012, P-30-100460, and P-30-001294.

On October 15, 2024, Andy Uk sent Joyce Perry a courtesy outreach email to inform her and the Juaneño Band of Mission Indians, Acjachemen Nation of minor modifications to the proposed project. The minor changes to the proposed project include:

- Embankment improvements based on Risk Informed Decision Making and feedback from DSOD;
- The identification of borrow areas at Irvine Lake that would excavate earthen material to use throughout the project, which would avoid previously recorded cultural resources within the project site footprint;
- Off-site hauling of material to accommodate improvements to the dam with temporary staging of material at a location downstream of the dam.

IRWD provided this update to Joyce Perry and the Juaneño Band of Mission Indians, Acjachemen Nation, because although there would be minor changes which involve ground disturbances and earthwork, there would be no differences or adjustments to the level of impacts to the cultural resources previously identified and/or discussed with the Juaneño Band of Mission Indians, Acjachemen Nation. The email provided a reminder that IRWD and Juaneño Band of Mission Indians, Acjachemen Nation previously had engaged in AB 52 consultation and that it was closed with mutually agreed-upon mitigation measures, and the email did not serve to re-initiate the AB 52 tribal consultation process.

SLF search results summary letter from the NAHC are included in Appendix D.

4.15.3 EXISTING CONDITIONS

Section 4.4, Cultural Resources, of this Draft EIR provides an evaluation of cultural resources, including archaeological and historic resources. As noted in that section, a cultural resource record search and literature review was conducted at the California Historical Resources Information System (CHRIS), which maintains records and literature regarding cultural resources within California. The South Central Coastal Information Center (SCCIC) is a designated branch of the CHRIS and houses records recorded in San Bernardino, Los Angeles, Orange, and Ventura Counties. The CHRIS office for Orange County is located at the SCCIC at California State University, Fullerton. The records search/literature review conducted for the Project revealed that 28 cultural resource studies have been conducted within 1-mile of the Project site; 14 occurred or overlapped within the Project site. Additionally, the records search/literature review conducted for the Project revealed that 18 cultural resources sites have been previously recorded within 1-mile of the Project site. The previously recorded resources include two precontact isolates (ground stone), 12 precontact sites, three historic sites/built environments, and one multicomponent site. The precontact sites consist of rock shelters, lithic scatters (stone debris left over from making stone tools), hearths roasting pits/remnants of campfires), cairns (rock features), bedrock milling features (ground stone technology), habitation debris (midden), and burials. The historic sites consist of roads/trails, single family residences, standing structures, wells/cisterns, water conveyance systems and a standing engineering structure (dam). Of the 18 cultural resources, two cultural resources (P-30-001012 and P-30176757) were identified within the Project site. Cultural resource P-30-001012 is described as a precontact lithic scatter and cultural resource P-30-17657 is the Santiago Dam.

Regional Ethnographies

Ethnography is a cultural anthropologic research method that strives to answer anthropological questions about different cultures. The following section describes the ethnographic background of the Project site.

Gabrielino/Tongva

At the time of European contact, this part of Los Angeles County was the home of the Gabrielino. The Gabrielino and their descendants are those people who became associated with Mission San Gabriel Arcángel, which was established in south-central Los Angeles County on September 8, 1771, in what has ever since been called the San Gabriel Valley. Today, these people are sometimes referred to as the Tongva, although the term originally (i.e., before the arrival of Euro-Americans) referred to the inhabitants of the San Gabriel Valley only. Today, Gabrielino ancestry also refers to the occupants of the San Fernando Valley (Fernandeño). The Eastern Gabrielino refers to those who lived south of the San Gabriel Mountains, mainly in the San Gabriel Valley, while the Western Gabrielino refers to those who lived along the western coast of Los Angeles County, from Malibu to Palos Verdes, and includes the people living in the San Fernando Valley.

The ancestral Gabrielino arrived in the Los Angeles Basin probably 500 years Before the Common Era. Large, permanent villages were established in the fertile lowlands along rivers and streams and in sheltered areas along the coast. Eventually, Gabrielino territory encompassed the watersheds of the Los Angeles, San Gabriel, Rio Hondo, and Santa Ana Rivers (which includes the greater Los Angeles Basin) to perhaps as far south as Aliso Creek, as well as portions of the San Fernando, San Gabriel, and San Bernardino Valleys. Gabrielino territory also included the islands of San Clemente, San Nicholas, and Santa Catalina. Recent studies suggest the population may have numbered as many as 10,000 individuals at their peak in the Pre-contact Period.

The subsistence economy of the Gabrielino was one of hunting and gathering. The surrounding environment was rich and varied, and the natives were able to exploit mountains, foothills, valleys, deserts, and coasts. As was the case for most native Californians, acorns were the staple food (by the Intermediate Horizon), supplemented by the roots, leaves, seeds, and fruit of a wide variety of flora (i.e., cactus, yucca, sage, and agave). Fresh and saltwater fish, shellfish, birds, insects, and large and small mammals were exploited.

A wide variety of tools and implements were employed by the Gabrielino to gather, collect, and process food resources. The most important hunting tool was the bow and arrow. Traps, nets, blinds, throwing sticks, and slings were also employed. Fish were an important resource and nets, traps, spears, harpoons, hooks, and poisons were utilized to catch them. Ocean-going plank canoes and tule balsa canoes were used for fishing and for travel by those groups residing near the Pacific Ocean.

The processing of food resources was accomplished in a variety of ways: nuts were cracked with hammer stone and anvil; acorns were ground with mortar and pestle; and seeds and berries were ground with mano and metate. Yucca, a valuable resource in many areas, was eaten by the natives and exploited for its fibers. Strainers, leaching baskets and bowls, knives, bone saws, and wooden drying racks were also employed. Food was consumed from a variety of vessels. Catalina Island steatite was used to make ollas and cooking vessels.

Gabrielino houses were circular domed structures of willow poles thatched with tule. They were actually quite large and could, in some cases, hold 50 individuals. Other structures served as sweathouses, menstrual huts, and ceremonial enclosures.

Juaneño/Acjachemen

During the Late Prehistoric and Contact Periods, the Project area was located also within the Juaneño territory. As with the Gabrielino, whose name signifies their mission association, the name Juaneño designates those peoples that fell under the control of the Mission at San Juan Capistrano. Specifically, it denotes the indigenous Native Americans living in and near the San Juan and San Mateo Creek Drainages, who called themselves the Acjachemen.

During the Pre-Contact Period, the Acjachemen population is thought to have numbered upwards of 3,500. It is known that 1,138 local Native Americans, consisting primarily of Acjachemen but including Gabrielino, coastal and interior Luiseño, Serrano, and Cahuilla, resided at Mission San Juan Capistrano in the year 1810. The Mission's death register shows as many as 1,665 native burials in its cemetery by this time, a number, in addition to those who died unrecorded at the remaining villages from natural causes and introduced infectious diseases.

Overall, the Acjachemen territory consisted of the eastern Santa Ana Mountains to the coast and southward to San Juan Capistrano. The majority of the known ethnographic village sites are located primarily in this region. To this day, the San Juan Capistrano area has seen continuous habitation by the Juaneño people.

The Juaneño lived in structured villages, populated variously by between 35 and 300 people, consisting of a single lineage to multiple clans in larger settings. While each village unit maintained economic and social ties to neighboring villages, they also maintained a well-defined resource area.

The Juaneño exploited a wide variety of resources for their dietary needs. These consisted primarily of plant foods, including seeds, nuts, fruits, tubers, and greens. Marine resources constituted the largest sources of meat and consisted mostly of shellfish and fish. Marine resources were collected from open water, bay, and estuary habitats. Birds and mammals made up most of the remainder of the diet. Many common bird species and most small rodents were exploited where available. Seasonal rounds of exploitation formed the basis for the successful procurement of various food types as evident by the settlement patterns still identifiable today from the remains of simple campsites to complex village sites.

4.15.4 THRESHOLDS OF SIGNIFICANCE

In accordance with the Appendix G of the CEQA Guidelines, a project would result in a significant tribal cultural resources impact if it would:

Threshold 4.15-1 Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1 (k), or

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

4.15.5 IMPACT ANALYSIS

Regulatory Requirement

RR CR-1 If human remains are found during ground-disturbing activities, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains will occur, in accordance with Section 7050.5 of the California Health and Safety Code. The County Coroner will be notified of the discovery immediately. If the County Coroner determines that the remains are or believed to be Native American, s/he will notify the NAHC within 24 hours of the discovery. In accordance with Section 5097.98 of the California Public Resources Code, the NAHC must immediately notify those persons it believes to be the most likely descended from the deceased Native American (i.e., the most likely descendant). The descendants will complete their inspection within 48 hours of being granted access to the site by IRWD. IRWD will discuss and confer with the most likely descendants regarding all reasonable options regarding the descendants' preferences for treatment of the human remains prior to disturbing the site by further construction activity.

Threshold 4.15-1

Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k).

Less Than Significant Impact with Mitigation. For purposes of this impact analysis, a tribal cultural resource is considered a site, feature, place, cultural landscape, sacred place, or object which is of cultural value to a California Native American Tribe and is either eligible for the CRHR or a local register.

As discussed in Section 4.4, Cultural Resources, of this EIR, impacts to historical resources, archaeological resources, and human remains would be less than significant. Potential impacts to archeological resources would be mitigated to a less than significant level with the implementation of **MM CR-1**, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM CR-2**, which provides details for treatment of unanticipated discoveries. Additionally, the Project would comply with the State requirements pertaining to the protection of human remains by implementing **RR CR-1**.

One historic property/historical resource was identified within the Project site: the Santiago Dam Complex (P-30-176757), which currently has a status code of 2S2, indicating it has been determined eligible for the NRHP and is listed in the CRHR. The updated evaluation completed as part of the current study found that the Dam remains eligible for the NRHP/CRHR under Criterion A/1. The Dam is eligible for its important historical associations with water resources development in Orange County, as well as with the citrus agriculture industry. This cultural resource is a historical-era resource and is not considered a tribal cultural resource.

Although specific aspects of the Dam would be modified, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. The character-defining features of the Dam necessary for it to continue to convey its historical significance under Criterion A/1 include its ongoing function as an earthen embankment dam on Santiago Creek, maintaining the same general massing and scale. Therefore, the proposed Project would result in no adverse effects to historic properties under Section 106 of the NHPA, and no significant impacts to historical resources under CEQA. Additionally, the Project would not have an impact on a tribal cultural resource that is listed or eligible for listing on the CRHR or a local register.

The Project would result in a less than significant impact with implementation of **MM CR-1** and **MM CR-2 and** would comply with **RR CR-1**.

Impact Conclusion: *Potential impacts to archeological resources would be mitigated to a less than significant level with the implementation of **MM CR-1**, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM CR-2**, which identifies treatment of unanticipated discoveries. Additionally, the Project would comply with the State requirements pertaining to the protection of human remains by implementing **RR CR-1**.*

The Santiago Creek Dam Complex (P-30-176757) was determined eligible for the CRHR and listed in the CRHR. However, it would remain recognizable as an earthen embankment dam and would continue to perform the historic function for which it is eligible. Thus, pursuant to Threshold 4.15-1, the Project would not have an impact on a tribal cultural resource that is listed or eligible for listing on the CRHR or a local register.

Threshold 4.15-1

Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Less Than Significant Impact with Mitigation. The second component of this analysis is if the proposed Project would impact a tribal cultural resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a Native American tribe. Subdivision (c) states:

> A resource may be listed as an historical resource in the California Register if it meets any of the following CRHR criteria:
>
> (1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
>
> (2) Is associated with the lives of persons important in our past.
>
> (3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
>
> (4) Has yielded, or may be likely to yield, information important in prehistory or history.

Based on information available through the record searches at the SCCIC and the NAHC, and the long-term past use of the Project area, there is no information available that indicates there are significant tribal resources within the Project area that would be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code Section 5024.1. However, as noted in Section 5.15.2 above, IRWD requested consultation with tribes that notified IRWD of a desire to be consulted with regarding the Project.

IRWD received two responses. Andrew Salas (Gabrieliño Band of Mission Indians – Kizh Nation) responded on April 22, 2022. Consultation between the Gabrieliño Band of Mission Indians – Kizh Nation and IRWD was conducted on October 19, 2023. Additionally, Joyce Perry (Juaneño Band of Mission Indians) responded on May 18, 2022. Consultation between the Juaneño Band of Mission Indians and IRWD was conducted on August 23, 2022. Based on consultation between IRWD and the tribal representatives, no tribal cultural resources were identified on the Project site; however, earthwork activities (i.e., grading, excavation, and trenching) at the Project site may disturb native sediments and, therefore, could have the potential to impact unidentified archaeological resources of Native American origin.

In order to reduce the potential for impacts to unidentified tribal cultural resources, IRWD would voluntarily implement **MM TCR-1, MM TCR-2,** and **MM TCR-3** in response to concerns expressed by local Tribes.

Impact Conclusion: *Potential impacts to tribal cultural resources would be mitigated to a less than significant level with the implementation of **MM TCR-1**, **MM TCR-2**, and **TCR-3**, which detail procedures related to tribal monitoring and protocols for unanticipated discoveries.*

4.15.6 CUMULATIVE IMPACTS

Although Tribal Cultural Resources impacts are site-specific with regard to any given resource (e.g., resources of important cultural value to Native Americans), impacts may be considered cumulative due to the loss of cultural resources in general over time throughout the region. There are no tribal cultural resources listed or determined eligible for listing, on the national, State, or local register of historical resources on the Project site. However, should buried resources be identified, ground disturbance within native sediment could lead to the accelerated degradation of previously unknown tribal cultural resources. Mitigation can reduce potential impacts to a less

than significant level. As with the Project, testing and data recovery is standard practice in the County and is routinely required of projects prior to and during grading activities. Despite the site-specific nature of cultural resources, the mitigation identified for tribal cultural resources monitoring, standard mitigation measures and adherence to State requirements would reduce the potential for cumulative impacts. As a result, with implementation of **MM TCR-1, MM TCR-2,** and **MM TCR-3**, the Project would not have a cumulatively considerable contribution to a significant cumulative impact related to tribal cultural resources.

4.15.7 MITIGATION PROGRAM

Mitigation Measures

MM CR-1 IRWD will retain a certified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Standards for professional archaeology, to observe ground-disturbing activities (including but not limited to geotechnical excavations, vegetational removal, grubbing, grading, and excavation) within previously undisturbed soils below the fill soils and to salvage and catalogue archaeological resources as necessary. Monitoring will not be necessary for secondary movement of soils, such as backfilling. The archaeologist will be present at the pre-construction meeting, will establish procedures for archaeological resource surveillance within previously undisturbed soils in coordination with IRWD throughout construction of the proposed Project, and will establish, in cooperation with IRWD, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the artifacts as appropriate. The archaeological monitor will have the authority to temporarily halt or divert work away from any discoveries of archaeological resources in order to evaluate the resources pursuant to **MM CR-2.** The archaeologist may determine, in consultation with IRWD, to reduce monitoring to spot-checking or eliminate monitoring depending on site conditions observed, such as the presence of fill material, soil stratigraphy, encountering bedrock, or other factors.

The archaeological monitor will keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the certified archaeologist will prepare a monitoring report that details the results of monitoring. The report will be submitted to IRWD and any Native American groups who request a copy. The certified archaeologist will submit a copy of the final report to the California Historic Resources Information System South Central Coastal Information Center.

MM CR-2 If archaeological resources are inadvertently unearthed during excavation activities (within disturbed or undisturbed soils), the contractor will immediately cease all earth-disturbing activities within a 50-foot radius of the area of discovery, and the certified archaeologist and IRWD will be notified immediately. If the certified archaeologist determine the archaeological resources are potentially significant pursuant to CEQA Guidelines Section 15064.5 or California Public Resources Code (PRC) Section 21083.2(g), the archaeologist, in consultation with IRWD and representatives from the tribal governments consulting under AB 52, will determine appropriate treatment, which may include avoidance of the area of the find, data recovery, documentation, testing, reburial, archival review, and/or transfer to the appropriate museum or educational institution, or other appropriate actions. After the find has been appropriately avoided or mitigated, work in the area may resume.

MM TCR-1 ***Juaneño Band of Mission Indians, Acjachemen Nation – Belardes Tribal Monitoring.***

At least one month prior to beginning earthwork activities (i.e. grading, excavation and trenching) related to the existing water line tie-in activities of the proposed project, located at the intersection of Santiago Canyon Road and Haul Road, IRWD will notify the representatives of the Juaneño Band of Mission Indians, Acjachemen Nation - Belardes ("Acjachemen Nation - Belardes") identifying the date of starting earthwork activities. The notification will invite the representative to be present at the project site, and IRWD will further coordinate with the Acjachemen Nation – Belardes for construction monitoring. Acjachemen Nation – Belardes will be provided reasonable access to the project site, at its own expense and in a manner that will not conflict construction activities or cause construction delays to the contractor, to observe these earthwork activities. If Native American artifacts and ancestral human remains related to Acjachemen Nation – Belardes are uncovered during earthwork activities, MM TCR-3 Protocols for Unanticipated Discoveries will be implemented.

The Acjachemen Nation – Belardes will document and provide logs to IRWD detailing the time/date of the visit, the outcome of the site visit and detail proposed activities it intends to conduct at the next site visit. The logs will also specifically describe the relevant ground-disturbing activities, the type of construction activities performed, locations of ground-disturbing activities, soil types, cultural-related materials, and any other facts, conditions, materials, or discoveries of significance to the Acjachemen Nation - Belardes. The monitor logs will identify and describe any discovered tribal cultural resources, including but not limited to, Native American cultural and historical artifacts, remains, places of significance, etc., as well as any discovered Native American (ancestral) human remains and burial goods.

MM TCR-2 ***Gabrieleno Band of Mission Indians - Kizh Nation Tribal Monitoring.***

During the AB 52 consultation process, the Gabrieleno Band of Mission Indians - Kizh Nation (Kizh Nation) informed IRWD's staff that the Gabrieleno tribe has a strong tribal cultural presence in the region from the past, including the project site area. Therefore, there could be Kizh Nation tribal cultural resources present at the project site area and Kizh Nation has requested Native American monitoring of ground disturbing activities. The project site area spans over a vast area and the proposed project would have multiple construction phases with varied activities and schedules. At least one month prior to beginning earthwork activities, IRWD will notify in writing the Native American representatives from the Kizh Nation (tribal representative) of the date of the start of earthwork activities. The tribal representative, at their own expense, and in a manner that does not interfere with earthwork activities, will be allowed to observe subsurface ground disturbing construction activities. Monitoring may include either direct observation of the earthwork activities or the examination of excavated soils prior to disposal for evidence of cultural resources. If Native American artifacts and ancestral human remains are uncovered during earthwork activities, then MM TCR-3 Protocols for Unanticipated Discoveries will be implemented.

The Kizh Nation tribal representative will complete daily monitoring logs and provide logs to IRWD detailing the time/date of the visit and the outcome of the site visit and detail proposed activities for their next site visit. The logs will also

specifically describe the relevant ground-disturbing activities, the type of construction activities performed, locations of ground-disturbing activities, soil types, cultural-related materials, and any other facts, conditions, materials, or discoveries of significance to the Kizh Nation. The monitor logs will identify and describe any discovered tribal cultural resources, including but not limited to, Native American cultural and historical artifacts, remains, places of significance, etc., as well as any discovered Native American (ancestral) human remains and burial goods.

MM TCR-3 ***Protocols for Unanticipated Discoveries.***

If a cultural resource is found, all construction activities in the immediate vicinity of the discovery (i.e., not less than the surrounding 50 feet) will cease and will not resume until the discovered cultural resource(s) is assessed by IRWD's consulting Qualified Archaeologist. If the Qualified Archaeologist determines that the resources may be significant under CEQA, then the Qualified Archaeologist, in consultation with IRWD, will develop an appropriate treatment plan for the resource(s). IRWD will also consult with the Native American tribes or other appropriate Native American representatives in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. Under CEQA, preservation in place is the preferred manner of mitigating impacts to archaeological sites. However, if avoidance is infeasible, other appropriate measures will be instituted, which could include, among other options, detailed documentation, or data recovery excavation. Work may proceed on other parts of the project area while mitigation for cultural resources is being carried out.

4.15.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project-specific and cumulative impacts to archaeological resources would be mitigated to a less than significant level with the implementation of **MM CR-**1, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and **MM CR-2**, which provides details for treatment of unanticipated discoveries. Additionally, the Project would comply with the State requirements pertaining to the protection of human remains by implementing **RR CR-1**. In order to reduce the potential for impacts to unidentified tribal cultural resources, the Project would implement **MM TCR-1**, **MM TCR-2**, and **MM TCR-3,** which would reduce potential impacts to tribal cultural resources to less than significant levels.

4.15.9 REFERENCES

Psomas. 2024 (February). *Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California.* Pasadena, CA: Psomas. Appendix D.

South Environmental. 2023 (November). *Historical Resources Assessment, Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California*. Pasadena, CA: South Environmental.

This page intentionally left blank

4.16 UTILITIES AND SERVICE SYSTEMS

This section of the Environmental Impact Report (EIR) describes the existing utilities and service systems (wet and dry utilities) for the proposed Project and identifies associated potential impacts related to water, sewer, solid waste, electricity, natural gas, and communication systems for the proposed Project.

4.16.1 REGULATORY SETTING

Federal

Water

Federal Safe Drinking Water Act of 1974

The Safe Drinking Water Act authorizes the U.S. Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. EPA, States, and water systems then work together to make sure that these standards are met. Originally, the Safe Drinking Water Act focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments to the Act enhanced existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap. The Act applies to every public water system in the United States.

Wastewater

Federal Clean Water Act (33 USC Sections 1251, et seq.)

The Clean Water Act's (CWA) primary goals are to restore and maintain the chemical, physical, and biological integrity of the nation's waters and to make all surface waters fishable and swimmable. The CWA forms the basic national framework for the management of water quality and the control of pollution discharges; it provides the legal framework for several water quality regulations, including the National Pollutant Discharge Elimination System (NPDES), effluent limitations, water quality standards, pretreatment standards, antidegradation policy, nonpoint source discharge programs, and wetlands protection. The EPA has delegated the responsibility for administration of portions of the CWA to State and regional agencies. In California, the State Water Resources Control Board (SWRCB) administers the NPDES permitting program and is responsible for developing NPDES-permitting requirements. The SWRCB works in coordination with the Regional Water Quality Control Boards to preserve, protect, enhance, and restore water quality.

State

Water

State of California Water Recycling Act

Enacted in 1991, the Water Recycling Act established water recycling as a State priority. The Water Recycling Act encourages municipal wastewater treatment districts to implement recycling programs to reduce local water demands.

California Code of Regulations, Title 22, Division 4, Chapter 3 Water Recycling Criteria

California regulates the wastewater treatment process and use of recycled water pursuant to California Code of Regulations (CCR) Title 22, Division 4, Chapter 3, "Water Recycling Criteria." According to these regulations, recycled water to be used for irrigating public areas must be filtered and disinfected to tertiary standards.

Urban Water Management Act

The Urban Water Management Plan Act (UWMP Act) was passed in 1983 (California Water Code Sections 10610 through 10657) and has been amended several times. The Act requires "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000-acre feet of water annually, to prepare and adopt, in accordance with prescribed requirements, an urban water management plan." Urban water suppliers must file these plans with the California Department of Water Resources every five years. The plans must describe and evaluate reasonable, practical, and efficient water uses, as well as reclamation, and conservation activities. As required by the Memorandum of Understanding Regarding Urban Water Conservation in California and Assembly Bill 11, the 2005 UWMP Act incorporated water conservation initiatives and a Water Shortage Contingency Plan.

Making Conservation a California Way of Life

In 2018, the California State Legislature passed AB 1668 and SB 606, which directed the State Water Board to adopt water efficiency standards and also performance measures for commercial, industrial, and institutional water use. Making Conservation a California Way of Life is a new regulation adopted by the State Water Board in July 2024 that establishes individualized water efficiency goals for each Urban Retail Water Supplier. These goals are based on the unique characteristics of the supplier's service area and give suppliers the flexibility to implement locally-appropriate solutions. Once implemented, these goals are expected to reduce urban water use by more than 400,000 acre feet by 2030, thereby helping California adapt to the water supply impacts resulting from climate change. The proposed regulations are intended to help realize the water savings outlined in California's Water Supply Strategy, released in 2022.

Senate Bill 610

In regard to water supply, portions of the Water Code (commonly referred to as Senate Bill (SB) 610, according to the enacting legislation) require the preparation of a Water Supply Assessment (WSA) for certain projects. SB 610 requires that a WSA be prepared for any "project" which would consist of one or more of the following:

- A proposed residential development of more than 500 dwelling units;
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space;
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space;
- A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space;
- A mixed-use project that includes one or more of the projects specified above; or
- A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

Assembly Bill 3030

Assembly Bill (AB) 3030, the Groundwater Management Act, is codified in Section 10750 et seq. of the California Water Code. AB 3030 provides local water agencies with procedures for developing a groundwater management plan to permit those agencies to manage their groundwater resources efficiently and safely while protecting the quality of their supplies. Under AB 3030, a local water agency may voluntarily develop a groundwater management plan. Once an agency adopts a plan, the rules and regulations within the plans must be adopted to implement the program outlined in the plan.

Efficiency Standards

CCR Title 24 contains the California Building Code (CBC), including the California Plumbing Code (Part 5), which promotes water conservation. CCR Title 20 addresses Public Utilities and Energy and includes appliance efficiency standards that promote water conservation. In addition, a number of California enactments require water-efficient plumbing fixtures in structures:

- CCR Title 20 Section 1604(g) establishes efficiency standards that provide a maximum flow rate for all new showerheads, lavatory faucets, sink faucets, and tub spout diverters.
- CCR Title 20 Section 1606 prohibits the sale of fixtures that do not comply with established efficiency regulations.
- CCR Title 24 Sections 25352(i) and (j) address pipe insulation requirements, which can reduce water used before hot water reaches equipment or fixtures. Insulation of water heating systems is also required.
- Health and Safety Code Section 17921.3 requires low-flush toilets and urinals in virtually all buildings.

Solid Waste

California Integrated Waste Management Act of 1989 (AB 939)

The California Integrated Waste Management Act of 1989 (AB 939) requires all California cities and counties to achieve a 50 percent diversion rate by 2000. Additional solid waste statutes are included in California's Public Resources Code, Government Code, and Health and Safety Code, among others. The California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires each development project to provide an adequate storage area for collection and removal of recyclable materials.

California Department of Resources Recycling and Recovery (CalRecycle) Organics Regulations (SB 1383)

This bill requires the State Air Resources Board, no later than January 1, 2018, to approve and begin implementing that comprehensive strategy to reduce emissions of short-lived climate pollutants to achieve a reduction in methane by 40 percent, hydrofluorocarbon gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030, as specified. The bill also establishes specified targets for reducing organic waste in landfills.

Regional

Water

IRWD 2020 Urban Water Management Plan

The Urban Water Management Planning Act (UWMP Act) requires all urban water suppliers to prepare, adopt, and file an Urban Water Management Plan (UWMP) with the Department of Water Resources (DWR) every five years. IRWD's 2020 UWMP is an update to the 2015 UWMP and was prepared in conformance with Water Code Sections 10610 through 10656 of the UWMP Act. Included in the plan is detailed information about IRWD's water demand, supply, and reliability for the next 25 years (IRWD 2021).

Local

County of Orange General Plan

Land Use Element

The following policies of the County of Orange General Plan Land Use Element (County of Orange 2024) pertaining to utilities and service systems are applicable to the Project:

Policy 13: Recycling/Materials Recovery – To encourage and facilitate the establishment of recycling/materials recovery facilities to address the State mandate given through the California Integrated Waste Management Act of 1989 (AB 939).

Policy 14: Urban and Storm Runoff Regulations – To guide physical development within the County while protecting water quality through required compliance with urban and stormwater runoff regulations.

Public Services & Facilities Element

The following policies of the County of Orange General Plan Public Services & Facilities Element (County of Orange 2012a) pertaining to utilities and service systems are applicable to the Project:

Water System

Goal 1: Encourage the planning and development of a water conveyance and distribution system to meet the County's future demand.

Objective 1.1: To achieve desired water system service levels through the coordination of land use and water system planning.

Objective 1.2: To implement State, regional, and local facility plans for water delivery to Orange County.

Objective 1.3: To increase storage and delivery capacity for water supplies in Orange County.

Policy 1: System Capacity and Phasing – To ensure the adequacy of water system capacity and phasing, in consultation with the service providing agency(ies), in order to serve existing and future development as defined by the General Plan.

Policy 2: Water Delivery System – To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.

Policy 2: Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and the water agencies through cooperative water facility planning and implementation efforts.

Wastewater System

Goal 1: Support the planning and development of a wastewater system to meet both the County's demand and attain water quality goals.

Objective 1.1: To maintain wastewater system service levels through the coordination of land use and wastewater system planning.

Objective 1.2: To implement wastewater agency facility and water quality plans for Orange County.

Policy 1: Water Quality – To protect quality in both delivery systems and groundwater basins through effective wastewater system management.

Policy 2: Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and wastewater agencies through cooperative wastewater studies, planning, and facility implementation efforts.

Policy 3: System Capacity and Phasing – To ensure the adequacy of wastewater system capacity and phasing in consultation with the service providing agency(ies) in order to serve existing and future development as defined by the General Plan.

General Plan, Resources Element

The following policies of the County of Orange General Plan Resources Element (County of Orange 2012b) pertaining to utilities and service systems are applicable to the Project:

Energy Resources Component

Goal 1: Maximize the conservation and wise use of energy resources in all residences, businesses, public institutions, and industries in Orange County.

Objective 1.1: Achieve a reduction in projected per capita energy demand and consumption by the year 2005.

Goal 2: Encourage the utilization of existing energy resources to their highest potential and the development of alternative energy sources consistent with sound energy conservation practices and techniques to meet the County's future energy demand.

Objective 2.1: Encourage the efficient development of local energy resources to supply a portion of the County's energy demand through the year 2005 in a manner which protects the environment.

Policy 2: Energy Resource Development – To encourage and actively support the efficient use and optimum development of energy resources in the County consistent with sound resource management practices.

Policy 3: Energy Conservation – To encourage and actively support the utilization of energy conservation measures in all new and existing structures in the County

Water Resources Component

Goal 1: Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.

Objective 1.1: To maintain the adequacy and dependability of imported water supplies.

Objective 1.2: To achieve a reduction in per capita water consumption by the year 2020.

Objective 1.3: To reduce dependence on imported water supplies through both conservation and local water resource development.

Policy 1: Water Supply – To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.

Policy 2: Conservation – To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.

Policy 3: Groundwater Resources – To support groundwater management efforts that are conducted by County water agencies.

Policy 4: Shortage Planning – To ensure that Orange County will not be severely impaired by any potential future water shortages.

Policy 5: Water Quality – Protect and improve water quality through continued management, enforcement, and reporting requirements. Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats. Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles. Consider implementation of LID principles to conserve natural features (trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils. Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources.

4.16.2 METHODOLOGY

Information presented in this section is obtained through research relating to utility providers and facilities, existing capacities, and planned improvements. Impact analysis discusses the proposed Project's demand in light of existing capacities. For CEQA purposes, the potential effects associated with implementation of the proposed Project are related to the provision of adequate service levels and the need to upgrade and/or provide additional facilities to serve the proposed Project.

4.16.3 EXISTING CONDITIONS

Water

The Project site is within the service area of IRWD for potable water service.

Irvine Ranch Water District

IRWD is a retail water supplier that serves an approximately 181 square mile area that encompasses the Cities of Irvine, Newport Beach, Tustin, Orange, Lake Forest, Costa Mesa, plus unincorporated areas of Orange County.

IRWD's drinking water comes from two primary sources: local groundwater and imported water. Approximately 52 percent of IRWD's overall supply comes from local groundwater wells in the Orange County Groundwater Basin and the Irvine and Lake Forest sub-basins. For many years, IRWD received almost all of its water from imported sources. To alleviate this dependency on costly imported water, IRWD began to develop a series of local wells in 1979. The Dyer Road Wellfield Project extracts low-cost, high-quality water from deep within the Orange County Groundwater Basin. IRWD now operates 27 groundwater wells.

IRWD buys approximately 18 percent of its water through the Municipal Water District of Orange County (MWDOC), which buys water from the Metropolitan Water District of Southern California (MWD), a regional water wholesaler that delivers imported water from Northern California and the Colorado River (IRWD 2024a).

IRWD's 2020 Urban Water Management Plan (2020 UWMP) was prepared in accordance with the California Urban Water Management Planning Act (Act) and other applicable laws. The Act requires IRWD, as an urban water supplier, to prepare and adopt a UWMP, which analyzes and projects IRWD's water supply reliability during normal, single dry, and multiple dry years over the next 20 years. IRWD uses demographic growth projections developed by the Center for Demographic Research at California State University, Fullerton to estimate future water demands. Per the 2020 UWMP, IRWD's forecast total water demand for 2040 is 178,727 acre-feet per year (AFY) (IRWD 2021).

Existing Water Infrastructure

IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serve as a critical water supply source for IRWD's service area. IRWD uses water from Irvine Lake as a source of water for non-drinking purposes, such as irrigation uses, and as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. IRWD also treats water from Irvine Lake at the Howiler Treatment Plant that is used to backstop and augment Serrano Water District's use of groundwater. Eventually, IRWD will construct a pipeline from the Howiler Plant to IRWD's service area. The construction and operation of this pipeline will be subject to additional environmental review.

Santiago Creek Dam impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The outlet works for the dam consist of a tower, an outlet conduit, and downstream control house. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where a bifurcation splits the flow into a main pipe and diverter pipe. The main pipe supplies water to IRWD. If an emergency drawdown is necessary, the diverter valve (normally kept closed) can be opened and water can be released through the diverter pipe to discharge into the streambed immediately downstream of the Control House.

Wastewater

The Project area is within the jurisdiction of IRWD for wastewater infrastructure. IRWD's wastewater system is comprised of two Recycled Water Treatment Plants (Los Alisos and Michelson) and 1,153 miles of sewer connection pipelines (IRWD 2024b).

Electricity

Southern California Edison (SCE) maintains electrical facilities and infrastructure within the County and surrounding areas that provide service to the project area under the applicable rules and tariffs approved by the California Public Utilities Commission. SCE delivers power to approximately 15 million people in California, including to the Project site (SCE 2024).

Natural Gas

SoCalGas (SCGC) is the nation's largest natural gas distribution utility, delivering natural gas to 21.1 million consumers through 5.9 million meters in more than 500 communities (SCGC 2024). SoCalGas' service territory encompasses approximately 24,000 square miles throughout Central and Southern California, from Visalia to the Mexican border. The service is provided in accordance with SCGC's policies and extension rules on file with the CPUC.

Solid Waste

Waste Management provides solid waste collection and disposal services to the Project area. Collected waste is disposed of at Frank R. Bowerman (FRB) Landfill, located at 11002 Bee Canyon Access Road in Irvine. FRB Landfill has a maximum daily permitted capacity of 11,500 tons per day (tpd), and an annual daily annual average disposal amount of 6,214 tpd. This landfill has a remaining capacity of 161.88 million cubic yards and an estimated closure date of 2053. Other landfills that serve the County include Prima Deshecha and Olinda Alpha Landfills, with closure dates of 2102 and 2036, respectively (Halligan 2023). The FRB Landfill is approximately 725 acres with 530 acres allocated for waste disposal (OC Waste & Recycling 2024).

4.16.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, the Project would result in a significant utilities and service systems impact based upon the following thresholds:

Threshold 4.16-1 Would the Project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which cause significant environmental effects?

Threshold 4.16-2 Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Threshold 4.16-3 Result in a determination by the wastewater treatment provider that serves or may service the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Threshold 4.16-4 Generate solid waste in excess of State or local standards or in excess of the capacity of Local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Threshold 4.16-5 Comply with federal, State, and Local Management and reduction statues and regulations related to solid wastes including the CIWMP (County Integrated Waste Management Plan)?

4.16.5 IMPACT ANALYSIS

Threshold 4.16-1

Would the Project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which cause significant environmental effects?

Water

Less than Significant Impact. The Project involves abandonment of the existing Santiago Creek Dam outlet tower, construction of a new inclined outlet structure located on the left abutment of the existing dam, structural improvements to the dam spillway, and improvements to the dam embankment. The Project would include creation of a new inclined outlet structure, which would accommodate water from the lake and convey the water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow to the indirect low pressure system, or the emergency outlet pipeline. Water that enters the indirect low pressure system would reach IRWD's distribution systems. Water that enters the emergency outlet pipeline would be released at the end of the new spillway. Additional proposed water infrastructure would include the inclined inlet/outlet structure, which would consist of multiple approximately 30-inch riser pipes spaced incrementally to allow water to be drawn from the reservoir at different depths depending on the water quality in the reservoir. During construction, water would be rerouted to an alternate pipeline that would feed directly into the indirect low pressure system and continue service to IRWD customers. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide and elevated by up to approximately one foot to accommodate a wider access road, and protective railings would be installed on both sides of the access road. All water infrastructure is included as a part of the proposed Project, and impacts related to the construction and operation of the dam improvements are analyzed and mitigated within this EIR. The Project would not require additional public water infrastructure to meet Project demands. Therefore, impacts related to water facilities are less than significant, and no mitigation is required.

Wastewater

No Impact. The Project does not include construction or expansion of any wastewater facilities. In addition, the Project would not result in additional population, and the Project would not require additional public wastewater infrastructure to meet Project demands. Therefore, no impact related to wastewater would occur, and no mitigation is required.

Stormwater

No Impact. The Project does not include construction or expansion of any stormwater facilities. The Project has been designed to accommodate anticipated storm flows and involves raising the existing spillway 6 feet to 797.9 feet, which is 2 feet higher than the existing maximum water storage elevation with the flashboards installed. Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of

approximately 1,600 acre-feet of additional water. IRWD estimates that the upper two feet of the reservoir (i.e., 795.9 to 797.9 elevation contours) could be inundated for an approximate maximum of 30 to 45 days per year but typically would be inundated for less time. The Project also includes an emergency outlet facility which would control flow and dissipate energy as water is released into the existing Santiago Creek. Erosion control measures would be implemented to minimize the potential for erosion in the creek as discussed in Section 4.9, Hydrology and Water Quality. Therefore, the Project is designed to accommodate storm flows and no impact related to stormwater facilities would occur; no mitigation is required.

Electricity

Less Than Significant Impact. Construction of the Project would require relocation of the existing SCE overhead power lines and power poles at the downstream toe of the dam within the Project vicinity. The existing power lines would be moved and placed outside of the construction limits. SCE would relocate the existing overhead electrical lines as shown on Exhibit 3-16, Conceptual SCE Site Plan. The Project would not require any further relocation or construction of new or expanded facilities beyond what is currently proposed and analyzed as part of this EIR. Impacts would be less than significant, and no mitigation is required.

Natural Gas

No Impact. The Project does not include construction or expansion of any natural gas facilities. In addition, the Project would not result in an additional population, and the Project would not require additional public natural gas infrastructure to meet Project demands. Therefore, no impact related to natural gas would occur, and no mitigation is required.

Telecommunications

No Impact. The Project does not include construction or expansion of any telecommunications facilities. In addition, the Project would not result in an additional population, and the Project would not require additional public telecommunications infrastructure to meet Project demands. Therefore, no impact related to telecommunications would occur, and no mitigation is required.

Impact Conclusion: *The Project would not require or result in the relocation or construction of new or expanded wastewater treatment, storm drainage, natural gas, or telecommunications facilities. The Project would not result in additional demand for water supply. Construction of the Project would require relocation of the existing overhead power lines and power poles in the Project vicinity. This relocation would be completed by SCE prior to construction. The new poles would be placed outside of the construction limits for the Project and are not included as part of this Project. As such, impacts would be less than significant, and no mitigation is required.*

Threshold 4.16-2

Would the Project have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Less Than Significant Impact. Water would be needed for various construction activities. The available water source in the Project vicinity is a 12-inch potable water line running along East Santiago Canyon Road south of Irvine Lake. IRWD would install a temporary highline from Santiago Canyon Road, along the Blue Diamond Haul Road to the staging area. The temporary construction water line would be routed above-ground through the Irvine Lake parking area and

along the primary contractor access/haul road to the proposed working areas. However, the amount of water required would not be substantial and the Project is consistent with the General Plan, which anticipates water use and plans for future water supplies.

In addition, IRWD's 2020 UWMP water reliability analysis indicated that IRWD is reliable throughout all conditions including normal, single dry year, multiple dry year and extended drought (IRWD 2021).

IRWD imports water from MWD (via Lake Mathews, which is primarily Colorado River Water). MWD has determined and stated in its 2020 UWMP that it is able to meet the current and projected full service demands of its member agencies under all three hydrologic conditions through 2045 by developing and implementing water resources programs and activities through its preferred resource mix. As such, IRWD maintains water supplies that are sufficient to serve reasonably- foreseeable future development including the Project site, during normal, dry, and multiple dry years.

In addition, a primary purpose of the Project is to improve water supply reliability, because IRWD uses water from Irvine Lake as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in the County The Project would include an inclined outlet structure that would be placed near the left abutment of the existing dam, and replacement of the existing spillway with a side-channel spillway on the left abutment. The spillway crest would be raised by six feet to regain operational storage capacity that was lost over the years due to sedimentation. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide to accommodate a wider access road, and protective railings would be installed on both sides of the access road. Therefore, the Project would provide additional capacity and improve water supply reliability for IRWD and its service area. The Project would have sufficient water supplies available. Therefore, any impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The Project would not result in a significant additional demand for water. Less-than-significant water-related impacts would occur, and no mitigation is required.*

Threshold 4.16-3

Would the Project result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?

No Impact. As noted previously, the Project would not include construction or expansion of any wastewater facilities. The Project would involve removal of the dam keeper's house and associated septic system, which would result in a minor reduction of wastewater generation. In addition, the Project would not result in an additional population, and the Project would not require additional public wastewater infrastructure to meet Project demands. Therefore, the Project would not require wastewater capacity. No impact related to wastewater would occur, and no mitigation is required.

Impact Conclusion: *The Project would result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the*

provider's existing commitments. No impacts would occur, and no mitigation is required.

Threshold 4.16-4

Would the Project generate solid waste in excess of State or local standards or in excess of the capacity of Local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less Than Significant Impact. As stated in Section 3.0, Project Description, the closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new retaining wall would be needed to cut the roadway into the existing slope without affecting the existing closed Santiago Canyon Landfill facility. Additionally, a new emergency access walkway (approximately five feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent landfill during a spillway event. The walkway would connect to the new access. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide to accommodate a wider access road, and protective railings would be installed on both sides of the access road. During construction activities, the Project would implement all Best Management Practices (as further described in Section 4.9, Hydrology and Water Quality) and appropriate geotechnical measures (as further described in Section 4.6, Geology and Soils) to ensure the Project would not impact the adjacent closed landfill. In addition, access to the site would not inhibit access to the existing FRB Landfill, located south of the site, as discussed further in Section 4.14, Transportation.

Solid waste generated from the Project site would likely be disposed of at the FRB Landfill, which is part of the Orange County landfill system operated by OC Waste & Recycling. As stated above, the landfill is permitted to receive a maximum of 11,500 tpd with a 6,214 tpd daily annual average. Solid waste would be generated during construction related to demolition and construction activities and would be periodically generated during operations from temporary maintenance activities. As confirmed by OC Waste & Recycling, the increase in solid waste disposal resulting from implementation of the Project could be accommodated within the permitted capacity of the County's overall landfill system, which includes the Frank R. Bowerman Landfill. The County of Orange maintains 15 years of countywide solid waste landfill capacity as required by AB 939 (Halligan 2023). A less than significant impact related to landfill capacity would occur from implementation of the proposed Project, and no mitigation is required.

Impact Conclusion: *The Project would not generate solid waste in excess of State or local standards or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals. Impacts would be less than significant, and no mitigation is required.*

Threshold 4.16-5

Would the Project comply with federal, State, and Local Management and reduction statues and regulations related to solid wastes including the CIWMP (County Integrated Waste Management Plan)?

No Impact. Solid waste practices in California are governed by multiple federal, State, and local agencies that enforce legislation and regulations to ensure landfill operations minimize impacts to public health and safety and the environment. OC Waste & Recycling is obligated to obtain a

Solid Waste Facilities Permit, a Storm Water Discharge Permit, and a permit to construct and operate gas management systems and to meet Waste Discharge Requirements. The Local Enforcement Agency and the SWRCB enforce landfill regulations related to health, air quality, and water quality, respectively.

During construction activities, the Project would comply with OC Waste & Recycling's Construction & Demolition Program and with the 65% diversion requirement associated with applicable construction and demolition projects. Applicants can achieve diversion through reuse, recycling, and/or composting of construction and demolition materials at County-approved facilities or use of a County Franchised Waste Hauler. Additionally, the Project would comply with OC Waste & Recycling's specific criteria for the acceptance of clean soil in order to protect the environment and ensure regulatory compliance (Halligan 2023). Therefore, the proposed Project would not inhibit OC Waste & Recycling's compliance with regulatory requirements and would comply with all applicable federal, State, and local regulations. No impact would occur, and no mitigation is required.

Impact Conclusion: *The Project would comply with federal, State, and Local Management and reduction statues and regulations related to solid waste. No impact would occur, and no mitigation is required.*

4.16.6 CUMULATIVE IMPACTS

The proposed Project does not have a residential component that would generate population or significantly increase demand for utilities and service systems. While other projects in the area with residential elements would result in increased demand on existing utility-related facilities and services, the proposed Project would not contribute to any cumulative impact on existing facilities or require construction of such facilities that would impact the environment.

More specifically in terms of water, because the Project is consistent with the County General Plan land use designation for the site, which takes into account water requirements, the Project would not result in the unplanned-for or excessive use of water. The Project itself aims to increase water supply reliability within the service districts of IRWD, and no cumulatively considerable impact to water resources would occur.

All cumulative projects would be required to upgrade and install infrastructure, as needed, to accommodate each project, in coordination with utility service providers and the County. These on and off-site improvements would be analyzed as part of each project's environmental review and would be mitigated to the extent feasible. Therefore, cumulative impacts related to the relocation or upgrade of utilities are not anticipated. Each cumulative project would also be required to evaluate and confirm the availability of water and wastewater treatment services as part of their environmental and discretionary review process. Therefore, cumulative impacts related to the reliability of water and wastewater services would also be less than significant. Finally, solid waste that would be generated by the cumulative projects as well as the proposed Project would not be cumulatively considerable given that these projects would collectively generate a very small percentage of the daily capacity for the landfills that would receive these projects' waste. Also, the County of Orange's solid waste landfill system would have the capacity to provide the proposed Project with long-term solid waste disposal services, both on a project-specific and cumulative basis given that the County of Orange maintains 15 years of countywide solid waste landfill capacity, as required by AB 939. Therefore, the Project would not result in any contribution to the cumulative physical impact on existing utility capacities, facilities, and services.

4.16.7 MITIGATION PROGRAM

Mitigation Measures

The proposed Project would not result in significant utilities and service systems impacts; therefore, no mitigation measures are required.

4.16.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The Project would not result in Project-specific and cumulative impacts associated with demand on existing utility capacities, facilities, and services. No construction of new or expansion of existing utility facilities would be required resulting in physical effect on the environment. The potential impacts would be less than significant.

4.16.9 REFERENCES

California State Water Board. 2023 (August 15, last updated). Making Conservation a California Way of Life Fact Sheet. Sacramento, CA: State Water Board. https://www.waterboards.ca.gov/conservation/regs/docs/conservation-a-way-of-life.pdf.

Halligan, Aimee. 2023 (July 26). Personal Communication Email Between A. Halligan (OC Waste and Recycling) and J. Hitchcock (Psomas) entitled Solid Waste Disposal Services/Facilities Inquiry for the Proposed Santiago Creek Dam and Spillway Improvements Project.

Irvine Ranch Water District (IRWD). 2024a (November 11, date accessed). Irvine Ranch Water District: Water Supply & Reliability. Irvine, CA: IRWD. https://www.irwd.com/services/water-supply-reliability.

———. 2024b (November 11, date accessed). Irvine Ranch Water District: About Us. Irvine, CA: IRWD. https://www.irwd.com/about-us.

———. 2021 (June). 2020 Urban Water Management Plan. Irvine, CA: IRWD. https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/2020_urban_water_management_plan_irwd_adopted_june2021.pdf.

OC Waste & Recycling. 2024 (November 11, access date). Frank R. Bowerman Landfill. Santa Ana, CA: OC Waste & Recycling. http://www.oclandfills.com/landfill/active/bowerman.

Orange, County of. 2024 (June, updated). General Plan, Chapter III. Land Use Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2024-07/Adopted%20Land%20Use%20Element%20Amendment%20-%20June%202024.pdf.

———. 2012a. General Plan, Chapter V. Public Services & Facilities Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/8639.pdf.

———. 2012b. General Plan, Chapter VI. Resources Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/40235.pdf.

Southern California Gas Company (SCGC). 2024. (November 11, date accessed). SoCalGas – About Us, Company Profile. Monterey Park, CA: SoCalGas. https://www.socalgas.com/about-us/company-profile.

Southern California Edison (SCE). 2024 (November 11, date accessed). Southern California Edison's Service Area. Rosemead, CA: SCE. https://download.newsroom.edison.com/create_memory_file/?f_id=5cc32d492cfac24d21aecf4c&content_verified=True.

This page intentionally left blank

4.17 WILDFIRE

This section of the Environmental Impact Report (EIR) describes the existing wildfire hazards in the Project area and identifies associated potential wildfire risks related to development of the proposed Project.

4.17.1 REGULATORY SETTING

The following State and local regulations require actions reducing death, injuries, and property damage that can result from wildfire.

State Requirements

California Building Code

New construction in any Fire Hazard Severity Zone (FHSZ) must comply with California Building Code (CBC) Chapter 7A, *Materials and Construction Methods for Exterior Wildfire Exposure.* CBC Chapter 7A sets forth requirements pertaining to roofing; vents (covered with metal wire mesh or other materials with openings no larger than 0.125 inch); exterior coverings; floor projections; underfloor protection; exterior windows, skylights, and doors; decking; accessory structures; and use of ignition-resistant materials.

California Fire Code

The 2022 California Fire Code (CFC), California Code of Regulations, Title 24, Part 9, effective January 1, 2020, is based on the 2021 International Fire Code. Typical fire safety requirements of the CFC include requirements for the installation of fire sprinklers; building materials, and particular types of construction; and the clearance of debris and vegetation within a prescribed distance from occupied structures within wildfire hazard areas. In addition, the CFC addresses fire flow requirements, fire hydrant spacing, and access road specifications.

California Department of Forestry and Fire Prevention Fire Prevention Program

The California Department of Forestry and Fire Prevention's (CAL FIRE's) Fire Prevention Program consists of various activities including wildland pre-fire engineering, vegetation management, fire planning, education, and law enforcement. Common projects include fire break construction and other fire fuel reduction activities that lessen the risk of wildfire to communities. These activities include brush clearance around communities, along roadways, and evacuation routes. Other important activities include defensible space inspections, emergency evacuation planning, fire prevention education, fire hazard severity mapping, implementation of the State Fire Plan, fire-related law enforcement activities such as investigations to determine fire cause and origin as well as arson cases, and support for local government fire safe planning in the State Responsibility Area (SRA).

CAL FIRE prepares FHSZ maps for SRA and Local Responsibility Areas (LRA) considering many factors such as fire history, existing and potential fuel (natural vegetation), flame length, blowing embers, terrain, and typical weather for the area (CAL FIRE 2024). Wildland fire protection in California is the responsibility of either the State, local government, or the federal government.

Cal/Occupational Safety and Health Administration (OSHA) Regulations (CCR Title 8)

The California Division of Occupational Safety and Health Administration (Cal/OSHA) has the primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally-approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations (CFR). Cal/OSHA standards are generally more stringent than federal regulations. The use of hazardous materials in the workplace requires employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.

California Public Resources Code

The California Public Resources Code (PRC) was established in 1939 by the California Code Commission. The PRC contains law relating to natural resources, the conservation, utilization, and supervision thereof, along with mines and mining, oil and gas, and forestry. The following sections of the PRC are relevant to the proposed Project:

PRC 4427: During any time of the year when burning permits are required in an area pursuant to this article, construction personnel are prohibited from use or operating any motor, engine, boiler, stationary equipment, welding equipment, cutting torches, tarpots, or grinding devices from which a spark, fire, or flame may originate, which is located on or near any forest-covered land, brush--covered land, or grass-covered land, without first clearing all flammable materials within 10 feet of the operation and maintaining a water-type fire extinguisher equipped and ready for use.

PRC 4428: No person, except any member of an emergency crew or except the driver or owner of any service vehicle owned or operated by or for, or operated under contract with, a publicly- or privately--owned utility, which is used in the construction, operation, removal, or repair of the property or facilities of such utility when engaged in emergency operations, may use or operate any vehicle, machine, tool or equipment powered by an internal combustion engine operated on hydrocarbon fuels, in any industrial operation located on or near any forest, brush, or grass--covered land between April 1 and December 1 of any year, or at any other time when ground litter and vegetation will sustain combustion permitting the spread of fire, without providing and maintaining, for firefighting purposes only, suitable and serviceable tools in the amounts, manner, and location prescribed in this section.

PRC 4431: During any time of the year when burning permits are required in an area pursuant to this article, no person shall use or operate or cause to be operated in the area any portable saw, auger, drill, tamper, or other portable tool powered by a gasoline-fueled internal combustion engine on or near any forest-covered land, brush-covered land, or grass-covered land, within 25 feet of any flammable material, without providing and maintaining at the immediate locations of use or operation of the saw or tool, for firefighting purposes one serviceable round point shovel, with an overall length of not less than 46 inches, or one serviceable fire extinguisher. The Director of Forestry and Fire Protection shall by administrative regulation specify the type and size of fire extinguisher necessary to provide at least minimum assurance of controlling fire caused by use of portable power tools under various climatic and fuel conditions.

The required fire tools shall at no time be farther from the point of operation of the power saw or tool than 25 feet with unrestricted access for the operator from the point of operation.

PRC 4442:

(a) Except as otherwise provided in this section, no person shall use, operate, or allow to be used or operated, any internal combustion engine which uses hydrocarbon fuels on any forest-covered land, brush-covered land, or grass-covered land unless the engine is equipped with a spark arrester, as defined in subdivision (c), maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire pursuant to Section 4443.

(b) Spark arresters affixed to the exhaust system of engines or vehicles subject to this section shall not be placed or mounted in such a manner as to allow flames or heat from the exhaust system to ignite any flammable material.

(c) A spark arrester is a device constructed of nonflammable materials specifically for the purpose of removing and retaining carbon and other flammable particles over 0.0232 of an inch in size from the exhaust flow of an internal combustion engine that uses hydrocarbon fuels or which is qualified and rated by the United States Forest Service.

(d) Engines used to provide motive power for trucks, truck tractors, buses, and passenger vehicles, except motorcycles, are not subject to this section if the exhaust system is equipped with a muffler as defined in the Vehicle Code.

(e) Turbocharged engines are not subject to this section if all exhausted gases pass through the rotating turbine wheel, there is no exhaust bypass to the atmosphere, and the turbocharger is in effective mechanical condition.

(f) Motor vehicles when being operated in an organized racing or competitive event upon a closed course are not subject to this section if the event is conducted under the auspices of a recognized sanctioning body and by permit issued by the fire protection authority having jurisdiction.

PRC 4291:

Sets forth requirements for defensible space, including clearing most flammable vegetation within 30 feet of buildings, and reducing flammable vegetation 30 feet to 100 feet from buildings.

Local Requirements

Orange County Municipal Code

The CFC is adopted as Section 3-3-1 et seq. of the Orange County Municipal Code. Section 3-3-31, Chapter 49 Requirements for Wildland-Urban Interface Fire Areas to ensure Fuel Modification plans shall be reviewed and approved by the Orange County Fire Authority for all new buildings to be built or installed in wildfire risk area.

ReadyOC

ReadyOC is a public outreach effort aimed at educating and empowering Orange County residents, businesses, and the community to better prepare for emergency situations. The primary goal is to ensure local residents are well prepared for a variety of emergency situations that could impact the County and to offer opportunities for concerned citizens to get involved in local readiness efforts.

Funded through the U.S. Department of Homeland Security, ReadyOC is administered by the Santa Ana and Anaheim police departments as part of the Urban Area Security Initiative in conjunction with the Orange County Sheriff's Department. The campaign is guided by the

ReadyOC Steering Committee composed of emergency management personnel representing several local government agencies and advised by a Corporate Advisory Council that includes many of Orange County's leading businesses and organizations (ReadyOC 2023).

Orange County

General Plan, Public Services & Facilities Element

The Public Services and Facilities Element, one of nine elements of the General Plan, sets forth a comprehensive strategy for the planning, management, and implementation of public facilities that are necessary to meet Orange County's existing and future demands. The Public Services and Facilities Element focuses on those publicly-managed services and facilities which have a direct influence on the distribution and intensity of development that can be accommodated through the utilization of existing technologies and assumptions that are used to determine adequate service levels. These services include community services, such as fire protection (County of Orange 2012a).

The Community Facilities section of the Public Services & Facilities Element specifically discusses the Orange County Fire Authority (OCFA), fire protection services, and fire station locations.

The following goals and objectives of the Public Services & Facilities Element pertaining to fire services are applicable to the Project:

Goal 1: Provide a safe living environment ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property from structural and wildland fire damages.

Objective 1: To achieve desired level of fire protection and paramedic service through coordinated land use and facility planning.

Policy 1: Facility Siting: Fire/paramedic facilities shall be sited in locations so as to assure efficient fire rescue and paramedic response for the service area. General criteria for site selection shall include:

a) Call response time: for 80 percent of the service area, first fire engine to reach the emergency scene within 5 minutes and paramedic to reach the scene within 8 minutes.

b) Land use compatibility: stations shall be located in commercial or industrial, or open space zones in order to avoid the disturbance to residential areas wherever possible.

c) Street access: stations shall be located adjacent to arterial highways with controlled traffic signalization.

Policy 3: Site Design Criteria – Require all land use proposals to implement adequate site design so as to maximize fire protection and prevention in order to minimize potential damages. The site design criteria shall be established to reflect the levels of protection needed for projects in various fire hazard areas. Such criteria shall include consideration as to: structure type and density, emergency fire flow and fire hydrant distribution, street pattern and emergency fire access, fuel modification programs, automatic fire sprinkler systems, and other requirements as determined by the Fire Chief.

In accordance with the Insurance Services Office (ISO) suggested standards, ultimate fire protection ratings shall be maintained by General Plan land use categories as follows: (1) ISO 3

for all urban developments including Residential (1C and 1B), Commercial (2A and 2B), Employment (3.0), and Public Facilities (4.0) which are within five miles from a fire station and less than 1000 feet from a hydrant; and (2) ISO 4 for Rural Residential (1A) which are within five miles from a fire station and less than 100 feet from a hydrant. For areas greater than five miles or 1000 feet, the ISO suggested standard is 9.

General Plan, Safety Element

The Safety Element, one of nine elements of the General Plan, contains County policies on identified and potential hazards and safety considerations, their mitigation (i.e., reduction in damage and loss to real and personal property and minimization of adverse social and economic impacts), and implications for development.

The Fire section of the Safety Element examines the threat of fire to urban areas, wildlands, and the Wildland-Urban Interface (WUI). Fire is a constant threat in all parts of the County. It is the responsibility of the Orange County Fire Authority to meet the fire threat challenge for present and future development and residents (County of Orange 2012b).

The following goal of the County of Orange General Plan Safety Element pertaining to wildfire is applicable to the Project:

Goal 1: Provide a safe living environment, ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property fire.

Unified County of Orange and Orange County Operational Area Emergency Operations Plan

The Unified County of Orange (County) and Orange County Operational Area (OA) Emergency Operations Plan (EOP) provides guidance and procedures for the County and the County as the OA to prepare for and respond to significant or catastrophic natural, technological, or conflict-related incidents that produce situations requiring a coordinated response. It further provides guidance regarding management concepts, identifies organizational structures and relationships, and describes responsibilities and functions of the emergency organization to protect life and property. The plan incorporates and complies with the principles and requirements found in State and federal laws, regulations, and guidelines. The EOP outlines procedures for coordination between City, County of Orange, State, and federal authorities in emergency responses, and for City requests for mutual aid from such authorities (County of Orange 2016).

County of Orange & Orange County Fire Authority Local Hazard Mitigation Plan

The Local Hazard Mitigation Plan (LHMP) is a multi-jurisdiction plan developed jointly between the County of Orange, local governments, and the Orange County Fire Authority, a Joint Powers Authority (County of Orange and Orange County Fire Authority 2015). This collaborative plan was developed to ensure that each participating agency has met the requirements of 44 CFR §201.6. The current approved Local Hazard Mitigation Plan is adopted as an element of the County of Orange General Plan under Chapter IX – Safety Element as required under California Government Code §8685.9 and §65302.6. As a multi-jurisdiction plan, the document focuses on mitigating all natural hazards impacting unincorporated areas of the County as well as County and Orange County Fire Authority-owned facilities. The Orange County Fire Authority provides fire suppression and prevention services to the County's unincorporated areas as well as a variety of other jurisdictions and contracts under their Joint Powers Authority. As a result, fire mitigation strategies in this plan are inclusive of all areas served by the Fire Authority.

The Orange County Fire Authority Local Hazard Mitigation Plan (OCLHMP) discusses factors that exacerbate fire risk such as vegetation, weather, topography, and fuel hazards. The OCLHMP provides requirements for developments at the WUI, where the Project resides. These include requiring the construction of fuel modification zones (firebreak, fuel break, or green belt) in unincorporated County areas.

The proposed Project is located within unincorporated Orange County and would therefore be subject to compliance with the OCLHMP. The OCLHMP identifies hazard-mitigation measures to limit the impact of wildland fires in Orange County. The OCFA is the responsible agency for these mitigation measures, which include the list below.

- Implementation of a real-time remote sensing and fire detection platform to increase the ability to detect, respond to, and monitor wildland areas in Orange County.
- Increase communication, coordination, and collaboration between WUI property owners, local and county planners, and fire prevention crews and officials to address risk, existing mitigation measures, and federal assistance programs.
- Reduce the amount of combustible fuels within identified at-risk communities.
- Encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.
- Evaluate and implement roadway-hardening measures on identified high risk roadways in wildland areas in Orange County.
- Enhance outreach and education programs aimed at mitigating WUI hazards thereby reducing the exposure of stakeholders (public and private) to these hazards.
- Establish a countywide wildland fire prevention education task force.
- Enhance the efficiency of WUI/Intermix response and recovery activities.
- Development and dissemination of maps relating to the fire hazard to help educate and assist builders and homeowners in being engaged in wildland/urban mitigation activities and to help guide emergency services during response.
- Inventory alternative firefighting water sources and encourage the development of additional sources.

4.17.2 METHODOLOGY

Several maps of designated wildfire hazard zones (FHSZ, CAL FIRE; and WUI area, (US Forest Service) were reviewed to determine whether the Project site or surrounding open space areas are mapped in any of those zones or areas.

4.17.3 EXISTING CONDITIONS

The Santiago Creek Dam is a compacted earthfill embankment comprised of an outlet tower and spillway. Existing structures include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, Irvine Lake pipeline, and dam access road.

Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of State Route (SR) 241, Limestone Canyon Regional Park is located south of Santiago Canyon Road, and Oak Canyon Park is located at the southeast end of Irvine Lake. The

closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

The Project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan. Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. Vegetated slops surround the Santiago Dam, including vegetation types such as: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline.

Wildfire Context

Fires are a natural part of the landscape in California; however, with the changing weather patterns brought by climate change, the fire season is coming earlier and ending later than in the past (USFS 2024a). In the last five years (2019 - 2023), there have been 7,521 wildfires that have burned 1,563,049 acres in California (CAL FIRE 2023b). Drought or extended periods of low rainfall can dry out fuel, increasing its risk of burning. Periods of high rainfall decrease fire risk because there is more moisture in the vegetation; however, years of high rainfall increase the fuel load with growth of vegetation and weeds. In the Project region, Santa Ana wind conditions also increase the risk of fire with dry, gusty winds (CAL FIRE 2023b). According to the National Park Service, approximately 85 percent of wildfires are caused by humans. Human-caused wildfires are due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson (NPS 2022).

The climate of Southern California, including the Project site, has been characterized by fire climatologists as the worst fire climate in the United States with high winds (Santa Ana) occurring during autumn after a six-month drought period each year (Keeley 2004).

Contributing Wildfire Factors

Fire environments are dynamic systems and include many types of environmental factors and site characteristics. Fires can occur in any environment where conditions are conducive to ignition and fire movement. Assessment of existing wildfire risk in an area involves five major factors: fuel, topography, weather, resources exposed to wildfire; and effects of wildfire on those resources (LACCEO 2014; NPS 2017; IBHS 2023). The state of each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment.

1. **Fuel.** Many types of vegetation are fuel for wildfires, including forest, woodland, scrub (including chaparral and sage scrub), and grassland (LACCEO 2014)
2. **Topography.** The rate of wildfire spreading upslope will likely double with a doubling of grade (PVE and RHE 2013). Heat rising in front of fire heats and dries upslope fuels, speeding combustion. Gulches and canyons funnel air, like a chimney, which intensifies fire and speeds fire spread (PVE and RHE 2013).
3. **Weather.** Extreme fire weather is hot and dry, with strong winds. Hot, dry northeasterly winds, such as the Santa Ana winds common in the Los Angeles region in autumn, contribute to spreading wildfire (LACCEO 2014).

4. **Resources.** Resources exposed to wildfire include people, structures, other cultural resources, wildlife, and vegetation.
5. **Effects of wildfire.** In addition to their many adverse effects, wildfires have several favorable effects, including removing underbrush and debris, thus providing space and sunlight for new plants and aiding regeneration of fire-dependent plant species (BLM 2024). The discussion of effects in this section focuses on adverse effects of wildfires.

Wildland fire may transition to urban fire if structures are receptive to ignition. Understanding the existing wildland vegetation and fuel conditions on and around the project site is necessary to understand the fire environment.

State and Local Responsibility Areas

As defined by PRC Section 4126, SRAs are State- and privately-owned forest, watershed, and rangeland for which the primary financial responsibility of preventing and suppressing wildland fires rests with the State. State Responsibility Areas, by definition, do not include any lands within city limits. Within SRAs, CAL FIRE maps fire hazard severity zones based on factors such as fuel, slope, and fire weather to identify the degree of fire hazard throughout California (e.g., moderate, high, or very high). CAL FIRE also provides recommendations for fire hazard severity zones within LRAs, but the responsibility for mapping LRAs lies within the local jurisdiction responsible for fire management and control within the LRA. While fire hazard severity zones do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe and therefore are of greater concern.

According to the California Fire Hazard Severity Zone Viewer, the Project site is located within a very high FHSZ in an SRA. The areas surrounding the Project site, which are primarily open space areas, are also located within a very high FHSZ, with the exception of a portion of Irvine Lake, which is located within a high FHSZ within an SRA (CAL FIRE 2023a). The OCFA also provides a daily Fire Rating for coastal, inland and mountain areas (OCFA 2024d). This website can provide updates and local rates on the present status of fire danger within the OCFA service area. Additionally, the Project site and surrounding areas are not in a WUI area (that is, an area where structures and other human developments meet or intermingle with wildland vegetative fuels) mapped by the US Forest Service. (USFS 2024b).

Firefighting Resources in the Project Region

The OCFA provides regional fire protection, emergency medical services, and rescue services to the unincorporated areas of Orange County, including the Project site, plus 22 cities. Resources are deployed based upon a regional service delivery system that assigns personnel and equipment to emergency incidents without regard to jurisdictional boundaries. The equipment used by the department has the versatility to respond to both urban and wildland emergency conditions (County of Orange 2012). The nearest OCFA Station is Station No. 8, located at 10631 Skyline Drive, Santa Ana, approximately 5.8 miles west of the Project site (OCFA 2024a). In addition, the nearest fire station outside of the OCFA jurisdiction is Orange City Fire Department Station 7, located at 8501 E. Fort Road, Orange, approximately three miles west of the Project site, which would be able to respond, if necessary, in the event of an emergency.

The OCFA Operations section also includes the California Urban Search and Rescue Task Force 5, which is a State task force that responds as a FEMA or California OES resource during national or regional emergencies such as earthquakes, hurricanes, or other natural and manmade disasters; the Emergency Planning and Coordination section, which provides emergency management planning, agreement coordination, and homeland security grand coordination; and

investigations section, which conducts fire investigation and evaluation and initiates early intervention strategies (OCFA 2024b).

Additionally, OCFA has an air operations team with multiple helicopters for firefighting and emergency rescue purposes. The helicopter operation is located at Fullerton Airport, located at 4011 West Commonwealth Avenue, Fullerton, approximately 20 miles northeast of the Project site (OCFA 2024c).

4.17.4 THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, the Project would result in a significant wildfire impact where:

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

Threshold 4.17-1 Substantially impair an adopted emergency response plan or emergency evacuation plan?

Threshold 4.17-2 Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Threshold 4.17-3 Require installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Threshold 4.17-4 Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage change?

4.17.5 IMPACT ANALYSIS

Project Design Features

PDF WILDF-1 The Project will comply with the general provisions of the Orange County Fire Authority fire prevention requirements, including prohibiting operation of any stationary equipment, welding equipment, cutting torches, tarpots, or grinding devices from which a spark, fire or flame may originate on or near any forest-covered land, brush covered land, or grass covered land, without:

1. Having an IRWD approved Hot Work Permit;
2. Prior to starting construction activities, soaking around the work area for a distance of 30 feet to reduce fire spread into wildlands, which shall remain soaked for the duration of the work;
3. Maintaining, at a minimum, one serviceable round point shovel with an overall length of not less than forty-six (46) inches and one backpack pump water-type fire extinguisher fully equipped and ready for use at the immediate area during the operation;

4. Stopping work when winds are 8 MPH during periods when relative humidity is less than 25%, or a Red Flag condition has been declared or public announcement is made, or when an official sign was caused to be posted by the Orange County Fire Authority or IRWD; or
5. Keeping a cell phone nearby and calling 911 immediately in case of a fire.

PDF WILDF-2 The Project will comply with the general provisions of the Orange County Fire Authority, including prohibiting operation of either mechanized or non-mechanized equipment during Red Flag Warnings as declared by the Orange County Fire Authority or other jurisdictional agency or IRWD determines hazardous conditions exist and informs the Project Contractor of such.

PDF WILDF-3 The Project will comply with the general provisions of the Orange County Fire Authority, including training all construction personnel in the requirements of the Fire Prevention and Response Plan prior to construction. The Plan will outline the responsibilities for prevention, pre-suppression and suppression activities associated with fire hazards for the Project. Additionally, fire safety information shall be disseminated to construction personnel during regular safety meetings and fire management techniques shall be applied during construction.

Regulatory Requirements

RR WILDF-1 The Project will comply with the general provisions of the California Fire Code relating to fire safety, emergency access, and emergency egress routes.

RR WILDF-2 The Project will comply with PRC Sections 4427, 4428, 4431, and 4442, related to the handling of combustible fuels and equipment that can exacerbate fire risks, in addition to fire protection and prevention requirements specified by the California Code of Requirements and California Division of Occupational Safety and Health Administration . This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use.

Threshold 4.17-1

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project substantially impair an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact. As previously stated, the Project site is located within a very high FHSZ in an SRA, and the areas surrounding the Project site, which are primarily open space areas, are also located within a very high FHSZ (CAL FIRE 2023a).

The County does not have formally-designated evacuation routes, however, the major transportation routes in Orange County include the freeway system and surface streets. The Project site is located approximately 4.5 driving miles northeast of SR-261 and approximately four driving miles east of SR-241, which are the major freeways located in the site vicinity. The Project is located approximately four driving miles north of Santiago Canyon Road, which is the

major roadway available. These major freeways and roadways in the area would be utilized as the main evacuation routes in case of an emergency. In addition, the Orange County Sheriff's Department, in conjunction with the Santa Ana and Anaheim police departments, would implement ReadyOC to provide emergency preparedness in an emergency.

Construction of the proposed Project would not physically interfere with the outlying arterial roadway system as all construction activities and staging areas would be within the boundaries of the existing Santiago Creek Dam and would not impede the use of the surrounding freeways or streets. Existing access routes would be maintained at the Project site during construction activities and the proposed Project would not alter access. Implementation of the proposed Project would not alter traffic conditions or modify the local or regional circulation system, as discussed further in Section 4.14, Transportation, of this EIR. Further, IRWD's Project Manual includes specific fire hazard-reduction measures, such as **PDF WILDF-1** through **PDF WILDF-3**, that would be implemented during construction activities to reduce potential for wildfire impacts on site.

Additionally, the Project proposes ancillary site improvements, including a new access road and ramp to provide vehicle access to the new inclined/outlet structure and raising of the dam crest with a concrete parapet wall, providing a new emergency access walkway and stair system to reach the inclined inlet/outlet structure and dam crest from the adjacent landfill facility during a reservoir spill event, and a new prefabricated truss-type bridge structure across the proposed spillway. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide and elevated by up to approximately one foot to accommodate a wider access road, and protective railings would be installed on both sides of the access road. These site improvements would provide improved emergency access and allow expanded emergency access to the site. The Project would implement **RR WILDF-1**, which requires compliance with the general provisions of the CFC relating to fire safety, emergency access, and emergency egress routes, which would provide emergency safety measures.

The Project would also comply with the Orange County EOP, which provides guidance and procedures for the County and the County as the OA to prepare for and respond to significant or catastrophic natural, technological, or conflict-related incidents that produce situations requiring a coordinated response. Much of the EOP is procedural, including setting forth roles and responsibilities of City agencies and officials in emergency responses; coordination between City, County, State, and federal authorities; and procedures for requesting mutual aid and for continuity of County government. Project development would not substantially impair implementation of the EOP. Therefore, the Project would not substantially impair an adopted emergency response plan or emergency evacuation plan, impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The proposed Project would not substantially impair an adopted emergency response plan or emergency evacuation plan, as it would not prevent access to the local or regional circulation system and would improve an emergency access walkway in the case of a reservoir spill event with RR WILDF-1 and PDFs WILDF-1 through WILDF-3 incorporated. Therefore, the potential impacts associated with emergency access would be less than significant.*

Threshold 4.17-2

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Less Than Significant Impact. As indicated above, the Project site is located within a very high FHSZ in an SRA, and the areas surrounding the Project site, which are primarily open space areas, are also located within a very high FHSZ. These areas include slopes surrounding the Project site that may be susceptible to prevailing winds, as brush and grassland habitats are highly flammable. Vegetation on-site that may contribute to wildfire risk includes: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore.

During construction, equipment and on-site diesel fuel could create a risk of wildfire with possible ignition sources such as internal combustion engines, gasoline-powered tools, and equipment that could produce a spark, fire, or flame. The use of spark-producing construction machinery within or adjacent to fire risk areas such as the surrounding open space areas, could expose temporary project workers and contractors to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire, resulting in a potentially significant impact. However, all personnel on the Project site would be required to comply with **RR WILDF-2**, which includes compliance with the PRC Sections 4427, 4428, 4431, and 4442, relating to the handling of combustible fuels and equipment that can exacerbate fire risks. During construction, strict adherence to these PRC sections would ensure that contractors are responsible for all monitoring and safety measures ensuring that any risk to exacerbate wildfire would be reduced. Additionally, all construction must comply with fire protection and prevention requirements specified by the California Code of Regulations (CCR) and Cal/OSHA. This includes various measures such as the easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use. Additionally, the Project would include installation of HeloPods[1] near the Flats area at the eastern edge of the lake at the upstream end of the reservoir for use in the absence of stored water in Irvine Lake.

Operation-related activities would involve a limited number of maintenance trucks for inspections and material delivery. These trucks would be limited to established access roads and would have a low potential of producing sparks, fire, or flame, that could result in uncontrolled spread of wildfire. Nevertheless, due to the site topography and wildfire risk, operators of the proposed Project site would comply with PRC Sections 4427, 4428, 4431, and 4442, which include regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks. Therefore, operational impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The proposed Project would be surrounded by open space areas, however, it would not exacerbate wildfire risks within the area, as it would incorporate RR WILDF-2, and comply with all applicable regulations including PRC Sections 4427, 4428, 4431, and 4442 and Cal/OSHA. Therefore, the*

[1] Portable, tactical helicopter dip sources, which provide a water source to fire crews to refill the helicopters' water tanks closer to the location of a wildfire.

potential impacts associated with slope, prevailing winds, and other factors would be less than significant.

Threshold 4.17-3

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project require installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Less Than Significant Impact. As indicated above, the Project site is located within a very high FHSZ in an SRA, and the areas surrounding the Project site, which are primarily open space areas, are also located within a very high FHSZ.

Development of the proposed Project would include construction and operation of a new outlet tower, spillway improvements and access road improvements. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide to accommodate a wider access road, and protective railings would be installed on both sides of the access road. The proposed access road improvements are proposed for SCE utility line relocation. The Project, similar to other such projects, has the potential to increase the risk associated with wildfires due to the presence of heavy construction equipment, including the use of flammable liquids and the presence of internal combustion engines, which could generate sparks or cause leaks that create fire risks, as discussed in further detail above. All infrastructure installed as part of the Project during operation and maintenance will adhere to CCR Title 24, the CBC, and County of Orange Safety Element. Therefore, with regulatory compliance measures incorporated, installation or maintenance activities would not exacerbate wildfire risk and would not cause environmental impacts other than those analyzed throughout Section 4.0, Impact Analysis, of this EIR. Impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The proposed Project would not exacerbate wildfire risks within the area as a result of installation or maintenance of associated infrastructure, as it would comply with all applicable regulations such as the California Code of Regulations Title 24, the California Building Code, and the County of Orange Safety Element. Therefore, the potential impacts associated with installation or maintenance of associated infrastructure would be less than significant.*

Threshold 4.17-4

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage change?

Less Than Significant Impact. As indicated above, the Project site is located within a very high FHSZ in an SRA, and the areas surrounding the Project site, which are primarily open space areas, are also located within a very high FHSZ.

During construction activities, site alteration through movement of substantial quantities of soil and earth materials has the potential to result in landslides as a result of runoff or drainage

changes during construction. As discussed in Section 4.9, Hydrology and Water Quality, given that the size of the proposed Project exceeds one acre, the Project would be required to comply with the National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (Construction General Permit) and local stormwater ordinances. These State and local requirements were developed to ensure that erosion is controlled on construction sites. The Construction General Permit requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP), which requires applications of Best Management Practices (BMPs) to control runoff from construction work sites. The BMPs would include, but would not be limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of infiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. In the event that a wildland fire is followed by a rain event, and results in downstream flooding or landslides as a result of post-fire runoff, the BMP measures required to be implemented under the SWPPP would reduce the risk of runoff, post-fire slope instability, and drainage changes. Additionally, the Project's design is required to be consistent with Division of Safety of Dams and US Army Corps of Engineers requirements and standards, and applicable seismic safety requirements of the CBC, among other requirements. This would include engineering design measures to appropriately manage risks of landslides affecting the Project.

During operations, the proposed Project would be designed to withstand a variety of site conditions to allow IRWD to impound water within Irvine Lake, a critical water supply reservoir for IRWD, and to maintain the reservoir, which provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. Operation of the proposed project would not involve onsite personnel that could be put at risk should landslides or flooding occur as a result of wildland fires. Operation of the proposed project would be managed in a manner that would not result in runoff, post-fire slope instability, or drainage changes as a result of potential wildland fire. As a result, impacts would be less than significant, and no mitigation is required.

Impact Conclusion: *The proposed Project would not expose people or structure to risks subsequent to wildfire, such as flooding or landslides, as it would comply with all applicable regulations during construction and operations. Therefore, the potential impacts associated with wildfire risks such as flooding, and landslides would be less than significant.*

4.17.6 CUMULATIVE IMPACTS

Projects considered in the cumulative impact analysis consist of four projects within a one-mile buffer of the Project, three of which are located in the unincorporated County of Orange and the fourth is located in the City of Orange. These related projects are described in more detail in Table 4-1, Cumulative Projects List, which is provided in Section 4.0, Impact Analysis.

All four of the cumulative projects including No. 1 (Loma Ridge Jeep Trail), No.2 (Below Irvine Lake), No. 3 (Haul Road and SR-241) and No. 4 (Blue Diamond Haul Road) are located within the very high FHSZ in an SRA, as designated by CalFire. As the cumulative projects would be located in a very high FHSZ within an SRA, these projects could potentially exacerbate wildfire risks, including risks subsequent to wildfire such as flooding and landslides.

However, similar to the proposed Project, other related projects would be required to comply with existing State, County and City laws, regulations, and guidelines addressing wildfire hazards,

including relevant CBC and CFC provisions; California Public Resources Code; the Orange County Municipal Code. Section 3-3-31, (which adopted the CFC as Section 3-3-1 et seq) and Chapter 49, Requirements for Wildland-Urban Interface Fire Areas, to ensure Fuel Modification plans shall be reviewed and approved by the OCFA for all new buildings to be built or installed in wildfire risk areas. As such, cumulative impacts would be less than significant after regulatory compliance, and Project's impacts would not be cumulatively considerable.

4.17.7 MITIGATION PROGRAM

Mitigation Measures

No mitigation measures have been identified for wildfire.

4.17.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project-specific and cumulative wildfire impacts of the proposed Project would be less than significant with compliance with pertinent regulatory requirements listed above. No significant unavoidable wildfire impacts would occur.

4.17.9 REFERENCES

Bureau of Land Management (BLM). 2024 (November 6, date accessed). Chapter Introduction: Fire Ecology. Washington, D.C.: BLM. https://www.blm.gov/sites/blm.gov/files/tablerocks_fire_ecol_intro.pdf.

California Department of Forestry and Fire Prevention (CAL FIRE). 2024. Fire Hazard Severity Zones in a State Responsibility Area Viewer. Sacramento, CA: CAL FIRE. https://calfire-forestry.maps.arcgis.com/apps/webappviewer/index.html?id=988d431a42b242b29d89597ab693d008.

———. 2023a (June 15). Fire Hazard Severity Zones in a State Responsibility Area Viewer. Sacramento, CA: CAL FIRE. https://calfire-forestry.maps.arcgis.com/apps/webappviewer/index.html?id=988d431a42b242b29d89597ab693d008.

———. 2023b. Wildfire Activity Statistics. Sacramento, CA: CAL FIRE. https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/calfire-website/our-impact/fire-statistics/2023_redbook_final.pdf?rev=e3ba4cccf9fe4d0e97a921189d85baaf&hash=9593161EBE9D4EAC55B5ACD30F46228A.

———. 2022. Frequently Asked Questions About: 2022 Fire Hazard Severity Zones. Sacramento, CA: CAL FIRE. https://www.osfm.fire.ca.gov/media/1bboqr4l/2022-fhsz-faqs-june-8-2023.pdf.

City of Palos Verdes Estates and City of Rolling Hills Estates (PVE and RHE). 2013 (October 31). Multijurisdictional Hazard Mitigation Plan. https://www.rpvca.gov/DocumentCenter/View/2110/Multijurisdictional-Mitigation-Plan-PDF?bidId=.

County of Orange and Orange County Fire Authority (OC and OCFA). 2015. Local Hazard Mitigation Plan. https://bof.fire.ca.gov/media/8969/online-only-rpc-1-b-1-orange-county-fire-authority-lhmp.pdf.

Insurance Institute for Business and Home Safety (IBHS). 2023 (June 23, access date). Why Did Only One Side of This Home Burn? https://ibhs.org/wildfire/wildfire-demo-2019/.

J.E. Keeley. 2004. Invasive Plants and Fire Management in California Mediterranean-Climate Ecosystems.

Los Angeles County Chief Executive Office (LACCEO). 2014. County of Los Angeles All-Hazard Mitigation Plan. Los Angeles, CA: LACCEO. https://ceo.lacounty.gov/wp-content/uploads/OEM/hazmitgplan.pdf.

National Park Service (NPS). 2022 (March). Wildfire Causes and Evaluations. https://www.nps.gov/articles/wildfire-causes-and-evaluation.htm.

———. 2017 (February 16, last updated). Wildland Fire Behavior. https://www.nps.gov/articles/wildland-fire-behavior.htm.

Orange County Fire Authority (OCFA). 2024a (November 6, date accessed). Find Closest Fire Stations in Orange County. Santa Ana, CA: County of Orange. https://ocfa.org/AboutUs/StationLocator/stationlocator-map.html.

———. 2024b (November 6, date accessed). About Us- Operations. Santa Ana, CA: County of Orange. https://ocfa.org/AboutUs/Departments/Operations.aspx.

———. 2024c (November 6, date accessed). About Us- Air Operations. Santa Ana, CA: County of Orange. https://ocfa.org/AboutUs/Departments/OperationsDirectory/airoperations.aspx.

———. 2024d (November 6, date accessed). Tomorrow's Fire Rating. Santa Ana, CA: County of Orange. https://ocfa.org/SafetyPrograms/FireDanger.aspx.

Orange, County of. 2016 (August). Unified County of Orange and Orange County Operational Area, Emergency Operations Plan. Santa Ana, CA: County of Orange. https://ochealthinfo.com/sites/hca/files/import/data/files/67783.pdf.

———. 2012a. General Plan, Chapter V. Public Services & Facilities Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/8639.pdf.

———. 2012b. General Plan Chapter IX. Safety Element. Santa Ana, CA: County of Orange. https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/40234.pdf.

ReadyOC. 2024 (November 6, date accessed). About ReadyOC. Santa Ana, CA: County of Orange. https://readyoc.com/about-readyoc.

US Forest Service (USFS). 2024a (December 15, date accessed). Pacific Southwest Region, Climate Change. https://www.fs.usda.gov/main/r5/climatechange.

———.2024a (November 6, date accessed). Wildland Urban Interface: 2010. https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=bfec19a14d96451eb3a04e52c4537dee.

This page intentionally left blank

SECTION 5.0 ALTERNATIVES

5.1 INTRODUCTION

Sections 15126.6(a)–15126.6(b) of the State California Environmental Quality Act (CEQA) Guidelines (14 *California Code of Regulations* [CCR]) provides guidance on the range of alternatives to a proposed project that must be evaluated. The CEQA Guidelines state the following:

(a) Alternatives to the Proposed Project. An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible. The Lead Agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason.

(b) Purpose. Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

Pursuant to the CEQA Guidelines, a range of alternatives to the proposed Project is considered and evaluated in this Environmental Impact Report (EIR). These alternatives were developed in the course of Project planning and environmental review. The discussion in this section provides:

1. A description of alternatives considered;
2. An analysis of whether the alternatives meet most of the objectives of the Project (as presented in Sections 1.4 and 3.5 of this EIR and restated below); and
3. An analysis comparing the alternatives under consideration and the proposed Project. The focus of this analysis is to determine if the alternatives are capable of eliminating or reducing the significant environmental effects of the Project to a less than significant level.

5.2 CRITERIA FOR SELECTING ALTERNATIVES

Several criteria were used to select alternatives to the proposed Project. These criteria include the alternative's ability to achieve the Project Objectives, feasibility, and ability to eliminate or reduce significant impacts. Each of these are described below.

5.2.1 ABILITY TO ACHIEVE PROJECT OBJECTIVES

The ability of an alternative to meet most of a project's objectives is an important component when evaluating alternatives. When an alternative is selected, not only are the environmental impacts considered but so is the alternative's ability to meet a project's intended objectives. Section 15126.6(f) of the CEQA Guidelines (14 CCR) states the following:

> The range of alternatives required in an EIR is governed by a 'rule of reason' that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project.

The primary objective of the proposed Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities as well as to modify the embankment to permit operation of the facilities for a long-term water resource benefit. In implementing the proposed Project, Irvine Ranch Water District (IRWD) would:

1. Create new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements established by the California DWR DSOD, which is the governing state agency associated with this Project;
2. Satisfy IRWD's operational requirements in the present and the future;
3. Extend the useful life of the facilities;
4. Improve water supply reliability; and
5. Minimize impacts to local environmental resources and surrounding property owners.

5.2.2 FEASIBILITY

When developing alternatives for evaluation in an EIR, the feasibility of implementing the alternative must be considered. If a range of alternatives is developed but, due to regulatory restrictions, cannot be implemented, the analysis would not meet the CEQA intent to provide a reasonable range of feasible alternatives. Section 15126.6(f)(1) of the CEQA Guidelines (14 CCR) states the following:

> Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives (*Citizens of Goleta Valley v. Board of Supervisors* [1990] 52 Cal.3d 553; see *Save Our Residential Environment v. City of West Hollywood* [1992] 9 Cal.App.4th 1745, 1753, fn. 1).

It has been recognized that, for purposes of CEQA, "feasibility" encompasses "desirability" to the extent that the latter is based on a reasonable balancing of the relevant economic, environmental, social, and technological factors (*California Native Plant Society v. City of Santa Cruz* [2009] 177 Cal.App.4th 957, 1001). This balancing is harmonized with CEQA's fundamental recognition that policy considerations may render alternatives impractical or undesirable (Ibid.; see also *California Public Resources Code,* Section 21081; 14 CCR 15126.6[c] and 15364).

5.2.3 ELIMINATION/REDUCTION OF SIGNIFICANT IMPACTS

Section 15126.6(b) of the CEQA Guidelines states that "[b]ecause an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly".

The proposed Project, evaluated in Sections 4.1 through 4.17 of this EIR, results in a range of impacts. Therefore, the Alternatives evaluated in this section have been developed in an effort to reduce and/or eliminate one or more potentially significant impacts associated with the proposed Project. Although the level of impact may be the same for each alternative when compared to the CEQA Thresholds of Significance, the degree or severity of impact may be slightly different under each scenario.

A significant and unavoidable impact related to air quality was identified for the proposed Project and is briefly summarized below.

Air Quality

Based on the analysis presented, pollutant emissions from the proposed Project would exceed the SCAQMD thresholds and would result in a significant impact even with the implementation of mitigation measure MM AQ-1 and SCAQMD regulatory requirements. Additionally, the Project's construction activities would conflict with the 2022 AQMP's goal of reducing criteria pollutant emissions. Subsequently, the Project would in a temporary significant and unavoidable impact related to consistency with the AQMP.

The potentially significant adverse environmental impacts of the proposed Project, which require mitigation, are briefly summarized below.

Biological Resources

The Project has potential to impact special status plant and wildlife species. Potentially significant impacts were identified for mud nama, Crotch's bumble bee, western pond turtle, coastal California gnatcatcher, least Bell's vireo, bald eagle, and roosting bats. Additionally, wildlife using habitat adjacent to the Project could be indirectly impacted by construction noise, night lighting during construction, dust, and invasive plant species. Assuming implementation of PDF BIO-1 through PDF BIO-9 and with implementation of MM BIO-1 through MM BIO-8 these impacts would be reduced to less than significant. Therefore, the potential impact on special status species would be less than significant.

The Project would impact coastal sage scrub, riparian, and woodland habitats. The additional inundation during implementation of the Project would also affect a limited amount of these habitats. With implementation of MM BIO-3, MM BIO-4, and MM BIO-8 these impacts would be less than significant. Therefore, the potential impact on riparian habitats and sensitive natural communities would be less than significant.

The Project has potential to impact areas within the jurisdiction of the USACE, RWQCB, and CDFW. The Project also has potential to significantly impact water quality during construction. With implementation of MM BIO-5 these impacts would be less than significant. Therefore, the potential impact on state and federally protected wetlands and other jurisdictional resources would be less than significant.

Santiago Dam represents an existing barrier to wildlife movement; therefore, the Project would not impact wildlife movement along a regional wildlife corridor. However, the Project is located within a NCCP/HCP Reserve and wildlife movement in adjacent areas could be affected by noise, night lighting, and human activity during construction. With implementation of PDF BIO-1, PDF BIO-6, and PDF BIO-7, impacts would be less than significant.

The Project has potential to affect nesting birds/raptors, which are protected by the MBTA and California Fish and Game Code. With implementation of standard pre-construction surveys and nesting bird protections (PDF BIO-5), the impact would be less than significant, and no conflict with applicable requirements would occur.

The Project is consistent with the NCCP/HCP. With implementation of MM BIO-4 and MM BIO-6, the impact would be reduced to less than significant, and no conflict with the NCCP/HCP would occur.

Cultural Resources

The Project has potential to cause a substantial adverse change in the significance of an archaeological resource. However, potential effects would be mitigated to a less than significant level with the implementation of MM CR-1, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and MM CR-2 which provides details for treatment of unanticipated discoveries.

Geology and Soils

The Project has a potential to disturb paleontological resources. However, potential effects may be mitigated to a less than significant level with the implementation of MM GEO-1, which requires retention of a qualified Paleontologist to observe grading activities within undisturbed soils, including geotechnical investigations, and MM GEO-2 which provides details for treatment of unanticipated discoveries.

Hazards and Hazardous Materials

A portion of the Project site is located on the former Irvine Park-Army Camp and is currently designated on the Cortese List. With the implementation of MM HAZ-1, which requires USACE to make explosives safety education material available to landowners and the community, and coordinate with landowners as it plans required response activities, impacts would be less than significant.

Tribal Cultural Resources

Potential impacts to archeological resources would be mitigated to a less than significant level with the implementation of MM CR-1, which requires archaeological monitoring during grading activities within previously undisturbed soils, including geotechnical investigations, and MM CR-2 which provides details for treatment of unanticipated discoveries. Additionally, the Project would comply with the State requirements pertaining to the protection of human remains by implementing RR CR-1. Potential impacts to tribal cultural resources would be mitigated to a less than significant level with the implementation of MM TCR-1, MM TCR-2, and MM TCR-3, which detail procedures related to tribal monitoring and protocols for unanticipated discoveries.

The proposed Project would not result in potentially significant adverse impacts related to other environmental issues, including Aesthetics, Energy, Greenhouse Gas Emissions, Hydrology and

Water Quality, Land Use and Planning, Noise, Public Services, Recreation, Transportation, Utilities and Service Systems, and Wildfire.

5.2.4 ALTERNATIVE CONSIDERED BUT NOT CARRIED FORWARD

The CEQA Guidelines require that an EIR identify alternatives that were considered by the lead agency but rejected as infeasible along with a brief explanation of the reasons underlying this determination. Among the factors that may be used to eliminate alternatives from detailed consideration in the EIR are:

1. Failure to meet most of the basic project objectives,
2. Infeasibility, or
3. Inability to avoid significant environmental impacts (CEQA Guidelines Section 15126.6(c)).

In accordance with 15126.6(c) of the CEQA Guidelines, alternatives were considered by IRWD but rejected from further analysis due to one or more of the above reasons. A description of each alternative and the rationale for it being rejected from further consideration is provided below.

Repair of Existing Spillway

IRWD examined several retrofit alternatives. Repair of the existing spillway was determined infeasible from an engineering standpoint. Any design variation would result in the same impacts and modifying the existing spillway would involve essentially replacing the existing structure. Therefore, this alternative was omitted from further consideration.

Extended Construction Schedule

IRWD considered elongating the construction schedule by one year, which would reduce the intensity of daily construction activities and thereby reduce maximum daily air pollutant emissions to a certain degree. However, extending the overall duration of Project construction by another year would significantly increase the Project cost; would extend the amount of time the unimproved dam, outlet tower, and spillway would present safety risks to IRWD and the community; and would unduly prolong the length of time this critical water storage reservoir is out of service. Therefore, this alternative was omitted from further consideration.

Shorter Construction Workdays

IRWD considered implementing shorter construction workdays during the dry season instead of the 20-hour workdays included in the proposed Project. Shorter construction workdays would reduce the duration of daily construction activities and thereby reduce maximum daily air pollutant emissions to a certain degree. However, construction of the proposed Project necessitates 20-hour workdays during the dry season to accomplish construction within a reasonable timeframe due to seasonal restrictions associated with work during the wet season. As indicated above, extending the overall duration of Project construction would significantly increase the Project cost; would extend the amount of time the unimproved dam, outlet tower, and spillway would present safety risks to IRWD and the community; and would unduly prolong the length of time this critical water storage reservoir is out of service. Therefore, this alternative was omitted from further consideration.

5.2.5 ALTERNATIVE SITE

Section 15126.6(f)(2) of the CEQA Guidelines sets forth the following criteria for determining whether to identify an alternative site because "An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (14 CCR 15126.6[f][3]). Section 15126.6(f)(2) of the CEQA Guidelines (14 CCR) states the following:

(A) Key question. The key question and first step in analysis is whether any of the significant effects of the project would be avoided or substantially lessened by putting the project in another location. Only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR.

(B) None feasible. If the lead agency concludes that no feasible alternative locations exist, it must disclose the reasons for this conclusion, and should include the reasons in the EIR. For example, in some cases there may be no feasible alternative locations for a geothermal plant or mining project which must be in proximity to natural resources at a given location.

(C) Limited new analysis required. Where a previous document has sufficiently analyzed a range of reasonable alternative locations and environmental impacts for projects with the same basic purpose, the lead agency should review the previous document. The EIR may rely on the previous document to help it assess the feasibility of potential project alternatives to the extent the circumstances remain substantially the same as they relate to the alternative (*Citizens of Goleta Valley v. Board of Supervisors* [1990] 52 Cal.3d 553, 573).

Development of the Project on an alternative site was not carried forward for detailed consideration, as the Project consists of improvements to the existing Santiago Creek Dam outlet tower, spillway, and dam embankment and crest. It would not be feasible to carry out the Project in a different location.

5.3 ALTERNATIVES FOR ANALYSIS

In accordance with Section 15126.6(a) of the CEQA Guidelines, the discussion in this section of the EIR focuses on a reasonable range of alternatives. The analysis provides a comparison of the alternatives' varying environmental effects and their merits and/or disadvantages in relation to the proposed Project and to each other; their feasibility and ability to achieve Project Objectives are also discussed.

The following alternatives are analyzed in this EIR:

- **Alternative 1 – No Project Alternative.** This alternative assumes the site would continue to remain in its current state and would not meet current standards. The alternative would also reduce the useful life of the facilities, and reduce water supply reliability. The existing uses on the site would continue with restricted operations. The existing site improvements would remain unchanged, and no structures would be demolished.
- **Alternative 2 - Purchasing Water Alternative.** This alternative assumes IRWD need to purchase, on average, 5,070 acre feet (AF) of expensive imported supplies each year to meet demands currently met with the Irvine Lake native water supplies.

In accordance with Section 15126.6(a) of the CEQA Guidelines, this EIR provides a comparison of the environmental effects and their merits and/or disadvantages of each alternative in relation

to the proposed Project, as well as each alternative's ability to achieve the Project Objectives. To facilitate the readers' understanding, Table 5-1 provides a matrix that compares each alternative's ability to meet the Project Objectives. The level of environmental impact and ability to meet Project Objectives is considered in identifying the environmentally superior alternative, which is discussed in Section 5.4, Environmentally Superior Alternative.

The site's existing environmental setting would be the same for the proposed Project and all alternatives. Additionally, unless specifically identified, it is assumed that the Mitigation Program identified for the Project would also be applicable for the alternatives, unless otherwise noted.

TABLE 5-1
COMPATIBILITY COMPARISON OF ALTERNATIVES
WITH PROJECT OBJECTIVES

Project Objective	Proposed Project	Alternatives	
		Alternative 1: No Project	Alternative 2: Purchasing Metropolitan Water
1. Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements established by the California DWR DSOD, which is the governing state agency associated with this Project	●	○	○
2. Satisfy IRWD's operational requirements	●	○	○
3. Extend the useful life of the facilities	●	○	○
4. Improve water supply reliability	●	○	●
5. Minimize impacts to local environmental resources and surrounding property owners	●	○	○

Proposed Project: Replacement of the Santiago Creek Dam outlet works and spillway facility, dam embankment and crest improvements.

Alternative 1 – No Project Alternative: No new development; operation of the existing dam facilities will continue.

2Purchasing Water Alternative: Includes purchasing imported water supplies each year.

Legend:

● = Fully Implements

◒ = Partially Implements

○ = Does Not Implement

5.3.1 ALTERNATIVE 1 – NO PROJECT ALTERNATIVE

Section 15126.6(e) of the CEQA Guidelines requires that an EIR evaluate a "No Project" alternative to allow decision makers to compare the impacts of approving a proposed project with the impacts of not approving that project. Section 15126.6(e)(3) of the CEQA Guidelines describes the two general types of no project alternative: (1) when the project is the revision of an existing land use, regulatory policy, or ongoing operation, the no project alternative would be the continuation of that plan and (2) when the project is other than a land use/regulatory plan (e.g., a specific development on an identifiable property), the no project alternative is the circumstance under which that project is not processed (i.e., no development).

Under the No Project Alternative, existing site conditions and the environmental setting would remain unchanged. This Alternative assumes the site would continue to remain in its existing state

without demolition of existing structures and site improvements, and the continued use and operation of the existing Santiago Creek Dam facilities. This alternative would not meet current standards and would reduce the useful life of the facilities, which would result in a reduction in water supply reliability.

Impact Evaluation

Aesthetics

The No Project Alternative would not result in any construction activities or new development on the site. In the absence of demolition and construction activities, no changes in the visual quality of the site would occur. Additionally, there would be no new land use, buildings, and site improvements on the site. No changes in the sources of light and glare would occur that could potentially impact the surrounding uses. Thus, in the absence of the proposed Project, the site would remain in its existing condition, with the existing Santiago Creek Dam facilities in operation. This alternative would have fewer aesthetic impacts than those of the proposed Project. However, Project impacts on aesthetics would also be less than significant.

Air Quality

The No Project Alternative would not involve any demolition and construction activities (including grading and excavation) or new development on the site. In the absence of construction activities and new traffic generation, this alternative would not result in any significant air quality impacts. SCAQMD thresholds for construction-related and long-term operational emissions would not be exceeded. Therefore, this alternative would avoid short-term direct emissions, and short-term contribution to cumulative air quality impacts that may occur with implementation of the proposed Project. As this Alternative generates more vehicle trips and the associated pollutant emissions than the proposed Project, NOx and PM_{10} emissions of this alternative would be slightly greater than those of the proposed Project, while CO emissions would be slightly less than the proposed Project and VOC and $PM_{2.5}$ emissions would be approximately the same as the proposed Project.

Biological Resources

The No Project Alternative would not result in any construction activities or new development on the site. In the absence construction activities, no impacts to biological resources would occur. Additionally, there would be no new land use, buildings, and site improvements on the site. Therefore, potential biological resources impacts identified for the proposed Project would not occur under the No Project Alternative. However, Project impacts would be less than significant with mitigation measures.

Cultural Resources

The existing Santiago Creek Dam is eligible for its important historical association with water resources development in Orange County, as well as with the citrus agriculture industry. Under the No Project Alternative, the Dam would not be demolished and no impacts to historical resources would result. In the absence of any construction and demolition activities on the site, this Alternative would not result in the potential for impacts to unknown buried archaeological or paleontological resources and human remains that may be encountered during grading and excavation activities. As such, the potential for impacts to cultural resources for the No Project Alternative would be less compared to the proposed Project. However, Project impacts on cultural resources would be less than significant with implementation of mitigation measures.

Energy

The No Project Alternative would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation. Additionally, the No Project Alternative would not conflict with or obstruct a State or local plan for renewable energy. Thus, the No Project Alternative would result in lower energy related impacts than the proposed Project.

Geology and Soils

The No Project Alternative would not involve any construction and/or demolition activities (including grading and excavation) or redevelopment of the site. Therefore, potential geology and soils impacts identified for the proposed Project would not occur under the No Project Alternative. However, Project impacts would be less than significant with mitigation measures.

Greenhouse Gas Emissions

The No Project Alternative would not involve any demolition or construction activities (including grading and excavation) or redevelopment of the site. In the absence of construction activities and operation of new land uses (including new traffic generation), this alternative would not generate GHG emissions from new sources but will continue generating GHG emissions at the rate that it is currently producing. However, the Project's GHG emissions would also be less than significant and would be less than the GHG emissions of the existing restaurant due to the Project's reduced vehicular trips. Thus, the No Project Alternative would not result in lower overall GHG emissions than the proposed Project.

Hazards and Hazardous Materials

The No Project Alternative would not involve the use, transport, disposal, or emission of hazardous materials associated with construction of the proposed Project. Additionally, with the continued operation of the existing Dam facilities, hazardous material uses would be limited. The hazards and hazardous materials impacts associated with this alternative are considered to be less than those of the proposed Project.

Hydrology and Water Quality

Under No Project Alternative, the existing hydrology patterns and hydrologic characteristics of the site would remain. Compared to the proposed Project, there would be no increase in the amount and velocity of surface runoff. The No Project Alternative would not change the amount of existing pervious surfaces on the site and would not increase the amount of pollutants in storm water runoff. The hydrology and water quality impacts under the No Project Alternative would be less than the proposed Project.

Land Use and Planning

Under the No Project Alternative, there would be no change in the existing or planned land uses on the site. The site would remain in its current condition. No residential uses currently occur on the Project site that would be impacted or divided by development of the proposed Project. The Project would not conflict with any applicable land use plans, policies, and regulations. Additionally, the Project would be compatible with the surrounding uses and would comply with County design standards. Overall, the land use impacts under the No Project Alternative would be less than the proposed Project.

Noise

The No Project Alternative would continue the existing Dam operations and would not involve any demolition, grading, or construction activities. Therefore, noise associated with the construction activities of the proposed Project would not occur under this alternative. All temporary noise impacts associated with implementation of the proposed Project can be mitigated to a level considered less than significant; however, no temporary noise impacts associated with this alternative would result, as no construction would occur under this alternative. Operationally, it is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of the No Project Alternative. Therefore, because there would be no increase in daily trips associated with daily operation of the Project components, no Project related traffic noise impacts are anticipated.

Public Services

Under the No Project Alternative, there would be no increase in demand for public services (fire and police protection services) as the Project site would remain in its currently condition. Because there would be no change in land use, increased demands on public services would not occur and the impact of the No Project Alternative relative to public services and facilities would be less than the proposed Project. However, the proposed Project's impacts on public services would also be less than significant.

Recreation

Under the No Project Alternative, there would be no increase in population. As such, no residential units are proposed, and no demand for recreational facilities would result. Additionally, no impacts on existing facilities would occur. No impacts pertaining to construction or expansion of a trail system would occur, and no mitigation is not required.

Transportation

The No Project Alternative would not involve any construction activities on the site. Additionally, the No Project Alternative would not generate operational trips. As such, the No Project Alternative would have no impacts related to short-term construction since no construction would occur. The No Project Alternative would have reduced traffic impacts (or impacts would be avoided) than the proposed Project.

Tribal Cultural Resources

The No Project Alternative would not involve any construction activities on the site. Thus, this alternative would not result in the potential for impacts to unknown and buried tribal cultural resources. The potential for impacts to tribal cultural resources for the No Project Alternative would be less than the proposed Project. However, Project impacts on tribal cultural resources would be less than significant based on a lack of evidence for existence of such resources.

Utilities and Service Systems

The No Project Alternative would not result in a change in demand for utilities and service systems (water, wastewater treatment, and solid waste generation), as the operation of the existing Santiago Creek Dam facilities would continue under this alternative. Therefore, the demand for utilities and service systems would remain at the existing levels. The impact of the No Project Alternative relative to utilities and service systems would be less than the proposed Project.

However, the Project impacts to utilities and service systems would be less than significant and no mitigation is required.

Wildfire

The Project site is located within a Very High Fire Hazard Severity Zone (FHSZ) in a State responsibility Area (SRA). The areas surrounding the Project site are also located within a Very High FHSZ, with the exception of a portion of Irvine Lake, which is located within a High FHSZ within an SRA. With regulatory compliance measures incorporated, the No Project Alternative would not exacerbate wildfire risk and impacts would be less than significant.

Conclusions

Would Alternative 1 Avoid or Substantially Lessen the Significant Impacts, Compared to the Project?

The proposed Project would result in a significant and unavoidable impact related to air quality. However, it would result in potentially significant impacts associated with Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, and Tribal Cultural Resources that can be mitigated. The No Project Alternative would maintain the site in its current condition with the existing Dam facilities. Thus, this alternative would avoid the above-mentioned mitigable impacts.

Because demolition of the existing structures and construction of the new Dam facilities would not occur under the No Project Alternative, there would also be reduced impacts for the following environmental topics: Aesthetics, Energy, Greenhouse Gas Emissions, Hydrology and Water Quality, Land Use and Planning, Public Services, Nosie Recreation, Transportation, Utilities and Service Systems, and Wildfire. The Project's impacts for these topics are also less than significant.

Would Alternative 1 Result in Attainment of Project Objectives, Compared to the Project?

By not developing the site with the proposed Dam facilities, the No Project Alternative would not attain any of the 5 Project Objectives identified above in Section 5.2.1, Ability to Meet Project Objectives.

5.3.2 ALTERNATIVE 2 – PURCHASING WATER ALTERNATIVE

IRWD owns and operates the Santiago Creek Dam and the Santiago Reservoir (or Irvine Lake) impoundment to store water supplies for the benefit of the surrounding communities. Irvine Lake is the largest surface water reservoir in Orange County and is a critical facility for water supply management. IRWD utilizes Irvine Lake to capture and store native runoff in wet years and store supplemental water for enhanced supply reliability. IRWD utilizes water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation for avocado orchards, and 2) as a source of water for the Baker Water Treatment Plant which creates drinking water for an estimated 85,000 homes in Orange County.

Each year, Irvine Lake captures and impounds native runoff from the upper Santiago Creek Watershed. IRWD has appropriative rights to the flows of Santiago Creek including a right to diversion by storage in Irvine Lake for municipal, domestic, and agricultural uses. Based on these existing water rights, the Irvine Lake can capture and store up to 28,000 AF per year of natural inflow or native water collected to storage each year. Over the past 25 years, approximately 5,070 AF per year of native Santiago Creek flows have been diverted into storage. Capturing and storing

this fresh water in Irvine Lake helps IRWD to increase water supply reliability and to reduce the cost of water for their customers. If this low-cost water supply was not available, IRWD would need to purchase, on average, 5,070 AF of expensive imported supplies each year to meet demands currently met with the Irvine Lake native water supplies.

Storage of Supplemental Water

IRWD also utilizes Irvine Lake to store supplemental imported water supplies from MWD to provide operational flexibility and create redundancy within the water conveyance systems. The imported water delivered to Irvine Lake is used for both consumptive purposes and water storage and it can be held for short or long periods of time to be later delivered when needed to meet demands. In the event of an emergency or extended facility shutdown on Metropolitan's delivery system, storage of supplemental water supplies helps IRWD to provide supply reliability, redundancy, and diversification. Without having water in storage, during periods of catastrophic supply interruption or critical drought conditions, IRWD would be more vulnerable to water supply disruptions and less reliable. During such water supply disruptions, IRWD may need to impose water restrictions under its Water Shortage Contingency Plans, which includes mandatory demand reduction measures.

Impact Evaluation

Aesthetics

Alternative 2 would not result in any construction activities or new development on the site. In the absence of demolition and construction activities, no changes in the visual quality of the site would occur. Additionally, there would be no new land use, buildings, and site improvements on the site. No changes in the sources of light and glare would occur that could potentially impact the surrounding uses. Thus, in the absence of the proposed Project, the site would remain in its existing condition, with the existing Santiago Creek Dam facilities in operation. This alternative would have fewer aesthetic impacts than those of the proposed Project. However, Project impacts on aesthetics would also be less than significant.

Air Quality

Alternative 2 would not involve any demolition and construction activities (including grading and excavation) or new development on the site. In the absence of construction activities and new traffic generation, this alternative would not result in any significant air quality impacts. SCAQMD thresholds for construction-related and long-term operational emissions would not be exceeded. Therefore, this alternative would avoid short-term direct emissions, and short-term contribution to cumulative air quality impacts that may occur with implementation of the proposed Project. As this Alternative generates less vehicle trips and the associated pollutant emissions than the proposed Project, NOx and PM_{10} emissions of this alternative would be less than those of the proposed Project. Additionally, CO, VOC, and $PM_{2.5}$ emissions would be less than those of the proposed Project.

Biological Resources

Alternative 2 would not result in any construction activities or new development on the site. In the absence construction activities, no impacts to biological resources would occur. Additionally, there would be no new land use, buildings, and site improvements on the site. Therefore, potential biological resources impacts identified for the proposed Project would not occur under the No Project Alternative. However, Project impacts would be less than significant with mitigation measures.

Cultural Resources

The existing Santiago Creek Dam is eligible for its important historical association with water resources development in Orange County, as well as with the citrus agriculture industry. Under Alternative 2, the Dam would not be demolished and no impacts to historical resources would result. In the absence of any construction and demolition activities on the site, this Alternative would not result in the potential for impacts to unknown buried archaeological or paleontological resources and human remains that may be encountered during grading and excavation activities. As such, the potential for impacts to cultural resources for Alternative 2 would be less compared to the proposed Project. However, Project impacts on cultural resources would be less than significant with implementation of mitigation measures.

Energy

Alternative 2 would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation. Additionally, Alternative 2 would not conflict with or obstruct a State or local plan for renewable energy. Thus, Alternative 2 would result in lower energy related impacts than the proposed Project.

Geology and Soils

Alternative 2 would not involve any construction and/or demolition activities (including grading and excavation) or redevelopment of the site. Therefore, potential geology and soils impacts identified for the proposed Project would not occur under this alternative. However, Project impacts would be less than significant with mitigation measures.

Greenhouse Gas Emissions

Alternative 2 would not involve any demolition or construction activities (including grading and excavation) or redevelopment of the site. In the absence of construction activities and operation of new land uses (including new traffic generation), this alternative would not generate GHG emissions from new sources but will continue generating GHG emissions at the rate that it is currently producing. However, the Project's GHG emissions would also be less than significant and would be less than the GHG emissions of the existing restaurant due to the Project's reduced vehicular trips. Thus, Alternative 2 would result in lower overall GHG emissions than the proposed Project.

Hazards and Hazardous Materials

Alternative 2 would not involve the use, transport, disposal, or emission of hazardous materials associated with construction of the proposed Project. Additionally, with the continued operation of the existing Dam facilities, hazardous material uses would be limited. The hazards and hazardous materials impacts associated with this alternative are considered to be less than those of the proposed Project.

Hydrology and Water Quality

Under Alternative 2, the existing hydrology patterns and hydrologic characteristics of the site would remain. Compared to the proposed Project, there would be no increase in the amount and velocity of surface runoff. Alternative 2 would not change the amount of existing pervious surfaces on the site and would not increase the amount of pollutants in storm water runoff. The hydrology and water quality impacts under Alternative 2 would be less than the proposed Project.

Land Use and Planning

Under Alternative 2, there would be no change in the existing or planned land uses on the site. The site would remain in its current condition. No residential uses currently occur on the Project site that would be impacted or divided by development of the proposed Project. The Project would not conflict with any applicable land use plans, policies, and regulations. Additionally, the Project would be compatible with the surrounding uses and would comply with County design standards. Overall, the land use impacts under Alternative 2 would be less than the proposed Project.

Noise

Alternative 2 would continue the existing Dam operations and would not involve any demolition, grading, or construction activities. Therefore, noise associated with the construction activities of the proposed Project would not occur under this alternative. All temporary noise impacts associated with implementation of the proposed Project can be mitigated to a level considered less than significant; however, no temporary noise impacts associated with this alternative would result, as no construction would occur under this alternative. Operationally, it is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of Alternative 2. Therefore, because there would be no increase in daily trips associated with daily operation of the Project components, no Project related traffic noise impacts are anticipated.

Public Services

Under Alternative 2, there would be no increase in demand for public services (fire and police protection services) as the Project site would remain in its currently condition. Because there would be no change in land use, increased demands on public services would not occur and the impact of Alternative 2 relative to public services and facilities would be less than the proposed Project. However, the proposed Project's impacts on public services would also be less than significant.

Recreation

Under Alternative 2, there would be no increase in population. As such, no residential units are proposed, and no demand for recreational facilities would result. Additionally, no impacts on existing facilities would occur. No impacts pertaining to construction or expansion of a trail system would occur, and no mitigation is not required.

Transportation

Alternative 2 would not involve any construction activities on the site. Additionally, no operational trips would be generated under this alternative. As such, Alternative 2 would have no impacts related to short-term construction since no construction would occur. Alternative 2 would have reduced traffic impacts (or impacts would be avoided) than the proposed Project.

Tribal Cultural Resources

Alternative 2 would not involve any construction activities on the site. Thus, this alternative would not result in the potential for impacts to unknown and buried tribal cultural resources. The potential for impacts to tribal cultural resources for Alternative 2 would be less than the proposed Project. However, Project impacts on tribal cultural resources would be less than significant based on a lack of evidence for existence of such resources.

Utilities and Service Systems

Alternative 2 would not result in a change in demand for utilities and service systems (water, wastewater treatment, and solid waste generation), as the operation of the existing Santiago Creek Dam facilities would continue under this alternative. Therefore, the demand for utilities and service systems would remain at the existing levels. The impact of Alternative 2 relative to utilities and service systems would be less than the proposed Project. However, the Project impacts to utilities and service systems would be less than significant and no mitigation is required.

Wildfire

The Project site is located within a Very High Fire Hazard Severity Zone (FHSZ) in a State responsibility Area (SRA). The areas surrounding the Project site are also located within a Very High FHSZ, with the exception of a portion of Irvine Lake, which is located within a High FHSZ within an SRA. With regulatory compliance measures incorporated, Alternative 2 would not exacerbate wildfire risk and impacts would be less than significant.

Conclusions

Would Alternative 2 – Purchasing Water Alternative Avoid or Substantially Lessen the Potentially Significant Impacts, as Compared to the Project?

The Purchasing Water Alternative assumes IRWD would need to purchase, on average, 5,070 AF of expensive imported supplies each year to meet demands currently met with the Irvine Lake native water supplies. The proposed Project would result in a significant and unavoidable impact related to air quality. However, it would result in potentially significant impacts associated with Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, and Tribal Cultural Resources that can be mitigated. Alternative 2 would maintain the site in its current condition with the existing Dam facilities. Thus, this alternative would avoid the above-mentioned mitigable impacts.

Because demolition of the existing structures and construction of the new Dam facilities would not occur under Alternative 2, there would also be reduced impacts for the following environmental topics: Aesthetics, Energy, Greenhouse Gas Emissions, Hydrology and Water Quality, Land Use and Planning, Public Services, Nosie Recreation, Transportation, Utilities and Service Systems, and Wildfire. The Project's impacts for these topics are also less than significant.

Would Alternative 2 – Purchasing Metropolitan Water Alternative Result in Attainment of Project Objectives, as Compared to the Project?

With the purchasing of water, this alternative would meet 1 of the 5 Project Objectives identified above in Section 5.2.1, Ability to Meet Project Objectives. Specifically, Alternative 2 would not meet the objectives related to constructing new facilities and dam embankment modifications that will meet or exceed the current seismic, safety, and design requirements established by the California Department of Water Resources, Division of Safety of Dams; satisfying IRWD's operational requirements; extending the useful life of the facilities; and minimizing impacts to local environmental resources and surrounding property owners.

5.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the identification of an environmentally superior alternative. Section 15126.6(e)(2) of the CEQA Guidelines states that, if the No Project Alternative is the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other alternatives.

As shown, Alternative 1 - No Project Alternative would retain existing site conditions and thus, would not result in any environmental impacts. Additionally, the No Project Alternative would not meet any of the 5 project objectives.

Alternative 2 - Purchasing Water Alternative would generally have the same impacts as the No Project. In addition, this Alternative would only meet 1 of the 5 Project objectives.

Based on the detailed analyses in Sections 5.3.1 (Alternative 1 – No Project Alternative), and 5.3.2 (Alternative 2 – Purchasing Metropolitan Water) and the summaries above and in Table 5-2, the proposed Project is the next environmentally superior alternative to the No Project Alternative.

For ease of review of Table 5-2, below, please note these clarifications: **LTS:** Less than Significant Impact; **LTSM:** Less than Significant Impact with Mitigation; **G:** Greater Impact than the Proposed Project; (**=):** Same Impact as the Proposed Project; **L:** Less Impact than the Proposed Project.

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	Alternative 2: Purchasing Water
Aesthetics			
Threshold 4.1-1 Substantially degrade the existing visual character or quality of public views of the site and its surroundings (Public views are those that are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality.	LTS	L	L
Threshold 4.1-2 Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	LTS	L	L
Air Quality			
Threshold 4.2-1 Conflict with or obstruct implementation of the applicable air quality plan.	SI	L	L
Threshold 4.2-2 Violate any air quality standard or contribute substantially to an existing or projected air quality violation.	LTS	L	L
Threshold 4.2-3 Expose sensitive receptors to substantial pollutant concentrations.	LTS	L	L
Biological Resources			
Threshold 4.3-1 Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.	LTSM	L	L
Threshold 4.3-2 Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.	LTSM	L	L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Threshold 4.3-3 Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	LTSM	L	L
Threshold 4.3-4 Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	LTSM	L	L
Threshold 4.3-5 Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LTSM	L	L
Threshold 4.3-6 Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.	LTSM	L	L
Cultural Resources			
Threshold 4.4-1 Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.	LTS	L	L
Threshold 4.4-2 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	LTSM	L	L
Threshold 4.4-3 Disturb any human remains, including those interred outside of formal cemeteries.	LTSM	L	L
Energy			
Threshold 4.5-1 Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	LTS	L	= L
Threshold 4.5-2 Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	LTS	L	= L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Geology and Soils			
Threshold 4.6-1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42. ii) Strong seismic ground shaking. iii) Seismic-related ground failure, including liquefaction. iv) Landslides.	LTS	L	L
Threshold 4.6-2 Result in substantial soil erosion or the loss of topsoil.	LTS	L	L
Threshold 4.6-3 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.	LTS	L	L
Threshold 4.6-4 Be located on expansive soils, as defined in Table 18-1-B of the California Building Code (1994), creating substantial risks to life or property.	LTS	L	L
Threshold 4.6-5 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	LTSM	L	L
Greenhouse Gas Emissions			
Threshold 4.7-1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	LTS	L	L
Threshold 4.7-2 Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	LTS	L	L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Hazards and Hazardous Materials			
Threshold 4.8-1 Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.	LTSM	L	L
Threshold 4.8-2 Expose people or structure, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.	LTS	L	L
Hydrology and Water Quality			
Threshold 4.9-1 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality.	LTS	L	L
Threshold 4.9-2 Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	NI	=	=
Threshold 4.9-3 Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner in which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) impede or redirect flood flows.	LTS	L	L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Threshold 4.9-4 In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.	LTS	L	L
Threshold 4.9-5 Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	LTS	L	L
Land Use and Planning			
Threshold 4.10-1 Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	LTS	L	L
Noise			
Threshold 4.11-1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	LTS	L	L
Threshold 4.11-2 Generation of excessive groundborne vibration or groundborne noise levels.	LTS	L	L
Threshold 4.11-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.	NI	=	=

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Public Services			
Threshold 4.12-1 Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: i) Fire protection ii) Police protection iii) Schools iv) Parks	LTS	L	L
Recreation			
Threshold 4.13-1 Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	LTS	L	L
Threshold 4.13-2 Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	NI	=	=
Transportation			
Threshold 4.14-1 Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.	LTS	L	L
Threshold 4.14-2 Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).	LTS	L	L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Threshold 4.14-3 Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	LTS	L	L
Threshold 4.14-4 Result in inadequate emergency access.	LTS	L	L
Tribal Cultural Resources			
Threshold 4.15-1 Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1 (k), or ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	LTSM	L	L
Utilities and Service Systems			
Threshold 4.16-1 Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which cause significant environmental effects.	LTS	L	L
Threshold 4.16-2 Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.	LTS	L	L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Threshold 4.16-3 Result in a determination by the wastewater treatment provider that serves or may service the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	LTS	L	L
Threshold 4.16-5 Generate solid waste in excess of State or local standards or in excess of the capacity of Local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	LTS	L	L
Threshold 4.16-6 Comply with federal, State, and Local Management and reduction statues and regulations related to solid wastes including the CIWMP (County Integrated Waste Management Plan).	NI	=	=
Wildfire			
Threshold 4.17-1 Substantially impair an adopted emergency response plan or emergency evacuation plan.	LTS	L	L
Threshold 4.17-2 Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	LTS	L	L
Threshold 4.17-3 Require installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.	LTS	L	L

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES IMPACTS TO PROPOSED PROJECT IMPACTS

Impact Category	Proposed Project Impact	Alternatives	
		Alternative 1: No Project	**Alternative 2: Purchasing Water**
Threshold 4.17-4 Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage change.	LTS	L	L

Proposed Project: Replacement of the Santiago Creek Dam outlet works and spillway facility, dam embankment and crest improvements.

Alternative 1 – No Project Alternative: No new development; operation of the existing dam facilities will continue.

Alternative 2 - Purchasing Metropolitan Water: Includes purchasing imported water supplies each year

Proposed Project Impact: **LTS** - Less than significant impact; **LTSM** - Less than significant impact with Mitigation

Comparison of Project Impacts: **G** – greater impacts than the proposed Project; **=** the same impacts as the proposed Project; **L** – less impacts than the proposed Project

This page intentionally left blank

SECTION 6.0 LONG-TERM IMPLICATIONS OF THE PROJECT

6.1 SIGNIFICANT ENVIRONMENTAL EFFECTS THAT CANNOT BE MITIGATED

The environmental effects of the proposed Project and alternatives are addressed in Sections 4.1 through 4.17 and Section 5.0 of this EIR. Implementation of the Project would result in potential impacts for the following topical issues: Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, and Tribal Cultural Resources as discussed in Sections 4.1 through 4.17 and summarized in Table 1-1 in Section 1.0, Executive Summary.

6.2 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES THAT WOULD BE CAUSED BY THE PROJECT

Section 15126(c) of the CEQA Guidelines requires that an EIR describe any significant irreversible environmental changes which would occur as a result of the proposed action should it be implemented. The environmental effects related to the implementation of the proposed Project are analyzed in Sections 4.1 through 4.17 of this EIR. The proposed Project would replace the Santiago Creek Dam outlet works, make spillway facility improvements and embankment enhancements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility. The proposed use is an improvement of the site because the site is already developed with existing structures including the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, Irvine Lake pipeline, and dam access road. The Project would also modify the existing dam embankment by removing the dam face, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material. The dam crest would also be widened to approximately 35 to 45 feet wide to accommodate a wider access road, and protective railings would be installed on both sides of the access road. Therefore, the proposed Project is not considered a new long-term commitment of land resources to the proposed use. Nevertheless, construction and reduction of nonrenewable and/or slowly renewable resources, including petroleum fuels, and natural gas (for vehicle emissions, construction, and lighting); and lumber, sand/gravel, steel, copper, lead, and other metals (for use in construction, piping, and roadway infrastructure) would occur. Other resources that are slow to renew and/or recover from environmental stresses would also be impacted by Project implementation, such as air quality through the combustion of fossil fuels and production of greenhouse gases. Project development is an irreversible commitment of land and energy resources.

6.3 GROWTH-INDUCING IMPACTS OF THE PROPOSED ACTION

Pursuant to Sections 15126(d) and 15126.2(d) of the CEQA Guidelines, this section examines: (1) ways in which the Project could foster economic or population growth and (2) the construction of additional development, either directly or indirectly, in the surrounding environment. Per Section 15126.2(d) of the CEQA Guidelines, growth-inducing effects are not necessarily beneficial, detrimental, or of little significance to the environment. This issue is presented to provide additional information on ways in which this Project could contribute to significant changes in the environment.

Population growth in Orange County has maintained a strong but diminishing pace in recent decades. From 1980 to 1990, the population increased by 47,785 people annually, slowing to an average annual increase of 43,573 people during the 1990s. From 2000 to 2010, the average annual population increase dropped to 16,943 people per year. However, the Census estimates

for growth show an increase between 2010 and 2020 from 3,010,232 people in 2010 to 3,186,989 people in 2020. This is an average annual increase of 17,676 people (U.S. Census Bureau 2024). Based on US Census data as of July 1, 2022, the population of Orange County was 3,151,184 people (U.S. Census Bureau 2024). The recent lower growth in the County is a result of a number of factors, including lower fertility rates, a trend of increased mortality rates that was occurring prior to the COVID-19 pandemic, and lower net migration (CDR 2022).

Concurrently with significant increases in population, the economic character of Orange County overall has dramatically changed. The predominately rural/agricultural character of Orange County has changed to a diversified commercial/industrial economy. High technology industries, biomedical facilities, retail commercial, light manufacturing, administrative and financial services, and tourism have become major components of the County's economy. In 1965, the employment-to-population ratio was 22 percent. By 2010, the ratio had increased to approximately 49 percent countywide (note this was down from 54 percent in 2008). Not only had the proportion of jobs to residents increased, but it was also based on a dramatically larger population. The growth in population and employment is projected to continue through 2040 and beyond. Based on the Orange County Projections 2022, developed by the Center for Demographic Research, between 2019 and 2050 an approximate 4.1 percent increase in population and an 11.8 percent increase in employment is projected to occur in Orange County (CDR 2022). When considering growth-inducing impacts, it is important to consider the context and historical growth trends of the area. There are many factors that can affect the amount, location, and rate of growth in Orange County and the region in general. These factors include market demand for housing, employment, and commercial services; the desirability of climate and living/working environment and commercial economy; the availability of other services/infrastructure; and the land use and growth management policies of local jurisdictions.

To address this issue, potential growth-inducing effects, identified in CEQA Guidelines Section 15126.2(d), are examined through analysis of the following questions:

1) **Would this Project remove obstacles to growth (e.g., through the construction or extension of major infrastructure facilities that do not presently exist in the project area or through changes in existing regulations pertaining to land development)?**

   The proposed Project would provide for replacement of the Santiago Creek Dam outlet works and spillway facility as well as dam embankment and crest improvements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility. Implementation of the Project would not increase employment and population in the area, and as such would not result in either direct or indirect population growth. The proposed Project is consistent with existing uses on the site and would not result in growth to the area.

2) **Would this Project result in the need to expand one or more public services to maintain desired levels of service?**

   Due to the nature of the proposed Project, no new demand for public services such as fire protection, police protection, schools, parks, libraries, or other public facilities would occur. No new population would be generated and no new facilities requiring public services would be constructed. Instead, the Project would continue operations of an existing facility with modifications to improve operations. Any increase in maintenance of the proposed facilities would be the responsibility of IRWD. This Project would not have any significant growth-inducing consequences with respect to public services.

3) Would this Project encourage or facilitate economic effects that could result in other activities that could significantly affect the environment?

Implementation of the Project would not increase employment and population in the area, and as such the Project would not result in either direct or indirect population growth. Given the nature of the Project, it would be self-sufficient and not expected to generate economic activity to the level that would necessitate an expansion of resources and supporting industry that would have significant effects on the environment. Therefore, this Project would not result in significant impacts with regards to facilitating economic effect leading to additional growth with environmental consequences.

4) Would approval of this Project involve some precedent-setting action that could encourage and facilitate other activities that could significantly affect the environment?

The proposed Project would provide replacement of the Santiago Creek Dam outlet works and spillway facility improvements as well as dam embankment and crest improvements in order to address specific seismic safety concerns and meet all applicable requirements as an existing public facility as well as modify the embankment to permit operation of the facilities for a long-term water resource benefit. Replacement and improvement of these structures is not unique such that its approval would set a precedent, facilitating other activities and resulting in significant impacts to the environment.

6.4 REFERENCES

Center for Demographic Research (CDR). 2022 (September 22, final approval). OCP-2022 Report Data (City and RSA Tabs) (an Excel Spreadsheet). Fullerton, CA: CDR.

U.S. Census Bureau. 2024 (November 12, date accessed). QuickFacts, Orange County, California. Washington, D.C.: U.S. Census Bureau. https://www.census.gov/quickfacts/orangecountycalifornia.

SECTION 7.0 PERSONS AND ORGANIZATIONS CONSULTED

7.1 AGENCY COORDINATION

7.1.1 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, SOUTH COAST REGION 5

Jennifer Blackhall ..... Environmental Scientist

7.1.2 SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

Hossein Shahrokhnia ..... Environmental Scientist

7.1.3 U.S. FISH AND WILDLIFE SERVICE

Carol Roberts ..... Field Response Coordinator

Willian Miller ..... Biologist

7.1.4 U.S. ARMY CORPS OF ENGINEERS

Eric Sweeney .....Project Manager

7.2 ORGANIZATIONS CONSULTED

7.2.1 OC WASTE AND RECYCLING

Aimee Halligan ..... CEQA & Habitat Program Manager

7.2.2 ORANGE COUNTY FIRE AUTHORITY

Tamera Rivers ..... Management Analyst

7.2.3 ORANGE COUNTY SHERIFF'S DEPARTMENT

Kyle Ishii ..... Sergeant

7.2.4 SOUTHERN CALIFORNIA EDISON

Audry Williams .....Senior Advisor, Archaeology Program

7.2.5 AECOM

Bryan Paine .....Department Manager

This page intentionally left blank

SECTION 8.0 LIST OF PREPARERS

8.1 IRVINE RANCH WATER DISTRICT

Paul Weghorst .....Executive Director of Water Policy

Fiona Sanchez .....Director of Water Resources

Kellie Welch .....Water Resources Manager

Andy Uk ..... Environmental Compliance Analyst

Annaliese Torres..... Environmental Compliance Analyst

Jacob Moeder .....Engineering Manager

8.2 CONSULTANTS

8.2.1 PSOMAS

Jennifer Marks .....Vice President/Senior Project Manager

Megan Larum .....Assistant Project Manager

Amber Heredia.....Senior Project Manager, Resource Management

Brad R. Blood, Ph.D..... Senior Regulatory Specialist, Resource Management

Allison Rudalevige .....Senior Botanist/Regulatory Specialist

Lindsay Messett..... Senior Wildlife Biologist

Jonathan Aguayo..... Senior Wildlife Biologist

Farshad Farhang .....Senior Noise Technical Specialist

Jessica Hitchcock .....Project Manager I

Jordan Werkmeister...Air Quality/Greenhouse Gas Emissions Specialist, Environmental Planner

Charles Cisneros ..... Cultural Resources Manager

Jennie Ramirez.....GIS Analyst

Danaé Overman..... Technical Editor

Sheryl Kristal.....Senior Word Processer

8.2.2 SOUTH ENVIRONMENTAL

Samantha Murray .....Cultural Resources Director

This page intentionally left blank

NOTICE OF PREPARATION AND SCOPING MEETING FOR THE SANTIAGO CREEK DAM OUTLET TOWER AND SPILLWAY IMPROVEMENTS PROJECT ENVIRONMENTAL IMPACT REPORT

DATE: May 04, 2023

TO: Reviewing Agencies and Other Interested Parties

FROM: Irvine Ranch Water District, 15600 Sand Canyon Avenue, Irvine, California 92618

PROJECT TITLE/SUBJECT: Santiago Creek Dam Outlet Tower and Spillway Improvements Project — Notice of Preparation of an Environmental Impact Report (EIR) and Notice of Public Scoping Meeting

PROJECT APPLICANT: Irvine Ranch Water District

NOTICE OF PREPARATION REVIEW PERIOD: May 04, 2023 – June 05, 2023 (30 days)

SCOPING MEETING: May 16, 2023

The purpose of this Notice of Preparation (NOP) is to notify potential Responsible Agencies (Agencies) that the Lead Agency, the Irvine Ranch Water District (IRWD), will prepare an Environmental Impact Report (EIR) for the proposed Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Project) and to solicit comments and suggestions regarding (1) the scope and content of the EIR and (2) the environmental issues and alternatives to be addressed in the EIR (California Environmental Quality Act [CEQA] Guidelines Section 15082). This NOP also provides notice to interested parties, organizations, and individuals of the preparation of the EIR and requests comments on the scope and contents of the environmental document. A more detailed Project Description is available in the Initial Study for review at www.IRWD.com/irvinelakeproject.

PROJECT LOCATION:

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. Santiago Creek Dam impounds Irvine Lake. The Project is located south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, Irvine Lake pipeline (ILP), and dam access road.

The Project site is located on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle. It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. Irvine Lake (also called the Santiago Creek Reservoir) was originally constructed in 1933 to store water for the benefit of the surrounding communities.

Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon

Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

PROJECT BACKGROUND:
IRWD and Serrano Water District (SWD), jointly referred to as the "Districts", operate Irvine Lake and the Santiago Creek Dam that serves as a critical water supply reservoir for the Districts. IRWD uses water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation uses, and 2) as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. SWD uses water from Irvine Lake to provide treated drinking water to its customers in the City of Villa Park and some parts of the City of Orange.

Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources, Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000. Santiago Creek Dam is in Orange County, California and impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River.

The Districts have been working with the DSOD to evaluate different structural elements of the existing Santiago Creek Dam, including the evaluation of the existing outlet tower and an alternative analysis for seismic retrofits or replacement of the tower. DSOD requested the Districts perform a seismic evaluation of the outlet tower; evaluation of the results shows that the tower is nearing the end of its useful life and could be replaced and upgraded to today's seismic and safety standards. In addition, DSOD also requested a spillway condition assessment be performed for the spillway at Santiago Creek Dam. The assessment found that the aging spillway is nearing the end of its useful life and the design, while acceptable at the time of construction, does not meet current design standards.

In light of the findings from the seismic evaluation for the existing outlet tower and comprehensive assessment of the existing spillway, the Districts have elected to develop designs for an inclined outlet structure that would be placed near the left abutment of the existing dam and to replace the existing spillway with a side-channel spillway on the left abutment. The spillway crest would also be raised by six feet to regain operational storage capacity that was lost over the years due to sedimentation. The existing outlet tower would be abandoned, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir.

The rehabilitation and replacement of the Santiago Creek Dam outlet works, and spillway facilities is necessary to address identified seismic safety concerns; to meet current DSOD regulatory requirements; to satisfy the Districts' operational requirements; to extend the useful life of the facilities; and to improve reliability.

PROJECT DESCRIPTION:
General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Initial Study.

- Demolition of existing structures, including the existing outlet tower, portions of the existing spillway, portions of the upstream dam embankment concrete facing, storage building on the dam crest, portions of the outlet works, portions of the ILP, catwalk/stairs across Santiago Creek, and piezometers/monitoring wells.

- The existing outlet tower would be demolished, capped, and a new inclined outlet structure would be constructed on the left abutment. Each riser would be equipped with an intake fish screen.

- Inlet/Outlet works would be configured to incorporate the new structure, including new valves and fittings. Water would enter through the new inclined inlet/outlet structure, would enter an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow to the ILP or the emergency outlet pipeline. Water that enters the ILP would reach the Districts' distribution systems. Water that enters the emergency outlet pipeline would be released at the end of the new spillway.

- The ILP would be increased from 36 inches to 54 inches to increase the capacity of the line to improve the hydraulic performance of the system.

- The existing spillway would be demolished and replaced with a new side-channel spillway at the left abutment.

Ancillary site improvements are also proposed for the Project, including the following:

- New access road and ramp to provide vehicle access to the new inclined/outlet structure. A new shotcrete tie-back retaining wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.

- New dam control building to house the valve system (approximately 52 feet by 18 feet with a height of 12 feet). The new building would be designed in accordance with IRWD's fire-hardening building criteria.

- Widening of the existing dam crest from 10 feet to 12 feet with a retaining wall on the downstream side of the crest. The retaining wall would be 1,300 feet in length and would have a height of 10 feet.

- Raising of the dam crest with an approximately 1.5-foot-tall parapet wall on the upstream side of the dam crest. This wall would raise the effective dam crest from an elevation of 795.9 to 797.9 feet for DSOD freeboard requirements during the Probably Maximum Flood event.

- New emergency access walkway (5 feet wide) and stair system along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent landfill during a spillway event. The walkway would connect to the new access road (described above).

- New prefabricated steel bridge structure for vehicles across the spillway.

The Project includes raising the spillway to 797.9 feet, which is 2 feet higher than the existing maximum water storage elevation with the flashboards installed. Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately an additional 1,600 acre-feet of additional water.

CONSTRUCTION ACTIVTIES:
It is estimated that construction of the Project would take approximately three years to complete, assuming potential down time associated with weather delays and work restrictions in the wet season. The initial construction schedule anticipates that the spillway and inclined outlet structure improvements would be constructed over multiple dry seasons.

NOTICE OF PREPARATION (NOP):
IRWD has made a determination that a full-scope EIR, inclusive of all environmental topics except for Agriculture and Forest Resources, Hazards and Hazardous Materials, Mineral Resources, Population and Housing, Public Services, Recreation, and Wildfire is required for the proposed Project. The NOP can also be accessed online at www.IRWD.com/irvinelakeproject. Copies are available for review at Irvine Ranch Water District, 15600 Sand Canyon Avenue, Irvine, California 92618, and at the following locations:

- Irvine/Katie Wheeler Library,13109 Old Myford Road, Irvine, CA 92602
- Library of the Canyons, 7531 East Santiago Canyon Road, Silverado, CA 92676

IRWD requests your careful review and consideration of this notice, and it invites any and all input and comments from interested Agencies, persons, and organizations regarding the preparation of the EIR. Pursuant to CEQA Section 21080.4, comments must be submitted in response to this notice no later than 30 days after receipt of the NOP during the scoping period, which begins on May 4, 2023, and ends at the close of business on June 5, 2023. All comments or other responses to this notice should be submitted in writing to:

Andy Uk
Environmental Compliance Analyst
Irvine Ranch Water District Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, California 92618
uk@irwd.com
949.453.5326

NOTICE OF PUBLIC SCOPING MEETING:
IRWD will conduct a public scoping meeting in conjunction with this NOP to present the Project, describe the EIR process, and receive public comments and suggestions regarding the scope and content of the EIR. The meeting will be held on May 16, 2023, at 5:00 PM, at the following location:

IRWD's Board Room
15600 Sand Canyon Avenue
Irvine, California 92618

ALTERNATIVES TO THE PROPOSED PROJECT:
CEQA Guidelines Section 15126.6(a) requires that, "an EIR describe a range of reasonable alternatives to the Project, or to the location of the Project, which would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen any of the significant effects of the Project and evaluate the comparative merits of the alternatives."

IRWD will develop alternatives, which will include the CEQA-required No Project Alternative, that will be determined once the technical analyses are completed and there is an understanding of the Project's potentially significant impacts.

PROBABLE ENVIRONMENTAL EFFECTS OF THE PROPOSED PROJECT:
IRWD has determined that all environmental topics, except for Agriculture and Forest Resources, Hazards and Hazardous Materials, Mineral Resources, Population and Housing, Public Services, Recreation, and Wildfire, will be included and analyzed in the EIR for the proposed Santiago Creek Dam Outlet Tower and Spillway Improvements Project.

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems

ANTICIPATED SCHEDULE
A 45-day public review period will be provided with the Notice of Availability when the Draft EIR is complete, after which responses to comments received will be prepared. IRWD will then hold a public hearing and make a recommendation on certification of the EIR to the Board of Directors.

CONCLUSION
IRWD requests the public's careful review and consideration of this notice, and it invites any and all input and comments from public agencies and interested individuals regarding the preparation and scope of the Draft EIR.

NATIVE AMERICAN HERITAGE COMMISSION

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
Reginald Pagaling
Chumash

SECRETARY
Sara Dutschke
Miwok

COMMISSIONER
Isaac Bojorquez
Ohlone-Costanoan

COMMISSIONER
Buffy McQuillen
Yokayo Pomo, Yuki, Nomlaki

COMMISSIONER
Wayne Nelson
Luiseño

COMMISSIONER
Stanley Rodriguez
Kumeyaay

COMMISSIONER
[Vacant]

COMMISSIONER
[Vacant]

EXECUTIVE SECRETARY
Raymond C. Hitchcock
Miwok, Nisenan

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

May 4, 2023

Andy Uk
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92618

Re: 2023050097, Santiago Creek Dam Outlet and Spillway Improvements Project, Orange County

Dear Mr. Uk:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (https://ohp.parks.ca.gov/?page_id=30331) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

cc: State Clearinghouse

May 24, 2023

Andy Uk
Environmental Compliance Analyst
Irvine Ranch Water District Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, California 92618

Subject: **Notice of Preparation and Scoping Meeting for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report**

Dear Andy Uk:

Staff is in receipt of the notice of preparation of an Environmental Impact Report (EIR) for the proposed Santiago Creek Dam Outlet Tower and Spillway Improvements Project generally located south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project proposes to demolish existing structures and to construct a new inclined outlet structure. Ancillary site improvements include but are not limited to a new access road and ramp to the new structure, new dam control building, widening and raising of the dam crest, and new emergency access walkway and prefabricated steel bridge structures.

Staff has reviewed the project proposal and has no comments at this time.

Thank you for the opportunity to review and comment on the proposed project. Please add me to the interest list to receive project notifications, including the NOA for the EIR. If you have any questions, please contact me at tilin@cityofirvine.org or 949-724-6361.

Sincerely,

Tiffany Lin
Associate Planner

ec: Marika Poynter, Manager of Planning Services

ORANGE COUNTY FIRE AUTHORITY

P. O. Box 57115, Irvine, CA 92619-7115 • 1 Fire Authority Road, Irvine, CA 92602-0125

Brian Fennessy, Fire Chief (714) 573-6000 www.ocfa.org

June 2, 2023

Andy Uk Environmental Compliance Analyst
IRWD Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, CA 92618
uk@irwd.com
949.453.5326

Subject: Notice of Preparation of EIR for Santiago Creek Dam and Spillway Improvement

Dear Andy Uk:

Thank you for the opportunity to review the subject document. The Orange County Fire Authority (OCFA) provides fire protection and emergency medical services response to 23 cities in Orange County and all unincorporated areas. The OCFA operates 78 fire stations throughout Orange County.

We have no comments at this time and look forward to reviewing the EIR.

Please contact me at 714-573-6253 if you have any questions.

Sincerely,

Robert J Distaso PE
Fire Safety Engineer
Planning and Development
robertdistaso@ocfa.org
www.ocfa.org

From: Joyce Perry
To: Andy Uk
Subject: [EXTERNAL] Tribal Response- NOP for Santiago Creek Dam Outlet Tower and Spillway Improvements Project EIR
Date: Friday, June 2, 2023 12:09:04 PM

Caution: This email originated from outside IRWD. Do not click links or open attachments unless you know the sender and were expecting the email.

Good Afternoon,

I am responding on behalf of the Juaneno Band of Mission Indians, Acjachemen Nation-Belardes to your NOP of an EIR for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project.

This project is located within our territory, and a sensitive area to our tribe. We wish to consult on this project as it moves forward. We ask to review the Tribal Cultural Resources section of the draft EIR when it is available.

Additionally we wish to reconfirm our recommendation made to Kellie Welch if IRWD on 9/22/22, for native monitoring by representatives of the Juaneno Band of Mission Indians during ground disturbance in the vicinity of Santiago Canyon Road and Haul Road with nearby resources P-30-001012, P-30-100460, and P-30-001294.

Thank you and we look forward to hearing from you.

Joyce Stanfield Perry
Húu'uni 'óomaqati yáamaqati- Teach peace

Payomkawichum Kaamalam - President
kaamalam.com

Juaneño Band of Mission Indians, Acjachemen Nation
Cultural Resource Director

SCAG
INNOVATING FOR A BETTER TOMORROW

SOUTHERN CALIFORNIA
ASSOCIATION OF GOVERNMENTS
900 Wilshire Blvd., Ste. 1700
Los Angeles, CA 90017
T: (213) 236-1800
www.scag.ca.gov

REGIONAL COUNCIL OFFICERS

President
Art Brown, Buena Park

First Vice President
Curt Hagman, County of San Bernardino

Second Vice President
Cindy Allen, Long Beach

Immediate Past President
Jan C. Harnik, Riverside County Transportation Commission

COMMITTEE CHAIRS

Executive/Administration
Art Brown, Buena Park

Community, Economic & Human Development
Frank Yokoyama, Cerritos

Energy & Environment
Deborah Robertson, Rialto

Transportation
Tim Sandoval, Pomona

June 5, 2023

Andy Uk, Environmental Compliance Analyst
Irvine Ranch Water District, Water Resources and Policy Department
15600 Sand Canyon Avenue
Irvine, California 92618
Phone: (949) 453-5326
E-mail: uk@irwd.com

Subject: SCAG Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project [SCAG NO. IGR10882]

Dear Andy Uk:

Thank you for submitting the Notice of Preparation of a Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project ("proposed project") to the Southern California Association of Governments (SCAG) for review and comment. SCAG is responsible for providing informational resources to regionally significant plans, projects, and programs per the California Environmental Quality Act (CEQA) to facilitate the consistency of these projects with SCAG's adopted regional plans, to be determined by the lead agencies.[1]

Pursuant to Senate Bill (SB) 375, SCAG is the designated Regional Transportation Planning Agency under state law and is responsible for preparation of the Regional Transportation Plan (RTP) including the Sustainable Communities Strategy (SCS). SCAG's feedback is intended to assist local jurisdictions and project proponents to implement projects that have the potential to contribute to attainment of Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) goals and align with RTP/SCS policies. Finally, SCAG is the authorized regional agency for Intergovernmental Review (IGR) of programs proposed for Federal financial assistance and direct Federal development activities, pursuant to Presidential Executive Order 12372.

SCAG staff has reviewed the Notice of Preparation of a Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project in Orange County. The proposed project includes the rehabilitation and replacement of Santiago Creek Dam outlet works and spillway facilities, increasing storage by approximately 1,600-acre feet of water.

When available, please email environmental documentation to IGR@scag.ca.gov providing, at a minimum, the full public comment period for review.

If you have any questions regarding the attached comments, please contact the IGR Program, attn.: Annaleigh Ekman, Senior Regional Planner, at (213) 630-1427 or IGR@scag.ca.gov. Thank you.

Sincerely,

Frank Wen, Ph.D.
Manager, Planning Strategy Department

[1] Lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the 2020 RTP/SCS (Connect SoCal) for the purpose of determining consistency for CEQA.

COMMENTS ON THE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE SANTIAGO CREEK DAM OUTLET TOWER AND SPILLWAY IMPROVEMENTS PROJECT [SCAG NO. IGR10882]

CONSISTENCY WITH CONNECT SOCAL

SCAG provides informational resources to facilitate the consistency of the proposed project with the adopted 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS or Connect SoCal). For the purpose of determining consistency with CEQA, lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with Connect SoCal.

CONNECT SOCAL GOALS

The SCAG Regional Council fully adopted Connect SoCal in September 2020. Connect SoCal, also known as the 2020 – 2045 RTP/SCS, builds upon and expands land use and transportation strategies established over several planning cycles to increase mobility options and achieve a more sustainable growth pattern. The long-range visioning plan balances future mobility and housing needs with goals for the environment, the regional economy, social equity and environmental justice, and public health. The goals included in Connect SoCal may be pertinent to the proposed project. These goals are meant to provide guidance for considering the proposed project. Among the relevant goals of Connect SoCal are the following:

SCAG CONNECT SOCAL GOALS	
Goal #1:	*Encourage regional economic prosperity and global competitiveness*
Goal #2:	*Improve mobility, accessibility, reliability and travel safety for people and goods*
Goal #3:	*Enhance the preservation, security, and resilience of the regional transportation system*
Goal #4:	*Increase person and goods movement and travel choices within the transportation system*
Goal #5:	*Reduce greenhouse gas emissions and improve air quality*
Goal #6:	*Support healthy and equitable communities*
Goal #7:	*Adapt to a changing climate and support an integrated regional development pattern and transportation network*
Goal #8:	*Leverage new transportation technologies and data-driven solutions that result in more efficient travel*
Goal #9:	*Encourage development of diverse housing types in areas that are supported by multiple transportation options*
Goal #10:	*Promote conservation of natural and agricultural lands and restoration of habitats*

For ease of review, we encourage the use of a side-by-side comparison of SCAG goals with discussions of the consistency, non-consistency or non-applicability of the goals and supportive analysis in a table format. Suggested format is as follows:

SCAG CONNECT SOCAL GOALS		
	Goal	Analysis
Goal #1:	*Encourage regional economic prosperity and global competitiveness*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
Goal #2:	*Improve mobility, accessibility, reliability and travel safety for people and goods*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
etc.		etc.

Connect SoCal Strategies

To achieve the goals of Connect SoCal, a wide range of land use and transportation strategies are included in the accompanying twenty (20) technical reports. Of particular note are multiple strategies included in Chapter 3 of Connect SoCal intended to support implementation of the regional Sustainable Communities Strategy (SCS) framed within the context of focusing growth near destinations and mobility options; promoting diverse housing choices; leveraging technology innovations; supporting implementation of sustainability policies; and promoting a Green Region. To view Connect SoCal and the accompanying technical reports, please visit the Connect SoCal webpage. Connect SoCal builds upon the progress from previous RTP/SCS cycles and continues to focus on integrated, coordinated, and balanced planning for land use and transportation that helps the SCAG region strive towards a more sustainable region, while meeting statutory requirements pertinent to RTP/SCSs. These strategies within the regional context are provided as guidance for lead agencies such as local jurisdictions when the proposed project is under consideration.

SCAG staff would like to call your attention to the Water Action Resolution unanimously adopted by SCAG's Regional Council on October 6, 2022 that formally affirmed the drought and water shortage emergency in Southern California and called on local and regional partners to join together to adopt an "all of the above" approach to addressing the region's water challenges and catalyzing opportunities. The Resolution calls on SCAG to take action and support partners to reduce water use; improve water conservation, reuse, and efficiency; enhance water systems' health and resilience; pursue and potentially implement new water supply and storage opportunities; and support investments in water infrastructure and conservation practices that support the region's economic and population growth and fosters planning for the region's housing needs.

DEMOGRAPHICS AND GROWTH FORECASTS

A key, formative step in projecting future population, households, and employment through 2045 for Connect SoCal was the generation of a forecast of regional and county level growth in collaboration with expert demographers and economists on Southern California. From there, jurisdictional level forecasts were ground-truthed by subregions and local agencies, which helped SCAG identify opportunities and barriers to future development. This forecast helps the region understand, in a very general sense, where we are expected to grow, and allows SCAG to focus attention on areas that are experiencing change and may have increased transportation needs. After a year-long engagement effort with all 197 jurisdictions one-on-one, 82 percent of SCAG's 197 jurisdictions provided feedback on the forecast of future growth for Connect SoCal. SCAG also sought feedback on potential sustainable growth strategies from a broad range of stakeholder groups – including local jurisdictions, county transportation commissions, other partner agencies, industry groups, community-based organizations, and the general public. Connect SoCal utilizes a bottom-up approach in that total projected growth for each jurisdiction reflects feedback received from jurisdiction staff, including city managers, community development/planning directors, and local staff. Growth at the neighborhood

level (i.e., transportation analysis zone (TAZ) reflects entitled projects and adheres to current general and specific plan maximum densities as conveyed by jurisdictions (except in cases where entitled projects and development agreements exceed these capacities as calculated by SCAG). Neighborhood level growth projections also feature strategies that help to reduce greenhouse gas emissions (GHG) from automobiles and light trucks to achieve Southern California's GHG reduction target, approved by the California Air Resources Board (CARB) in accordance with state planning law. Connect SoCal's Forecasted Development Pattern is utilized for long range modeling purposes and does not supersede actions taken by elected bodies on future development, including entitlements and development agreements. SCAG does not have the authority to implement the plan -- neither through decisions about what type of development is built where, nor what transportation projects are ultimately built, as Connect SoCal is adopted at the jurisdictional level. Achieving a sustained regional outcome depends upon informed and intentional local action. To access jurisdictional level growth estimates and forecasts for years 2016 and 2045, please refer to the Connect SoCal Demographics and Growth Forecast Technical Report. The growth forecasts for the region and applicable jurisdictions are below.

	Adopted SCAG Region Wide Forecasts				Adopted County of Orange Forecasts			
	Year 2020	**Year 2030**	**Year 2035**	**Year 2045**	**Year 2020**	**Year 2030**	**Year 2035**	**Year 2045**
Population	19,517,731	20,821,171	21,443,006	22,503,899	3,268,084	3,440,882	3,499,318	3,534,620
Households	6,333,458	6,902,821	7,170,110	7,633,451	1,065,426	1,103,569	1,124,628	1,154,274
Employment	8,695,427	9,303,627	9,566,384	10,048,822	1,773,571	1,886,065	1,927,505	1,980,433

MITIGATION MEASURES

SCAG staff recommends that you review the Final Program Environmental Impact Report (Final PEIR) for Connect SoCal for guidance, as appropriate. SCAG's Regional Council certified the PEIR and adopted the associated Findings of Fact and a Statement of Overriding Considerations (FOF/SOC) and Mitigation Monitoring and Reporting Program (MMRP) on May 7, 2020 and also adopted a PEIR Addendum and amended the MMRP on September 3, 2020 (please see the PEIR webpage and scroll to the bottom of the page for the PEIR Addendum). The PEIR includes a list of project-level performance standards-based mitigation measures that may be considered for adoption and implementation by lead, responsible, or trustee agencies in the region, as applicable and feasible. Project-level mitigation measures are within responsibility, authority, and/or jurisdiction of project-implementing agency or other public agency serving as lead agency under CEQA in subsequent project- and site- specific design, CEQA review, and decision-making processes, to meet the performance standards for each of the CEQA resource categories.

County Administration South
601 North Ross Street
Santa Ana, CA 92701

P.O. Box 4048
Santa Ana, CA 92702

(714) 667-8800

info@ocpw.ocgov.com

OCPublicWorks.com

Administrative Services

OC Development Services

OC Facilities Design & Construction Management

OC Facilities Maintenance & CUF

OC Fleet Services

OC Construction

OC Environmental Resources

OC Operations & Maintenance

OC Infrastructure Programs

OC Survey

June 5, 2023

Andy Uk
Environmental Compliance Analyst
Irvine Ranch Water District Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, CA 92618

Subject: Notice of Preparation and Initial Study for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report

Dear Andy Uk,

Thank you for the opportunity to comment on the Initial Study (IS) for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report (EIR). The County offers the following comments for your consideration.

OC Infrastructure/Traffic Engineering

1. Please provide a timeline for the proposed project (start year, end year, major points, etc.).

2. Page 13, Exhibit 3, of the IS, the project's proposed work and construction seems to extend outside Irvine Ranch Water District (IRWD) property line and into Unincorporated County of Orange jurisdiction. Confirm that has this been approved and permitted.

3. Page 23 of the IS, the project will potentially have a significant impact on inadequate emergency access. Will the proposed project be presented to the Orange County Fire Authority (OCFA) for approval?

4. Will Santiago Canyon Road be the primary road for construction workers and management to access the project? If so, please provide a traffic impact analysis/study to OC Traffic Engineering for review.

5. In the traffic impact analysis/study, please account for any changes in Level Of Service and Vehicle Miles Traveled within County roadway segments and intersections. Orange County's roadways are adjacent to the project site and should be considered.

6. County of Orange has a Capital Improvement Project (CIP) on Santiago Canyon Road planned construction for Fiscal Year 2025-2026. Will the project conflict with County of Orange's CIP? Please contact Sonica Kohli (714- 647-3910,

Sonica.Kohli@ocpw.ocgov.com) for more information regarding the County CIP project.

OC Flood Programs/Floodplain Management

1. Page 3-12, Section IX. Hydrology and Water Quality, Impact Analysis, Item C-i to C-iii is to analyze if the proposed project will alter the existing drainage pattern in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner in which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

   The response provided in the IS has categorized the impact as "Potentially Significant." However, the explanation provided in this section discusses potential impacts related to groundwater supplies and groundwater recharge. The IS does not adequately address the potential impacts to the existing drainage pattern, potential for erosion, or impacts to existing or planned stormwater drainage systems. Further details shall also be provided if the change of the outlet tower will alter the existing maximum discharge from Irvine Lake, and if there would be any impacts downstream.

2. The project should provide a detailed hydrology and hydraulic analysis for Orange County Public Works (OCPW) to review as this project would have impact to downstream facilities, especially Villa Park Dam, which is an OCPW maintained and operated facility.

OC Development Services/Planning

1. Provide a more in-depth project description. Include construction activities (i.e., construction staging and lay-down areas, phasing/construction schedule, on-site and off-site improvements), site improvement (i.e., site plan of area being improved, landscaping plans, signage, walls/fences, vehicular access, parking), and infrastructure characteristics (storm water, access easements, utilities, etc.)

2. Page 3-16, Section XV. Public Services, additional analysis should be included to confirm fire, police, and emergency services can maintain acceptable service ratios, response times, or other performance objectives during the construction phase.

OC Parks

Access Road:

1. Exhibit 3, Site Plan, indicates an access road from Irvine Regional "(Not for Construction)." Clarify whether this access road will be used in conjunction with the project, clarify where access to the project will be taken, and ensure all access points are shown on Exhibit 3.

2. Provide more information on whether access is needed through Irvine Regional Park as that will have an impact on recreation users at the park.

3. Page 1-4, Section 1.4 says "Ancillary site improvements are also proposed for the Project, including a new access road and ramp to provide vehicle access to the new inclined/outlet structure..." Clarify if this new access road is proposed to be on IRWD property or County property. A "proposed" or "new"

access road is not marked on the Site Plan. Relatedly, proposed improvements should be marked on the Site Plan/Exhibit.

Hours of Operation:

1. Clarify hours of operation for the project.

Impacts:

1. Page 3-16, Section XIV. Public Services and Section XV. Recreation impacts need to be evaluated in greater detail for potential impacts to the park areas in the vicinity of the Project. Potential impacts to the Recreation Lease Area need to be discussed and included in the evaluation as this is a known future project.

2. Evaluate whether the proposed spillway project will have an impact to future recreation at Irvine Lake as this recreation area is supposed to facilitate shoreline fishing.

3. Page 3-16 Section XV. Recreation states there will be no recreational impacts, but the lake will be drained (no fishing).

4. The draining of the lake and other disruptions caused by the project (noise, dust, construction traffic, etc.) may increase public demand and use of other competing recreational facilities as the public seeks alternate recreational facilities while Irvine Lake is impacted by the project. The following questions need to be addressed and evaluated in the Draft EIR: What alternate recreational facilities can the public use? Will these other facilities be able to support an increase in hikers, fishers, bikers, RVs, etc.? Will these recreational users come back to Irvine Lake when the project is completed? Will interruptions of recreational activities have an adverse physical effect on the environment?

5. Page 1-2, Section 1.2 states that, "The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area." The Project Boundary Map/Exhibit 2, which follows Page 1-2 (Page 10 of the PDF document), shows that the Project Boundary encompasses the County's Recreation Parcel (including our RV Storage Area), and portions of the James License Parcel which offers recreational opportunities.

6. Another consideration is whether impacts to the Orange County Modelers Association (OCMA) model airplane flyer hobby group has been considered. The Draft EIR needs to evaluate if access to the airfield will be impacted. It should also clarify that the group's recreational access will be preserved along Blue Diamond Road during the project as this group is another stakeholder in the area. Clarify whether OCMA has been consulted by IRWD and Serrano Water District regarding this project.

7. There are The Nature Conservancy/OC Parks Foundation conservation easement protections on the north, east and south side of the project area. Draft EIR needs to evaluate whether sound and dust related to the project construction through could impact surrounding habitat and Conservation Easement areas, as well as areas along the truck route. Project has the potential to impact nesting birds in proximity to the project.

8. Page 3-10 Section VIII. Hazard and Hazardous Material Section sub-heading "b)" since the lake is used for recreational fishing, the impact on fish/fishing this should be considered with the evaluation of the potential of hazardous materials impacting the reservoir.

9. Page 3-16 Section XIV. Public Services, although this will not result in the provision of new public services, the lake currently is used to provide public recreation (shoreline fishing) and since the project will require draining the reservoir for an extended period this will likely have an impact on public park/recreation services.

10. Page 3-20 Section XIX. Wildfire, although the site is not within a VHFHSV zone, if the reservoir is used for firefighting purposes (water drops), it could have an impact on recreational and habitat areas since the project requires draining the reservoir for an extended period of time.

11. Post-project impacts in the form of invasive weeds brought in or spread via trucks and movement of material that are not apparent for a year or even a few years after project initiation often occurs. This could be remediated by having the project include surveys and weed treatment obligations during and, for a time period, after the project to make sure project impacts post-project are accounted for. Following preventative measures for weed seed spread and requiring surveys, weed treatment, and communication for priority nonnative, invasive species should be included in conditioning for the project. As the project approaches, OC Parks will provide:
    - OC Parks' Best Management Practice guidelines for sanitation practices to prevent invasive weed seed spread.
    - A current list of OC Parks' target invasive species.
    - The OC Parks Integrated Pest Management (IPM) Plan and practices that must be followed for chemical control
    - Training in Calflora to map identified target weed populations and record treatment.
    - An OC Parks contact for communication.

12. Prior to project initiation, OC Parks requests to review detailed plans specific to remediation of temporary habitat impacts, including plant material palettes, installation and maintenance methods and timelines, and success criteria.

13. The Fremont Canyon Staging area is used by OC Parks to launch guided public hikes and is located along the dam road very close to the project area. The project will impact CE recreational values by detracting from user experience via sound, viewshed impacts and maybe dust; however this is a lightly used staging area (scheduled activities occurring about twice a week on average).

14. The Airfield Staging area and the Red Rock Wilderness area will be coming online for public access before or during the Irvine Lake Improvement process (on the south side of Irvine Lake). Analyze potential temporary impacts during construction related to recreational values specific to truck trips along access route and viewshed impacts.

<u>Typographical and Exhibit Edits</u>:

1. Page 1-1 Project Location: Info on surrounding land uses needs to be added; such info is included in the Air Quality Impact Analysis section in c).

2. Recreation Lease Area located at the southeastern side of the lake needs to be included as a surrounding land use in the Project Location section.

3. Page 1-2, 4th paragraph in Environmental Setting: "Surrounding land uses...SR-241" move up to after the first paragraph in the Environmental Setting section. Recreation Lease Area as an open space facility also needs to be included.

4. Page 1-2: The Project is within the Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) area.

5. Special Linkage located southeast of the lake –Footnote needed to clarify "Special Linkage".

6. Page 1-3 in Section 1.2 Environmental Setting, the words "fluctuating shoreline" is repeated.

7. Exhibit 2: Label Irvine Lake.

8. Exhibit 3: Label the Recreation Lease Area located at the southeastern side of the lake.

9. Page 1-4: Spell out "ILP" acronym prior to first use of acronym.

10. Page 1-5 in Section 1.5 Construction Activities, in addition to the number of years to complete, should identify the overall estimated frequency of truck trips.

11. Section 3.0 Discussion of Environmental Checklist Questions is missing the section on "Agriculture and Forest Resources" and has modified the numbering sequence (II, III, IV, etc.) for the remaining checklist topics in this section.

OC Waste & Recycling

Proximity to Landfill:

1. Proposed access and retaining wall via the landfill - The Santiago Canyon Closed Landfill is located immediately adjacent to the project boundaries. The project proposes a new access road and ramp to provide vehicle access to the new inclined/outlet structure. The project proponent also specifies that a new shot-crete tie-back retaining wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above. The project also entails a new emergency access walkway connecting to the new access road which would reach the inclined inlet/outlet structure and dam crest from the adjacent landfill facility during a reservoir spill event.
    - The Draft EIR should provide more detail on this project element to determine how the proposed project can be implemented without affecting the landfill.
    - The details of the improvements that have potential to impact the landfill should be clearly marked on a map.
    - There could be a potential impact to public services maintaining the closed landfill (Section XV. Public Services) if the stability of the landfill or any of the slopes is compromised. The IS identifies no impact.

- The Draft EIR should provide information that the project would not interfere with Orange County Waste & Recycling's (OCWR) ability to comply with environmental regulations at the landfill.
- Any access through the landfill property as part of construction of the project or to utilize the new access road via the landfill should be coordinated directly with OCWR. The Draft EIR should include additional detail regarding the access through the landfill, including specification of whether vehicle and/or pedestrian access are permanent or temporary access points.

2. Potential Impacts to the Integrity of the Santiago Canyon Closed Landfill Waste Prism and Cover – the Draft EIR should analyze any potential damage that will result to the waste prism and landfill cover as a result of excavation activities. Secondary impacts to the closed landfill associated with geotechnical stability, landslide, soil expansion and liquefaction potential, runoff and erosion should be analyzed. Mitigation measures should be required to protect the integrity of the closed landfill cover.

3. Potential Impacts to Groundwater & Groundwater Monitoring System at the Santiago Canyon Closed Landfill – Per the IS, the proposed project has the potential to introduce sources of water pollutants that would have the potential to interfere with a water quality control plan or sustainable groundwater management plan. OCWR maintains a system of groundwater monitoring wells in and around the Santiago Canyon Closed Landfill. The Draft EIR should evaluate potential impacts to groundwater that could result in additional impacts to the landfill's groundwater monitoring system.

4. Potential Impacts to Landfill Gas Monitoring System at the Santiago Canyon Closed Landfill – OCWR maintains a system of gas monitoring probes to monitor landfill gas and emissions at the Santiago Canyon Closed Landfill. Gas probes occur on and within the immediate vicinity of the landfill property. The Draft EIR should evaluate any potential impacts to interfere with the landfill's probes and gas monitoring system.

Habitat Protection:

1. The Draft EIR should include a thorough, updated biological survey to determine the extent of biological resources on the site and the associated project impacts. In particular, items of concern should include the following:
    - *Sensitive Upland Vegetation Communities* – Areas in and around the Santiago Canyon Closed Landfill contain coastal sage scrub and other sensitive upland vegetation communities. The Draft EIR should include a thorough, updated biological survey to determine the extent of biological resources on the project site and the associated project impacts both on and off the Santiago Canyon Closed Landfill, particularly including any new infrastructure such as the new emergency access walkway and stair designed for access from the landfill property. The Draft EIR should also include the proposed mitigation measures for all project impacts to biological resources and detail compliance with the Orange County Central Coastal NCCP/HCP, as the project lies within NCCP/HCP areas. The Draft EIR should identify the permits that the project applicant will be required to obtain from both federal and state biological regulatory agencies.
    - *Sensitive Wildlife Species* – As suitable habitat for nesting and/or foraging by the California gnatcatcher is known to exist on the closed landfill and along its periphery, a protocol survey

for California gnatcatcher should be included as part of the Draft EIR biological resources analysis. The Draft EIR should provide mitigation measures for any impacts to nesting pairs of California gnatcatchers. The Draft EIR biological resources analysis should also identify any other federal- or state-endangered or threatened plant or animal species that may exist on the project site and quantify the impacts that will occur to these sensitive species from project development. Mitigation measures for these impacts should also be included. The Draft EIR should identify the permits that the project applicant will be required to obtain from both federal and state biological regulatory agencies.

OC Environmental Resources

1. Projects that, as part of a common plan of development, disturb one or more acres are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Order 2009-0009-DWQ (and subsequent Order 2022-0057-DWQ) and implement a Storm Water Pollution Prevention Plan (SWPPP) and monitoring program consistent with permit requirements.

2. Specific mention should be made of whether or not the project qualifies as a *Priority Development Project* under the city's municipal stormwater permit (Santa Ana Regional Board Order R8-2009-0030), or instead is a *Non-Priority Project* which would require preparation of a *Non-Priority Water Quality Project Plan*.

3. New development projects that create 10,000 square feet or more of impervious surface require the development of a Water Quality Management Plan (WQMP). Specific mention should be made of applicable city WQMP requirements for projects to comply with their municipal stormwater permits.

4. Specific mention should be made of the Orange County Stormwater Program's Drainage Area Management Plan (DAMP). The DAMP is Orange County's principal policy and program guidance document for stormwater management and includes a 2017 Technical Guidance Document to be followed in preparing the project's WQMP.

5. Specific mention should be made of the potential water quality impacts from the proposed project and identification of the anticipated pollutants to be generated or mobilized by the project should be provided.

6. Note that OC Environmental Resources (OCER) currently owns and operates the following hydrologic equipment within the project construction area: a rain gauge, waterlevel gauge, and bubbler line that stretches to the lake, located on the bridge above the spillway. The eventual dam improvements contractor, IRWD, and OCER should coordinate a plan in advance to either retrieve or protect the monitoring equipment prior to or during construction.

OC Infrastructure Programs/Regulatory Permitting

1. Section XIX. Wildfire Impact Analysis section applies to areas *in or near* very high fire hazard severity zones. According to the Map of CAL FIRE's Fire Hazard Severity Zones in State Responsibility Areas (https://osfm.fire.ca.gov/media/6737/fhszs_map30.pdf) and the Fire Hazard Severity Zones (FHSZ)

viewer (https://egis.fire.ca.gov/FHSZ/), Irvine Lake is a moderate fire hazard severity zone surrounded by very high fire hazard severity zones.

Section XIX. Wildfire lists that there are no impacts, citing the fact that the lake itself is a moderate fire hazard area. However, the adjacent properties are identified as high-risk areas. The evaluation method used may have neglected to consider the adjacent high-risk area, especially considering the recent rains and heavy vegetation growth, which contribute to the risk of wildfire in the area. It would be advisable to re-evaluate this impact and coordinate with the OCFA for their review.

2. The IS identifies that the project will raise the spillway by two feet, increasing the maximum storage capacity of the facility. OCPW is working with the U.S. Army Corps of Engineers (USACE) to address flood risk on the Santiago Creek.

   Has the project proponent worked with OCPW and/or the USACE to investigate how the facility could better function to reduce flood risk downstream and if additional measures could be incorporated into the design to help alleviate flooding? Measures could include further raising the spillway and/or dam structure, strategic sediment removal from within the basin to maintain greater flood capacity, upgrading technology within this and other dam facilities and flow gages in the Santiago Creek to better manage extreme flows in a more integrated manner. If discussions between the project proponent and the USACE/OCPW Santiago Creek flood team have not already taken place, it is recommended that a working group be established to maximize the flood alleviation benefits of this project.

If you have any questions regarding these comments, please contact Cindy Salazar at (714) 667-8870. Please continue to keep the County of Orange on the distribution list for future notifications related to the Project.

Sincerely,

Cindy Salazar

Cindy Salazar, Land Use Manager
OC Public Works /OC Development Services
601 North Ross Street
Santa Ana, California 92701
Cindy.Salazar@ocpw.ocgov.com

cc: Justin Kirk, Deputy Director, OC Development Services
Nardy Khan, PE/PMP, Deputy Director, OC Infrastructure Programs
Brian Kurnow, Interim Planning & Design Division Manager, OC Parks
Aimee Halligan, Habitat Program Manager, OC Waste & Recycling
Tracey Ingebrigtsen CPESC®, QSD/QSP, Countywide Compliance Program Manager, OC Environmental Resources
Giatho Tran, P.E., C.F.M., Senior Civil Engineer, OC Flood Programs
Alison Camara, Civil Engineer, OC Flood Programs
Giles Matthews, Regulatory Permitting Manager, OC Infrastructure Programs
Paul Lee, Civil Engineer, OC Infrastructure Programs
Arturo Cervantes, Senior Planner, OC Development Services
Yuritzy Randle, Associate Planner, OC Development Services

San Joaquin Hills
Transportation
Corridor Agency
Chair: Will O'Neill
Newport Beach

Transportation Corridor Agencies

Foothill/Eastern
Transportation
Corridor Agency
Chair: John Taylor
San Juan Capistrano

June 5, 2023

Via Email: uk@irwd.com

Andy Uk
Environmental Compliance Analyst
Irvine Ranch Water District
Water Resources and Policy Department
15600 Sand Canyon Avenue
Irvine, CA 92618

Re: Notice of Preparation for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project Environmental Impact Report

Dear Mr. Uk:

The Transportation Corridor Agencies (TCA) appreciate the opportunity to participate and provide comments on the Notice of Preparation for an Environmental Impact Report (EIR) for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Proposed Project). TCA understands that the Proposed Project includes the demolition, rehabilitation and replacement of the Santiago Creek Damn outlet works and spillway facilities in unincorporated Orange County. TCA thanks you for the opportunity to participate in your planning process.

TCA looks forward to receiving all future notices, the draft EIR, along with any other forthcoming documentation for the Proposed Project and requests to be kept on IRWD's distribution list. If you have questions or require additional information, please do not hesitate to contact me at 949.754.3487 or via email (vgomez@thetollroads.com).

Sincerely,

Virginia Gomez

Virginia Gomez
Environmental Analyst

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

STATE OF CALIFORNIA • NATURAL RESOURCES AGENCY Gavin Newson, Governor
DEPARTMENT OF FISH AND WILDLIFE Charlton H. Bonham, Director

South Coast Region
3883 Ruffin Road | San Diego, CA 92123
wildlife.ca.gov

June 5, 2023

Andy Uk
Environmental Compliance Analyst
Irvine Ranch Water District Water Resources & Policy Department
15600 Sand Canyon Avenue
Irvine, CA 92618
Uk@irwd.com

Subject: Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR), SCH# 2023050097

Dear Andy Uk:

The California Department of Fish and Wildlife (CDFW) received a Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) from Irvine Ranch Water District (IRWD) for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Project) pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.

Thank you for the opportunity to provide comments and recommendations regarding the activities involved in Santiago Creek Dam Outlet Tower and Spillway Improvements Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW Role

CDFW is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the State [Fish & G. Code, §§ 711.7, subdivision (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines, § 15386, subdivision (a)]. CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (Id., § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

related activities that have the potential to adversely affect state fish and wildlife resources.

CDFW is also submitting comments as a Responsible Agency under CEQA (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code, including lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). CDFW also administers the Natural Community Conservation Planning (NCCP) program, a California regional habitat conservation planning program. The Irvine Ranch Water District (IRWD) participates in the NCCP program through its role as a Participating Landowner under the County of Orange Central and Coastal Subregion Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP). To the extent implementation of the Project as proposed may result in "take" (see Fish & G. Code, § 2050) of any species protected under the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.) or the Native Plant Protection Act (NPPA; Fish & G. Code, §1900 et seq.), CDFW recommends the Project proponent obtain appropriate authorization under the Fish and Game Code.

PROJECT DESCRIPTION SUMMARY

Proponent: Irvine Ranch Water District

Objective: IRWD and Serrano Water District (SWD) have been working to evaluate the different structural elements of the existing Santiago Creek Dam including the analysis for seismic retrofits or replacement of the outlet tower. After the evaluation, the Division of Safety of Dams (DSOD) requested that the tower and spillway need to be improved because the current design does not meet current construction standards. The improvements and replacement of the Santiago Creek Dam outlet tower and spillway facilities are necessary to address the seismic safety concerns and to meet current DSOD regulatory standards. The proposed Project involves demolishing existing structures, including the outlet tower, spillway, portions of the upstream dam embankment concrete facing, storage building on the dam crest, portions of the outlet works, portions of the Irvine Lake pipeline (ILP), catwalks/stairs across Santiago Creek, and piezometers/monitoring wells. The existing spillway will be replaced with a new side-channel spillway at the left abutment. The Project also includes raising the spillway 6 feet to 797.9 feet, which is 2 feet higher than current water storage elevation.

Location: The Project is located at the Santiago Creek Dam at the northwest end of Irvine Lake in Orange County, California. The Project site is south of State Route (SR) 261 and east of SR 241 and Santiago Road. The Project is also located in the Central and Coastal Subregion NCCP/HCP. The Santiago Dam is in "Non-Reserve Open Space." The surrounding land uses include NCCP/HCP Reserve which include Irvine Regional Park, Limestone Canyon Regional Park, and Oak Canyon Park.

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

Biological Setting: As stated above, the Project site is located in "Non-Reserve Open Space within the NCCP/HCP plan area. The area surrounding the lake and dam is largely undeveloped and includes sensitive habitat. Per the Initial Study (IS), the habitat types that occur in the survey area include: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore and vegetated fluctuating shoreline. Other land cover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental vegetation, and developed areas associated with the lake.

The Project site has the potential to support several sensitive wildlife species, including but not limited to coastal California gnatcatcher (*Polioptila californica californica*; Federal Endangered Species Act listed-threatened (ESA), California Species of Special Concern (SSC), NCCP/HCP Covered Species)), least Bell's vireo (*Vireo bellii pusillus;* ESA listed endangered, California Endangered Species Act (CESA) listed endangered, NCCP/HCP Covered Species)), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*; SSC, NCCP/HCP Covered Species), bald eagle (*Haliaeetus leucocephalus*; California Fully Protected Species), western spadefoot (*Spea Hammondii*; SSC, NCCP/HCP Covered Species), orange-throated whiptail (*Aspidoscelis hyperythra*; NCCP/HCP Covered Species), two-striped gartersnake (*Thamnophis hammondii*; SSC), western mastiff bat (*Eumops perotis californicus*; SSC), and pallid bat (*Antrozous pallidus*; SSC).

The Project site also has the potential to support a variety of sensitive plant species including but not limited to intermediate mariposa lily (*Calochortus weedii var. intermedius*; California Rare Plant Rank (CRPR) 1B.2, NCCP/HCP Covered Species)), Allen's pentachaeta (*Pentachaeta aurea ssp. Allenii*; CRPR 1B.1), chaparral nolina (*Nolina cismontana*; CRPR 1B.2), Braunton's milk-vetch (*Astragalus brauntonii*; ESA listed-endangered, CRPR 1B.1), white rabbit-tobacco (*Pseudognaphalium leucocephalum*; CRPE 2B.2), and many-stemmed dudleya (*Dudleya multicaulis*; CRPR 1B.2).

Project Timeline: The Project would take approximately three years to complete. The initial construction schedule anticipates that the spillway and inclined outlet structure improvements would be constructed over multiple dry seasons.

COMMENTS AND RECOMMENDATIONS

CDFW offers the following comments and recommendations to assist IRWD in identifying and/or mitigating Project impacts on biological resources to ensure regional

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

conservation objectives in the County of Orange Central and Coastal Subregion NCCP/HCP are met and the Project is compliant with the NCCP/HCP.

Specific Comments

1) Biological Direct, Indirect, and Cumulative Impacts. This Project includes the use of heavy machinery for the construction of the new dam facilities. An increased amount of noise and artificial light are associated with construction activities. Artificial light can change normal wildlife behavior, often altering their nesting and foraging behavior. Edge effects, such as light pollution, are known to result in extirpation of species from an area. Due to the proximity of the Project site to sensitive habitat types and to Santiago Creek, it is essential to understand how the open space and biological diversity within it may be impacted by Project activities. This area is part of an essential wildlife corridor and open space that supports biological diversity in the area. CDFW recommends providing a thorough discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts. The following should be addressed in the DEIR:

    a) A discussion regarding indirect Project impacts on biological resources, including resources in nearby public lands, open space, adjacent natural habitats, riparian ecosystems, and any designated and/or proposed or existing reserve lands (e.g., preserve lands associated with an NCCP (NCCP, Fish & G. Code, § 2800 et. seq.). Impacts on, and maintenance of, wildlife corridor/movement areas, including access to undisturbed habitats in adjacent areas, should be fully evaluated in the DEIR;

    b) A discussion of potential adverse impacts from lighting, noise, temporary and permanent human activity, and exotic species and identification of any mitigation measures;

    c) A discussion on Project-related changes on drainage patterns downstream of the Project site; the volume, velocity, and frequency of existing and post-Project surface flows; polluted runoff; soil erosion and/or sedimentation in streams and water bodies; and post-Project fate of runoff from the Project site. Mitigation measures proposed to alleviate such Project impacts should be included;

    d) An analysis of impacts from land use designations and zoning located nearby or adjacent to natural areas that may inadvertently contribute to wildlife-human interactions. A discussion of possible conflicts and mitigation measures to reduce these conflicts should be included in the DEIR; and,

    e) A cumulative effects analysis, as described under CEQA Guidelines section 15130. General and specific plans, as well as past, present, and anticipated

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

future projects, should be analyzed relative to their impacts on similar plant communities and wildlife habitats.

2) Sensitive Bird Species. Based on the location of the Project, there is potential for special-status bird species. Project activities occurring during the breeding season of nesting birds could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment in habitat directly adjacent to the Project boundary. The Project could also lead to the loss of foraging habitat for sensitive bird species.

   a) CDFW recommends that measures be taken, primarily, to avoid Project impacts to nesting birds. Migratory nongame native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (Code of Federal Regulations, Title 50, § 10.13). Sections 3503, 3503.5, and 3513 of the California Fish and Game Code prohibit take of all birds and their active nests including raptors and other migratory nongame birds (as listed under the MBTA).

   b) Project activities including (but not limited to) staging and disturbances to native and nonnative vegetation, structures, and substrates should occur outside of the avian breeding season which generally runs from February 15 through August 31 (as early as January 1 for some raptors) to avoid take of birds or their eggs. If avoidance of the avian breeding season is not feasible, CDFW recommends surveys by a qualified biologist with experience in conducting breeding bird surveys to detect protected native birds occurring in suitable nesting habitat that is to be disturbed and (as access to adjacent areas allows) any other such habitat within 300-feet of the disturbance area (within 500-feet for raptors). Project personnel, including all contractors working onsite, should be instructed on the sensitivity of the area. Reductions in the nest buffer distance may be appropriate depending on the avian species involved, ambient levels of human activity, screening vegetation, or possibly other factors.

3) Coastal California Gnatcatcher and Least Bell's Vireo. There is a strong possibility that these two species occur on or near the Project site. The DEIR should include a complete, recent habitat assessment for suitable coastal California gnatcatcher (*Polioptila californica californica*) and least Bell's vireo (*Vireo bellii pusillus*) habitat. If suitable habitat for the coastal California gnatcatcher and least Bell's vireo is present onsite or adjacent to the Project site, CDFW recommends protocol level surveys for gnatcatcher and vireo to determine presence or absence of this species. Mitigation for direct, indirect, and cumulative impacts to this species should be determined after the completion of these surveys.

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

4) Biological Baseline Assessment. CDFW recommends providing a complete assessment and impact analysis of the flora and fauna within and adjacent to the Project site, with emphasis upon identifying endangered, threatened, sensitive, regionally, and locally unique species, including any Covered Species under the NCCP/HCP, and sensitive habitats. The Project impact analysis should therefore address direct, indirect, and cumulative biological impacts, as well as provide specific mitigation or avoidance measures necessary to offset those impacts. The DEIR should include the following information:

   a) A complete floristic assessment within and adjacent to the Project area, with particular emphasis upon identifying endangered, threatened, sensitive, and locally unique species and sensitive habitats. This should include a thorough, recent, floristic-based assessment of special status plants and natural communities.

   b) A complete, recent, assessment of the biological resources associated with each habitat type onsite and within adjacent areas that could also be affected by the Project. CDFW's California Natural Diversity Database (CNDDB) should be reviewed to obtain current information on any previously reported sensitive species and habitat. CDFW recommends that CNDDB Field Survey Forms be completed and submitted to CNDDB to document survey results. Online forms can be obtained and submitted at https://wildlife.ca.gov/Data/CNDDB/Submitting-Data.

   c) Vegetation mapping should follow criteria and definitions developed for the subregional NCCP/HCP. More specifically, areas of the property which may show invasion by non-native forbs (e.g., mustards, etc.) should nonetheless be identified as non-native grassland vegetation and any impacts mitigated accordingly. Such areas should not be categorized as 'Disturbed' or ruderal unless there is strong documentation that the property had been subject to an authorized use which caused a truly disturbed condition of the vegetation.

   d) The DEIR should have a complete, recent, assessment of rare, threatened, and endangered, and other sensitive species onsite and within the area of potential effect, including California Species of Special Concern and California Fully Protected Species (Fish & G. Code, §§ 3511, 4700, 5050 and 5515). Species to be addressed should include all those which meet the CEQA definition of endangered, rare, or threatened species (CEQA Guidelines, § 15380). Seasonal variations in use of the Project area should also be addressed. Focused species-specific surveys, conducted at the appropriate time of year and time of day when the sensitive species are active or otherwise identifiable, are necessary. Acceptable species-specific survey procedures should be developed in consultation with CDFW and USFWS; and,

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

e) A recent, wildlife and rare plant survey. CDFW generally considers biological field assessments for wildlife to be valid for a one-year period, and assessments for rare plants may be considered valid for a period of up to three years as long as there was not a prevailing drought during the time of the botanical survey. Some aspects of the proposed Project may warrant periodic updated surveys for certain sensitive taxa, particularly if build out could occur over a protracted time frame, or in phases.

General Comments

1) County of Orange Central and Coastal Subregion Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) CDFW issued Natural Community Conservation Plan Approval and Take authorization for the County of Orange Central and Coastal Subregion NCCP/HCP (Central and Coastal NCCP/HCP) per section 2800, et seq., of the California Fish and Game Code on July 17, 1996. The Central and Coastal NCCP/HCP establishes a multiple species conservation program to minimize and mitigate habitat loss and provides for the incidental take of covered species in association with activities covered under the permit.

   Compliance with approved habitat plans, such as Central and Coastal (NCCP/HCP), is discussed in CEQA. Specifically, section 15125(d) of the CEQA Guidelines requires that the CEQA document discuss any inconsistencies between a proposed Project and applicable general plans and regional plans, including habitat conservation plans and natural community conservation plans. An assessment of the impacts to the Central and Coastal NCCP/HCP as a result of this Project is necessary to address CEQA requirements.

   The proposed Project occurs within the area and is subject to the provisions and policies of the Central and Coastal NCCP/HCP. To be considered a covered activity, Permittees need to demonstrate that proposed actions are consistent with the Central and Coastal NCCP/HCP and its associated Implementing Agreement.

2) Lake and Streambed: Santiago Creek is located just east of the Project site. Santiago Creek is a blueline stream which enters Irvine Lake and continues downstream to the dam flowing north to west, ultimately reaching the Santa Ana River. This Project will impact the watersheds surrounding Santiago Dam and Irvine Lake. CDFW has regulatory authority over activities in streams and/or lakes that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of any river, stream, or lake or use material from a river, stream, or lake. For any such activities, the Project applicant (or "entity") must provide written notification to CDFW pursuant to section 1600 et seq. of the Fish and Game Code. Based on this notification and other information, CDFW

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

determines whether a Lake and Streambed Alteration Agreement (LSAA) with the applicant is required prior to conducting the proposed activities. CDFW's issuance of an LSAA for a Project that is subject to CEQA will require CEQA compliance actions by CDFW as a Responsible Agency. To minimize additional requirements by CDFW pursuant to section 1600 et seq. and/or under CEQA, the DEIR should fully identify the potential impacts to the stream or riparian resources and provide adequate avoidance, mitigation, monitoring, and reporting commitments for issuance of the LSAA. CDFW recommends the Applicant submit a Lake and Streambed Alteration Notification to CDFW.

3) Mitigation and Avoidance of Project-Related Biological Impacts: The DEIR should include mitigation measures for adverse project-related impacts to sensitive plants, animals, and habitats. Mitigation measures should emphasize avoidance and reduction of project impacts. For unavoidable impacts, onsite habitat restoration or enhancement should be discussed in detail. If onsite mitigation is not feasible or would not be biologically viable and therefore not adequately mitigate the loss of biological functions and values, offsite mitigation through habitat creation and/or acquisition and preservation in perpetuity should be addressed.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a data base which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be found at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data
The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link:
http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist IRWD in identifying and mitigating Project impacts on biological resources and ensuring Project consistency with the requirement of County of Orange Central and Coastal Subregion NCCP/HCP.

Questions regarding this letter or further coordination regarding the implementation of the Central and Coastal NCCP/HCP should be directed to Emily Gray, Environmental Scientist, at Emily.Gray@wildlife.ca.gov.

Sincerely,

DocuSigned by:
David Mayer
D700B4520375406...

David Mayer
Environmental Program Manager
South Coast Region

ec:
Jonathan Snyder, U.S. Fish and Wildlife Service, Jonathan_Snyder@fws.gov
State Clearinghouse, Sacramento, state.clearinghouse@opr.ca.gov
Karen Drewe, CDFW, Karen.Drewe@wildlife.ca.gov
Jennifer Turner, CDFW, Jennifer.Turner@wildlife.ca.gov
Jennifer Ludovissy, CDFW, Jennifer.Ludovissy@wildlife.ca.gov

References

California Department of Fish and Wildlife. 2020. California Natural Diversity Database. Available from: https://wildlife.ca.gov/Data/CNDDB.

California Department of Fish and Wildlife. 2020. Lake and Streambed Alteration Program. Available from: https://wildlife.ca.gov/Conservation/LSA

County of Orange Central and Coastal Subregion Natural Community Conservation Plan/Habitat Conservation Plan. 17 July 1996.

DocuSign Envelope ID: 3AB6556C-251C-4170-A8CD-18F882A4E819

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service. FWS/OBS-79/31. Washington, DC.

December 19, 2024

Andy Uk
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

VIA EMAIL
uk@irwd.com

Subject: Air Quality and Greenhouse Gas Emissions Technical Memorandum for the Santiago Creek Dam Outlet and Spillway Improvements Project

Dear Mr. Uk:

This Letter Report presents the results of the air quality and greenhouse gas (GHG) emissions analyses for the proposed Santiago Creek Dam Outlet and Spillway Improvements Project in unincorporated Orange County, California (hereinafter referred to as the "Project"). This analysis addresses the potential air quality impacts associated with the Project in accordance with the California Environmental Quality Act (CEQA) (California Public Resources Code §21000 et seq.) and the State CEQA Guidelines (California Code of Regulations, Title 14, §15000 et seq.).

PROJECT SETTING AND DESCRIPTION

The proposed Project would include rehabilitation and replacement of the Santiago Creek Dam outlet works and spillway facilities, necessary to address identified seismic and dam safety concerns. The Project involves dewatering, demolition activities, and construction of inlet/outlet works, downstream outlet works, pipelines, ancillary site improvements, and utility relocation. The Project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in Unincorporated Orange County, California. The Project site location is shown on Exhibit 1-1 and 1-2, Regional Location and Aerial Photograph, and is described in more detail below.

AIR QUALITY ANALYSIS

The Project site is located in the Orange County portion of the South Coast Air Basin (SoCAB), and, for air quality regulation and permitting, is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SoCAB is a 6,600-square-mile area bound by the Pacific Ocean to the west; the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east; and the San Diego County line to the south. The SoCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The SoCAB's terrain and geographical location (i.e., a coastal plain with connecting broad valleys and low hills) determine its distinctive semi-arid climate, which is characterized by moderate temperatures, oceanic influence, and precipitation that is limited to a few storms during the winter (i.e., November through April).

Regulatory Background

Air quality in the SoCAB is regulated by the USEPA, CARB, and the SCAQMD. Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although USEPA regulations may not be superseded, both State and local regulations may be more stringent. The Southern California Association of Governments (SCAG) is an important partner to the SCAQMD and produces estimates of anticipated future growth and vehicular travel in the basin that are used for air quality planning. The federal, State, regional, and local regulations for CAPs and TACs are discussed below.

Federal

The Federal Clean Air Act (CAA) requires the adoption of National Ambient Air Quality Standards (NAAQS), which are periodically updated to protect the public health and welfare from the effects of air pollution. The USEPA is responsible for setting and enforcing the NAAQS for criteria pollutants. Primary standards set limits to protect public health, including the health of at-risk populations such as people with pre-existing heart or lung disease (such as asthmatics), children, and older adults. Secondary standards set limits to protect public welfare, including protection against visibility impairment as well as damage to animals, crops, vegetation, and buildings.

Current federal standards are set for Ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate of <10 microns (PM10), particulates of <2.5 microns (PM2.5), and lead. These pollutants are called criteria pollutants because the USEPA has established National Ambient Air Quality Standards (NAAQS) for the concentrations of these pollutants. CARB has also established standards for the criteria pollutants, known as California Ambient Air Quality Standards (CAAQS), and the State standards are generally more restrictive than the NAAQS. When a region has air quality that fails to meet the standards, the USEPA and the CARB designate the region as “nonattainment” and the regional air quality agency must develop plans to attain the standards. NAAQS are shown above in Table 1.

TABLE 1
CALIFORNIA AND FEDERAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary[a]	Secondary[b]
O_3	1 Hour	0.09 ppm (180 µg/m^3)	–	–
	8 Hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
PM10	24 Hour	50 µg/m^3	150 µg/m^3	Same as Primary
	AAM	20 µg/m^3	–	Same as Primary
PM2.5	24 Hour	–	35 µg/m^3	Same as Primary
	AAM	12 µg/m^3	12.0 µg/m^3	15.0 µg/m^3
CO	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	–
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
NO_2	AAM	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary
	1 Hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)	–
SO_2	24 Hour	0.04 ppm (105 µg/m^3)	–	–
	3 Hour	–	–	0.5 ppm (1,300 µg/m^3)
	1 Hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)	–
Lead	30-day Avg.	1.5 µg/m^3	–	–
	Calendar Quarter	–	1.5 µg/m^3	Same as Primary
	Rolling 3-month Avg.	–	0.15 µg/m^3	
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per km – visibility ≥ 10 miles (0.07 per km – ≥30 miles for Lake Tahoe)	**No Federal Standards**	
Sulfates	24 Hour	25 µg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m^3)		

O_3: ozone; ppm: parts per million; µg/m^3: micrograms per cubic meter; PM10: respirable particulate matter 10 microns or less in diameter; AAM: Annual Arithmetic Mean; –: No Standard; PM2.5: fine particulate matter 2.5 microns or less in diameter; CO: carbon monoxide; mg/m^3: milligrams per cubic meter; NO_2: nitrogen dioxide; SO_2: sulfur dioxide; km: kilometer.

[a] *National Primary Standards:* The levels of air quality necessary, within an adequate margin of safety, to protect the public health.

[b] *National Secondary Standards:* The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Note: More detailed information in the data presented in this table can be found at the CARB website (www.arb.ca.gov).

Source: CARB 2016

Specific geographic areas are classified as either “attainment” or “nonattainment” areas for each pollutant based upon the comparison of measured data with the NAAQS. Attainment areas have concentrations of the criteria pollutant that are below the NAAQS, and a Nonattainment classification indicates the criteria pollutant concentrations have exceeded the NAAQS. When an area has been reclassified from a nonattainment to an attainment area for a federal standard, the status is identified as “maintenance”, and there must be a plan and measures that will keep the region in attainment for the following ten years. Areas designated as nonattainment are required to prepare regional air quality plans, which set forth a strategy for bringing an area into compliance with the standards. These regional air quality plans, which are developed to meet federal requirements, are included in an overall program referred to as the State Implementation Plan (SIP).

State of California

CARB, a part of the California Environmental Protection Agency (CalEPA), has also established the California Ambient Air Quality Standards (CAAQS) shown in Table 1, which are generally more restrictive than the NAAQS. CARB conducts research; compiles emissions inventories; develops suggested control measures; provides oversight of local programs; and prepares the SIP. For regions that do not attain the CAAQS, CARB requires the air districts to prepare plans for attaining the standards. CARB establishes emissions standards for motor vehicles sold in California, consumer products (e.g., hair spray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

Based on monitored air pollutant concentrations, the USEPA and the CARB designate an area’s status in attaining the NAAQS and the CAAQS, respectively, for selected criteria pollutants. These attainment designations are shown in Table 2. As identified in Table 2, Orange County is a nonattainment area for O3, PM10, and PM2.5.

TABLE 2
ATTAINMENT STATUS OF CRITERIA POLLUTANTS
IN THE SOUTH COAST AIR BASIN

Pollutant	State	Federal
O_3 (1 hour)	Nonattainment	No standard
O_3 (8 hour)		Extreme Nonattainment
PM10	Nonattainment	Attainment/Maintenance
PM2.5	Nonattainment	Serious Nonattainment
CO	Attainment	Attainment/Maintenance
NO_2	Attainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Lead	Attainment	Attainment/Nonattainment*
All others	Attainment/Unclassified	No standards

O_3: ozone; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter; CO: carbon monoxide; NO_2: nitrogen dioxide; SO_2: sulfur dioxide; SoCAB: South Coast Air Basin.

* Los Angeles County is classified nonattainment for lead; the remainder of the SoCAB is in attainment of the State and federal standards.

Source: SCAQMD 2016

Regional

South Coast Air Quality Management District and Southern California Association of Governments

In the SoCAB, the SCAQMD is the agency responsible for protecting public health and welfare through the administration of federal and State air quality laws, regulations, and policies. Included in the SCAQMD's tasks are the monitoring of air pollution; the preparation of the Air Quality Management Plan (AQMP) for the SoCAB; and the promulgation of rules and regulations.

In the Project area, SCAG is the federally designated Metropolitan Planning Organization and the State-designated transportation planning agency for six counties: Riverside, San Bernardino, Los Angeles, Ventura, Imperial, and Orange. On June 5, 2020, SCAG's Regional Council adopted the 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy (Connect Socal). The RTP/SCS is a long-range visioning plan that balances future mobility and housing needs with economic, environmental, and public health goals. The RTP/SCS includes a strong commitment to reduce emissions from transportation sources in order to improve public health, to meet the NAAQS as set forth by the CAA.

The SCAQMD and SCAG are jointly responsible for formulating and implementing the AQMP for the SoCAB. SCAG's Regional Mobility Plan and Growth Management Plan form the basis for the land use and transportation control portion of the AQMP.

Air Quality Management Plan

Air quality in Orange County is partially regulated by the SCAQMD, which is the agency principally responsible for comprehensive air pollution control in the SoCAB. The SCAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary. The SCAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources.

The Federal CAA requires the preparation of plans to demonstrate attainment of the NAAQS for which an area is designated as being in nonattainment. Furthermore, the CAA requires the revision of these plans every three years to address reducing pollutant concentrations that exceed the CAAQS. The SCAQMD and SCAG, in coordination with local governments and the private sector, develop the Air Quality Management Plan (AQMP) for the SoCAB to satisfy these requirements. The AQMP is the most important air management document for the SoCAB because it provides the blueprint for meeting State and federal ambient air quality standards.

The current regional plan applicable to the Project is the SCAQMD's 2022 AQMP. The SCAQMD is responsible for ensuring that the SoCAB meets the NAAQS and CAAQS by reducing emissions from stationary (area and point), mobile, and indirect sources. To accomplish this goal, the SCAQMD prepares AQMPs in conjunction with the SCAG, County transportation commissions, and local governments; develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary.

The 2022 AQMP was adopted on December 2, 2022, by the SCAQMD Governing Board. The 2022 AQMP evaluates integrated strategies and measures to meet the following NAAQS (SCAQMD 2022):

- 8-hour O_3 target of 80 parts per billion (ppb) by 2024, 75 ppb by 2032, 70 ppb by 2038;
- Annual PM2.5 (12 micrograms per cubic meter [$\mu g/m^3$]) by 2025;

- 1-hour O_3 (120 ppb) by 2023; and
- 24-hour PM2.5 (35 µg/m^3) by 2023.

South Coast Air Quality Management District Rules

The Project will be required to comply with existing SCAQMD rules for the reduction of fugitive dust and criteria pollutant emissions. The following rules are most relevant to the proposed Project:

SCAQMD Rule 201 requires a "Permit to Construct" prior to the installation of any equipment "the use of which may cause the issuance of air contaminants . . ." and Regulation II provides the requirements for the application for a Permit to Construct. Rule 203 similarly requires a Permit to Operate. Rule 219, Equipment not Requiring a Written Permit Pursuant to Regulation II, identifies "equipment, processes, or operations that emit small amounts of contaminants that shall not require written permits . . ."

SCAQMD Rule 402, Nuisance, states that a project shall not "discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property".

SCAQMD Rule 403, Fugitive Dust, requires actions to prevent, reduce, or mitigate fugitive particulate matter emissions. These actions include applying water or chemical stabilizers to disturbed soils; managing haul road dust by applying water; covering all haul vehicles before transporting materials; restricting vehicle speeds on unpaved roads to 15 miles per hour (mph); and sweeping loose dirt from paved site access roadways used by construction vehicles. In addition, Rule 403 requires that vegetative ground cover be established on disturbance areas that are inactive within 30 days after active operations have ceased. Alternatively, an application of dust suppressants can be applied in sufficient quantity and frequency to maintain a stable surface. Rule 403 also requires grading and excavation activities to cease when winds exceed 25 mph.

SCAQMD Rule 1113 governs the sale of architectural coatings and limits the VOC content in paints and paint solvents. Although this rule does not directly apply to the Project, it does dictate the VOC content of paints available for use during building construction.

Local

Unincorporated Orange County

There are no County regulations applicable to the Project's potential impacts on air quality. However, the Orange County General Plan addresses air quality in the unincorporated territory where the Project takes place. Within its Transportation Element, updated in 2020, the General Plan states that it is responsive to the Air Quality Management District (AQMD) objectives, and regional planning objectives of the Southern California Association of Governments (SCAG).[1] Similarly, the Land Use Element notes that "the purpose of the Enhancement of Environment Policy is to ensure that all land use activities seek to enhance the physical environment, including the air, water, sound levels, landscape, and plant and animal

[1] Orange County General Plan, Transportation Element Update 2020. Accessed June 2023, https://ocds.ocpublicworks.com/sites/ocpwocds/files/2020-12/Chapter%20IV-%20Transportation%202020.pdf

life."[2] The Resources Element (2013) has the most robust discussion on air quality affecting the area. It advances the goal to promote optimum sustainable environmental standards for air resources with an explicit policy to develop and support programs which improve air quality or reduce air pollutant emissions.[3] The Project is consistent with these General Plan goals, plans, and objectives to enhance the physical environment including air and water in Orange County.

Pollutants

The U.S. Environmental Protection Agency (USEPA) defines seven "criteria" air pollutants: SO_2, CO, NO_2, O_3, PM_{10}, $PM_{2.5}$, and lead. The characteristics and health effects of these criteria pollutants are described below:

Ozone (O_3)

O_3 is a secondary pollutant; it is not directly emitted. O_3 is formed by chemical reactions between VOCs (also referred to as reactive organic gasses [ROGs]) and NOx, which occur only in the presence of bright sunlight. VOC/ROG emissions are generally unburned hydrocarbons that are a result of motor vehicle travel and other combustion sources. Nitrogen oxides are also a result of the combustion process, most notably due to the operation of motor vehicles. Sunlight and hot weather cause ground-level $O_3$to form. (Not to be confused with the "ozone layer" which occurs very high in the atmosphere and shields the planet from some ultraviolet [UV] rays.) As a result, O_3 is known as a summertime air pollutant. Ground-level ozone is the primary constituent of smog. Because ground-level ozone is formed in the atmosphere, high concentrations can occur in areas well away from sources of its constituent pollutants.

People with lung disease, children, older adults, and people who are active are the most sensitive when O_3 levels are unhealthy. Numerous scientific studies have linked ground-level O_3 exposure to a variety of health problems, including:

- lung irritation that can cause inflammation much like a sunburn;
- wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities;
- permanent lung damage to those with repeated exposure to O_3 pollution; and
- aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.

Ground-level O_3 can also have detrimental effects on plants and ecosystems. These effects include:

- interfering with the ability of sensitive plants to produce and store food, making them more susceptible to certain diseases, insects, other pollutants, competition, and harsh weather;
- damaging the leaves of trees and other plants, negatively impacting the appearance of urban vegetation, national parks, and recreation areas; and

---

[2] Orange County General Plan, Land Use Element 2022. Accessed June 2023, https://ocds.ocpublicworks.com/sites/ocpwocds/files/2022-10/Adopted%20Land%20Use%20Element%20Amendment%20-%20Sept%202022.pdf

[3] Orange County, General Plan, Resources Element 2013. Accessed June 2013, https://ocds.ocpublicworks.com/sites/ocpwocds/files/import/data/files/40235.pdf

- reducing crop yields and forest growth, potentially impacting species diversity in ecosystems.

Currently, the SoCAB is designated as a "Nonattainment Area" for the State and federal O_3 standards.

Particulate Matter (PM_{10}, $PM_{2.5}$, and UFP)

Particulate matter includes both aerosols and solid particles of a wide range of size and composition. Of particular concern are inhalable particulate matter, which are those particles equal to or smaller than 10 microns in size (PM_{10}); fine particulate matter, which are particles smaller than or equal to 2.5 microns ($PM_{2.5}$); and ultrafine particulate matter (UFP), which are particles less than 0.1 micron. The size of the particulate matter refers to the aerodynamic diameter of the particulate. Smaller particulates are of greater concern because they can penetrate deeper into the lungs than large particles. $PM_{2.5}$ is directly emitted in combustion exhaust and fugitive dust and is formed from atmospheric reactions between various gaseous pollutants, including NOx, SOx, and VOCs. PM_{10} is directly emitted as a result of mechanical processes that crush or grind larger particles or from the re-suspension of dusts most typically through construction activities and vehicular travels. $PM_{2.5}$ and PM_{10} can remain suspended in the atmosphere for days and/or weeks and can be transported long distances. Ultrafine particles are the smallest particles and are good indicators of any kind of fuel burning, from diesel engines to refinery operations.

The principal health effects of airborne particulate matter are on the respiratory and cardiac systems. According to the USEPA, some people are more sensitive than others to breathing fine particles (USEPA 2023). People with influenza, chronic respiratory and cardiovascular diseases, and the elderly may suffer worsening illness and premature death due to breathing these fine particles. People with bronchitis can expect aggravated symptoms from breathing in fine particles. Children may experience decline in lung function due to breathing in PM_{10} and $PM_{2.5}$. Other groups considered sensitive are smokers and people who cannot breathe well through their noses. Exercising athletes are also considered sensitive, because many breathe through their mouths. However, all people exposed to elevated levels of particulate matter may experience temporary health effects (USEPA 2016a).

Short-term exposure to high $PM_{2.5}$ levels is associated with premature mortality and increased hospital admissions and emergency room visits. Long-term exposure to high $PM_{2.5}$ levels is associated with premature mortality and development of chronic respiratory disease. Short-term exposure to high PM_{10} levels is associated with hospital admissions for cardiopulmonary diseases, increased respiratory symptoms, and possible premature mortality. There are national and State 24-hour PM_{10} standards, but there is no annual long-term standard. With respect to long-term PM_{10} health effects, the USEPA concluded in a 2006 standards review that analysis of air quality data showed that the 24-hour PM_{10} standard generally resulted in annual average PM_{10} levels at or below the annual standard of 50 $\mu g/m^3$ and that available evidence did not suggest an association between long-term exposure to PM_{10} at 2006 ambient levels and health problems. Based on this conclusion, the national PM_{10} annual standard was revoked (USEPA 2006). However, California maintains an annual PM_{10} standard.

No federal or State standards have been established for UFP. Currently, PM_{10} levels in the SoCAB is designated as "Nonattainment areas" for State standards and "Attainment/Maintenance areas" for federal standards. $PM_{2.5}$ levels in the SoCAB are designated as "Nonattainment areas" for State and federal standards.

Carbon Monoxide (CO)

CO is a colorless and odorless gas which, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. CO combines with hemoglobin in the

bloodstream and reduces the amount of oxygen that can be circulated through the body. High CO concentrations can lead to headaches, aggravation of cardiovascular disease, and impairment of central nervous system functions. Carbon monoxide concentrations can vary greatly over comparatively short distances. Relatively high concentrations are typically found near crowded intersections; along heavily used roadways carrying slow moving traffic; and at or near ground level. Even under the most severe meteorological and traffic conditions, high CO concentrations are limited to locations within a relatively short distance (i.e., up to 600 feet or 185 meters) of heavily traveled roadways. Overall, CO emissions are decreasing as a result of the Federal Motor Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973.

Currently, CO levels in the SoCAB are in attainment for State and federal one-hour and eight-hour standards.

Nitrogen Dioxide (NO2)

Nitrogen gas, normally relatively inert (unreactive), comprises about 80 percent of the air. At high temperatures (i.e., in the combustion process) and under certain other conditions it can combine with oxygen to form several different gaseous compounds collectively called nitrogen oxides (NOx). NO is converted to NO_2, a red-brown pungent gas, in the atmosphere. Motor vehicle emissions are the main source of NOx in urban areas.

NO_2 is toxic to various animals and to humans. Its toxicity relates to its ability to form nitric acid with water in the eye, lung, mucus membrane, and skin. In animals, long-term exposure to NOx increases susceptibility to respiratory infections lowering their resistance to such diseases as pneumonia and influenza. Laboratory studies show susceptible humans, such as asthmatics, exposed to high concentrations of NO_2 can suffer lung irritation and, potentially, lung damage. Epidemiological studies have also shown associations between NO_2 concentrations and daily mortality from respiratory and cardiovascular causes and with hospital admissions for respiratory conditions.

NOx is primarily a combination of NO and NO_2. While the NAAQS and CAAQS only address NO_2, the total group of nitrogen oxides is of concern. NO and NO_2 are both precursors in the formation of O_3 and $PM_{2.5}$. Because of this and the fact that NO emissions largely convert to NO_2, NOx emissions are typically examined when assessing potential air quality impacts. Currently, NO_2 levels in the SoCAB are in attainment for State and federal standards.

Sulfur Dioxide (SO2)

Sulfur oxides (SOx) constitute a class of compounds of which SO_2 and sulfur trioxide (SO_3) are included. Ninety-five percent of pollution-related SOx emissions are in the form of SO_2. SOx emissions are typically examined when assessing potential air quality impacts of SO_2. Combustion of fossil fuels for generation of electric power is the primary contributor of SOx emissions. Industrial processes, such as nonferrous metal smelting, also contribute to SOx emissions. SOx is also formed during combustion of motor fuels. However, most of the sulfur has been removed from fuels, greatly reducing SOx emissions from vehicles.

SO_2 combines easily with water vapor, forming aerosols of sulfurous acid (H_2SO_3), a colorless, mildly corrosive liquid. This liquid may then combine with oxygen in the air, forming the even more irritating and corrosive sulfuric acid (H_2SO_4). Peak levels of SO_2 in the air can cause temporary breathing difficulty for people with asthma who are active outdoors. Longer-term exposures to high levels of SO_2 gas and particles cause respiratory illness and aggravate existing heart disease. SO_2 reacts with other chemicals in

the air to form tiny sulfate particles which are measured as $PM_{2.5}$. SO_2 is monitored at several sites in the SoCAB and is in attainment for the State and federal SO_2 standards.

Lead

Lead is a stable compound, which persists and accumulates both in the environment and in animals. In humans, it affects the blood-forming (or hematopoietic), the nervous, and the renal systems. In addition, lead has been shown to affect the normal functions of the reproductive, endocrine, hepatic, cardiovascular, immunological, and gastrointestinal systems, although there is significant individual variability in response to lead exposure. Since 1975, lead emissions have been in decline due in part to the introduction of catalyst-equipped vehicles and the decline in production of leaded gasoline. In general, an analysis of lead is limited to projects that emit significant quantities of the pollutant (e.g., lead smelters, battery manufacturers, and battery recyclers) and are not undertaken for transportation, residential, or commercial development projects. The SoCAB is in attainment for the State lead standard. The Los Angeles County portion of the SoCAB is classified nonattainment for the federal lead standard. Orange County is in attainment for the federal standard.

Visibility Reducing Particles

Visibility reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consist of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt. The State standard is intended to limit the frequency and severity of visibility impairment due to regional haze. The SoCAB is “unclassified” for this pollutant. There are no federal standards for visibility reducing particulates.

Sulfates (SO_4)

Sulfates (SO_4) are the fully oxidized ionic form of sulfur. SO_4 occurs in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to SO_4 takes place comparatively rapidly and completely in California urban areas due to regional meteorological features.

The CARB’s SO_4 standard is designed to prevent aggravation of respiratory symptoms. Effects of SO_4 exposure at levels above the standard include a decrease in respiratory function; aggravation of asthmatic symptoms; and an increased risk of cardiopulmonary disease. SO_4 is particularly effective in degrading visibility and, due to fact that it is usually acidic, can harm ecosystems and damage materials and property. The SoCAB is in attainment for the State SO_4 standard.

Hydrogen Sulfide (H_2S)

H_2S is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. It can also be present in sewer gas and some natural gas, and it can be emitted as the result of geothermal energy exploitation. Breathing H_2S at levels above the standard will result in exposure to a very disagreeable odor. In 1984, a CARB committee concluded that the ambient standard for H_2S is adequate to protect public health and to significantly reduce odor annoyance (CARB 2009). The SoCAB is “unclassified” for this pollutant.

Vinyl Chloride (Chloroethene)

Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.

Short-term exposure to high levels of vinyl chloride in air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Long-term exposure to vinyl chloride through inhalation and oral exposure causes liver damage. Cancer is a major concern from exposure to vinyl chloride via inhalation. Vinyl chloride exposure has been shown to increase the risk of angiosarcoma, a rare form of liver cancer in humans. Vinyl chloride is not routinely measured in the SoCAB. California has a vinyl chloride standard, but there is no corresponding federal standard.

Toxic Air Contaminants

In addition to criteria air pollutants, toxic air contaminants (TACs) emitted from mobile and stationary sources must be taken into consideration for projects proposing new sources of TAC emissions. TACs are those pollutants that are known or suspected to cause cancer or other serious health effects (e.g., reproductive effects or birth defects) or adverse environmental effects.

Installation and operation of stationary equipment that emit TACs generally require permits from the applicable air district, and a Health Risk Assessment (HRA) of TAC emissions may be a requirement under the permitting process. Land uses that would result in a long-term increase in mobile TAC emissions (e.g., distribution centers with diesel emissions from delivery trucks) also may require the preparation of an HRA. The HRA evaluates the risks posed to sensitive receptors (e.g., residents, schools, hospitals, and parks) in the vicinity of proposed TAC source(s) and must not exceed significance thresholds. Significance thresholds have been established in terms of cancer risk and hazard index.

Carcinogenic risks (i.e., cancer risks) are estimated as the incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a probability (e.g., 10 in 1 million). Hazard indices (HIs) express the potential for chemicals to result in non-cancer health impacts, and non-carcinogenic chemicals should not be present at levels expected to cause adverse health effects (i.e., HI greater than one). HIs are expressed using decimal notation (e.g., 0.001). If there is a reference exposure level of greater than 1, then impacts would be considered potentially significant. The National Contingency Plan (NCP, in accordance with *Code of Federal Regulations* [CFR], Title 40, Part 300) is commonly cited as the basis for target risk and hazard levels. According to the NCP, lifetime incremental cancer risks posed by a site should not exceed the range of between 1 in 1 million and 100 in 1 million.

Diesel Particulate Matter

Diesel particulate matter (DPM) is part of a complex mixture that makes up diesel exhaust emitted from a broad range of diesel engines, including on-road diesel engines of trucks, buses, and cars and the off-road road diesel engines that include locomotives, marine vessels, and heavy-duty equipment. Diesel exhaust is composed of gas and particles. The gas phase is composed of many urban hazardous air pollutants, such as acetaldehyde, benzene, and formaldehyde. The particle phase includes categories of fine and ultra-fine particles that, when inhaled, can cause immunological effects including lung inflammation and cellular changes in the lung. Human epidemiological studies demonstrate an association between diesel exhaust exposure and increased lung cancer rates in occupational settings. In 1998, the California Office of

Environmental Health Hazards (OEHHA) listed diesel PM as a TAC based on its potential to cause cancer and other adverse health effects. Under California regulatory guidelines, diesel exhaust, as a mixture, is identified as a known carcinogen.

Methodology

California Emission Estimator Model

Proposed Project emissions were calculated by using California Emissions Estimator Model (CalEEMod) version 2022.1.1.20 (CAPCOA 2023). CalEEMod is a computer program accepted by the SCAQMD that can be used to estimate criteria pollutant and GHG emissions associated with land development projects in California. CalEEMod has separate databases for specific Counties and air districts. The Orange County database was used for the Project. The model calculates emissions of CO, SO_2, PM_{10}, $PM_{2.5}$, and the O_3 precursors VOC and NOx. For this analysis, the results are expressed in pounds per day (lbs/day) and are compared with the SCAQMD mass daily thresholds to determine impact significance.

Specific inputs to CalEEMod include land uses and acreages. Construction input data include, but are not limited to, (1) the anticipated start and finish dates of each Project construction activity (e.g., grading, building, and paving); (2) inventories of construction equipment to be used during each Project activity; (3) areas to be excavated and graded for development; (4) volumes of materials to be imported to and exported from the Project site; (5) areas to be paved; and (6) areas to be painted. The input data and assumptions are discussed in Section 4.2.6 below and are shown in notes on the CalEEMod data in Attachment A. The CalEEMod has the capability to calculate reductions in construction emissions from the effects of dust control, off-road diesel-engine classifications, low-emission paints, and other selected measures.

Due to the lack of changes in operations between the existing dam and conditions under the dam improvements, operations phase emissions have been addressed qualitatively.

Local Concentrations of Criteria Pollutants from On-Site Sources

As part of the SCAQMD's environmental justice program, attention has focused on localized effects of air quality and the exposure of persons to criteria pollutants generated on a project site. The SCAQMD developed localized significance threshold (LST) methodology and mass rate look-up tables that public agencies can use to determine whether or not a project may generate significant adverse localized air quality impacts. In addition to the mass daily emissions for regional thresholds, the SCAQMD established California Environmental Quality Act (CEQA) significance thresholds for ambient air quality to address localized impacts. The localized impact analysis is based on the concentration of a pollutant at a receptor site. The concentration standard is either the same as the NAAQS or CAAQS or is based upon a health-based standard. It is possible for a pollutant to have a significant impact regionally and a less than significant impact locally or vice versa. It is also possible for both impacts (i.e., regional and local) to be significant or less than significant. The look-up tables allow the evaluation of impacts without the complex task of dispersion modeling.

The analysis is not performed for operations because there would be no substantial on-site stationary sources of criteria pollutants with the proposed Project. The LST methodology translates the concentration standards into emissions thresholds.

The LST methodology addresses NO_2, CO, PM_{10}, and $PM_{2.5}$ emissions. SO_2 and lead are not included because these pollutants are generated in very small amounts in development projects. Ozone is not

included because it is a secondary pollutant and local concentrations cannot be estimated from precursor emissions. For NO_2 and CO, the one-hour standards are used and receptors that could be exposed for one hour are considered. For PM_{10} and $PM_{2.5}$, the 24-hour standards are used and the receptors of interest are those where persons could be exposed for 24 hours, such as residences. Because emissions are based on the AAQS, exceedance of the LST represents a potential health impact. As noted above, even if a standard is exceeded, the potential impact can be confirmed or found to be less than significant by a more detailed analysis.

Sensitive Air Quality Receptors

Sensitive receptors include, but are not limited to, children, the elderly, persons with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. These sensitive receptors include, but are not limited to, schools, athletic facilities, hospitals, residential areas, parks, and convalescent homes. The Project site is located in a remote area with the nearest residential land uses located approximately 9500 feet to the west. There are nearby parks which include Oak Canyon Park, Irvine Regional Park, and Irvine Lake Park.

Existing Air Quality Conditions

Air quality data for the Project site is represented by the Saddleback Valley monitoring station located in Lake Forest. Pollutants measured at the Saddleback Valley Monitoring Station include Carbon monoxide (CO), ozone (O_3), respirable particulate matter with a diameter of 10 microns or less (PM10), fine particulate matter with a diameter of 2.5 microns or less (PM2.5) and Nitrogen dioxide (NO_2). The monitoring data presented in Table 3, Air Quality Levels Measured at the Saddleback Valley Monitoring Station, were obtained from the CARB and SCAQMD. Federal and State air quality standards are presented with the number of times those standards were exceeded.

TABLE 3
AIR QUALITY LEVELS MEASURED AT THE
SADDLEBACK VALLEY MONITORING STATION

Pollutant	California Standard	National Standard	Year	Max. Level	Days State Standard Exceeded	Days National Standard Exceeded
O_3 (1 hour)	0.09 ppm	None	2019[a]	0.106	3	—
			2020[a]	0.171	20	—
			2021[a]	0.105	2	—
			2022[b]	0.110	1	—
O_3 (8 hour)	0.070 ppm	0.070 ppm	2019[a]	0.087	11	11
			2020[a]	0.122	32	32
			2021[a]	0.081	8	8
			2022[b]	0.074	5	5
CO (1 hour)	20 ppm	35 ppm	2019[a]	1.0	0	0
			2020[a]	1.7	0	0
			2021[a]	0.8	0	0
CO (8 hour)	9 ppm	9 ppm	2019[a]	0.8	0	0
			2020[a]	0.8	0	0
			2021[a]	1.0	0	0
PM10 (24 hour)	50 µg/m^3	150 µg/m^3	2019[a]	45	0	0
			2020[a]	53	0	1
			2021[a]	35	0	0
			2022[b]	31	0	0
PM10 (AAM)	20 µg/m^3	None	2019[a]	16.6	0	0
			2020[a]	16.8	0	0
			2021[a]	15.6	0	0
			2022[b]	12.7	0	0
NO_2 (1 Hour)	0.18 ppm	0.100 ppm	2019[a]	—	—	—
			2020[a]	—	—	—
			2021[a]	—	—	—
PM2.5 (24 Hour)	None	35 µg/m^3	2019[a]	20.8	—	0
			2020[a]	35	—	0
			2021[a]	28.7	—	0
			2022[b]	22.6	—	—

—: Data Not Reported or insufficient data available to determine the value; O_3: ozone; ppm: parts per million; PM10: respirable particulate matter with a diameter of 10 microns or less; µg/m^3: micrograms per cubic meter; AAM: Annual Arithmetic Mean; NO_2: nitrogen dioxide; PM2.5: fine particulate matter with a diameter of 2.5 microns or less. N/A indicates that there is no applicable standard.

[a] Data from the SCAQMD.

[b] Data from the CARB.

Source: CARB 2022. SCAQMD 2021.

The monitoring data shows that O_3 is the air pollutant of primary concern in the Project area. At the monitoring station, the State 1-hour O_3 standards was exceeded 2-20 days between 2020-2022 The state and federal O_3 8-hour standards were also exceeded 8-32 days for the same time period. O_3 is a secondary pollutant and is not directly emitted from a source; it occurs as the result of photochemical reactions from ozone precursors, which include VOCs and NO_2 and sunlight.

Air Quality Impact Analysis

Thresholds of Significance

The SCAQMD's Air Quality Analysis Handbook (CEQA Handbook) provides significance thresholds for both construction and operation of projects within the SCAQMD's jurisdictional boundaries (SCAQMD 2023). The SCAQMD recommends that projects be evaluated in terms of the quantitative thresholds established to assess both the regional and localized impacts of project-related air pollutant emissions. The County of Orange uses the current SCAQMD thresholds to determine whether a proposed project would have a significant impact. These SCAQMD thresholds are identified in Table 4. The following questions correspond to the questions in the Air Quality section of the Initial Study Checklist in Appendix G of the State CEQA Guidelines.

TABLE 4
SOUTH COAST AIR QUALITY MANAGEMENT
DISTRICT AIR QUALITY SIGNIFICANCE THRESHOLDS

Mass Daily Thresholds (lbs/day)		
Pollutant	**Construction**	**Operation**
VOC	75	55
NOx	100	55
CO	550	550
PM10	150	150
PM2.5	55	55
SOx	150	150
Lead	3	3

lbs/day: pounds per day; VOC: volatile organic compound; NOx: nitrogen oxides; CO: carbon monoxide; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter; SOx: sulfur oxides.

Source: SCAQMD 2023.

The following questions correspond to the questions in the Air Quality section of the Initial Study Checklist in Appendix G of the State CEQA Guidelines.

Question AQ-1 Would the Project conflict with or obstruct implementation of the applicable air quality plan?

Significant and Unavoidable Impact. The SCAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary. It is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources and has prepared an Air Quality

Management Plans (AQMP) that establishes a program of rules and regulations directed at attaining the NAAQS and CAAQS. As discussed previously, the current regional plan applicable to the Project is the SCAQMD's 2022 AQMP.

The main purpose of an AQMP is to bring an area into compliance with the requirements of federal and State air quality standards. For a project to be consistent with the AQMP, the pollutants emitted from the project should not (1) exceed the SCAQMD CEQA air quality significance thresholds or (2) conflict with or exceed the assumptions in the AQMP. As shown in Threshold AQ-2 below, pollutant emissions from the proposed Project would exceed the SCAQMD thresholds and would result in a significant impact even with the implementation of mitigation measures and SCAQMD regulatory requirements. The General Plan designates the Project site as Open Space (5) (County of Orange 2022); additionally, the Project site falls within an Open Space Reserve (OSR) overlay. The Open Space (5) designation indicates the current and near-term use of the land, while the OSR overlay identifies lands of scenic and natural attraction, and areas of ecological, cultural, historical and recreational significance that are permanently preserved as and restricted to open space and compatible uses (County of Orange 2022). The County's General Plan allows for the development of water resource areas within these designations; moreover, the proposed is consistent with existing uses at the Project site. As such, the Project is consistent with the Zoning and Land Use designation of the County's General Plan General Plans of cities and counties within the SoCAB are used to determine the regional emissions of the Basin, emissions related to the development of the Project site is therefore consistent with the growth expectations for the region. While the operations phase of the Project is consistent with the AQMP, construction emissions associated with the Project would exceed the SCAQMD's significance thresholds despite the implementation of MM AQ-1. As such, the Project's construction activities would conflict with the 2022 AQMP's goal of reducing criteria pollutant emissions. Consequently, the Project would in a temporary unavoidable significant impact related to consistency with the AQMP.

Question AQ-2 Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in non-attainment under an applicable federal or State ambient air quality standard?

Significant and Unavoidable Impact. A project may have a significant impact where project-related emissions would exceed federal, State, or regional standards or thresholds, or where project-related emissions would substantially contribute to an existing or projected air quality violation. As identified in Table 2, Orange County is a nonattainment area for O_3, PM10, and PM2.5. The Project would generate PM10, PM2.5, NO_2, and O_3 precursors (NOx and VOC) during short-term construction and long-term operations. The SCAQMD has developed construction and operations thresholds to determine whether projects would considerably contribute toward a violation of ambient air quality standards. A project with daily emission rates below the SCAQMD's established air quality significance thresholds (shown previously in Table 4) would have a less than significant effect on regional air quality. Project emissions were estimated using the CalEEMod. CalEEMod is designed to model construction and operational emissions for land development projects and allows for the input of project- and county-specific information. CalEEMod modeling results can be found in Attachment A.

Construction Emissions

Air pollutant emissions would occur from construction equipment exhaust, grading; exhaust and particulate emissions from trucks hauling building materials to and from the Project site; from automobiles and light trucks driven to and from the Project site by construction workers; and VOCs from minor painting and asphalt paving operations. The proposed Project would comply with applicable SCAQMD rules and regulations, including Rule 403 for fugitive dust control and Rule 1113 for architectural coatings. Rule

403 measures include regular watering of active grading areas and unpaved roads, limiting vehicle speeds on unpaved surfaces, stabilizing stockpiled earth, and curtailing grading operations during high wind conditions. Watering of active grading areas is included in the CalEEMod emissions analysis and results in reduced PM10 and PM2.5 emissions. The emission reductions associated with compliance with Rule 403 have been included in the emissions calculations.

Regional Emissions Thresholds – Maximum Daily Regional Emissions

Project construction activities are those associated with the development of the Project components. Table 5, presents the estimated unmitigated maximum daily emissions during construction of the Project and compares the estimated emissions with the SCAQMD's daily regional emission thresholds.

TABLE 5
UNMITIGATED PROJECT MAXIMUM DAILY REGIONAL CONSTRUCTION EMISSIONS

Year	Emissions (lbs./day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
Summer						
2024	5	49	43	<1	5	2
2025	241	468	573	1	68	35
2026	46	374	433	1	52	32
Winter						
2024	23	205	179	1	21	13
2025	55	472	501	1	56	35
2026	34	280	349	1	37	19
2027	7	59	56	<1	31	15
Maximum Project (2024-2027)	**241**	**472**	**573**	**1**	**68**	**35**
SCAQMD Thresholds (Table 4)	*75*	*100*	*550*	*150*	*150*	*55*
Exceeds SCAQMD Thresholds?	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**

lbs./day: pounds per day; VOC: volatile organic compound; NOx: nitrogen oxides; CO: carbon monoxide; SOx: sulfur oxides; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter; SCAQMD: South Coast Air Quality Management District

Source: SCAQMD 2019 (thresholds); see Attachment B for CalEEMod model outputs.

As shown in Table 5, Project related construction emissions of VOC, NOx, and CO would exceed the SCAQMD's significance thresholds and would result in a significant impact to regional air quality prior to the implementation of mitigation measures.

The Project would implement **MM AQ-1** which requires use of Tier 4 offroad construction engines to minimize emissions during the development of the Project. Table 6 shows the emissions with the use of cleaner engines required under **MM AQ-1.**

TABLE 6
MITIGATED PROJECT MAXIMUM DAILY REGIONAL CONSTRUCTION EMISSIONS

Year	Emissions (lbs./day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
Summer						
2024	2	22	69	<1	4	1
2025	221	147	749	1	61	25
2026	16	112	617	1	41	21
Winter						
2024	6	46	293	1	15	7
2025	19	137	733	1	44	22
2026	14	87	560	1	35	17
2027	2	9	76	<1	29	13
Maximum Project (2024-2027)	**221**	**147**	**749**	**1**	**61**	**25**
SCAQMD Thresholds (Table 4)	*75*	*100*	*550*	*150*	*150*	*55*
Exceeds SCAQMD Thresholds?	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**

lbs./day: pounds per day; VOC: volatile organic compound; NOx: nitrogen oxides; CO: carbon monoxide; SOx: sulfur oxides; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter; SCAQMD: South Coast Air Quality Management District

Source: SCAQMD 2019 (thresholds); see Attachment B for CalEEMod model outputs.

As shown in Table 6, after implementation of **MM AQ-1**, Project construction would continue to exceed the established thresholds for VOC, CO, and NOx for Maximum Daily Regional Construction Emissions. Additionally, as shown in Table 6, implementation of **MM AQ**-1 requiring use of Tier 4 offroad engine standards may result in higher CO emissions than for equipment with other engine standards. While CO emissions are higher with implementation of **MM AQ-1**, VOCs and NOx would be reduced. VOCs and NOx contribute to ozone (smog) which has more health/environmental implications than CO; additionally, the region is in a state of attainment for CO pursuant to the ambient air quality standards. Therefore **MM AQ-1** would reduce overall impacts associated with this threshold. Because the Project would exceed the SCAQMD's construction emissions thresholds despite implementation of mitigation, construction emissions would be cumulatively considerable, and the impact would be significant and unavoidable.

Operational Emissions

The Project involves improvements to existing dam infrastructure and would not result in substantial increases in air pollutant sources such as vehicular or energy consumption. Existing operations related to dam inspection and maintenance activities would be comparable to that which would occur under the Proposed Project; no new vehicle trips associated with regular maintenance and operations beyond existing conditions are assumed. As such, air pollutant emissions would likewise be essentially the same and due to the minimal amount of vehicular and energy usage, the Project's operational phase would not result in an exceedance of the SCAQMD's operations phase thresholds and would not result in a significant impact related to operations phase emissions contributions to regional air quality.

Cumulative Impacts

The SCAQMD, in their White Paper on Regulatory Options for Addressing Cumulative Impacts from Air Pollution Emissions (presented to the Board on September 5, 2003), identifies that impacts that are less than significant on a Project level are also considered to be less than significant on a cumulative basis. The AQMD uses the same significance thresholds for project-specific and cumulative impacts analyzed in an Environmental Assessment or Environmental Impact Report, except for the Hazard Index for toxic air contaminant emissions (SCAQMD 2003). Any projects that are found to result in less than significant impacts on a project level are not considered to be cumulatively considerable and consequently would not result in a considerable contribution to cumulative impacts. After implementation of **MM AQ-1**, Project construction would result in significant construction-related regional air quality impacts, as quantified above in Tables 5 and 6 respectively. Since the SCAQMD recommends that a project's potential contribution to cumulative impacts be assessed utilizing the same significance criteria as those for project-specific impacts, the Project's unavoidable significant air quality impacts related to construction would likewise be cumulatively considerable.

Question AQ-3 Would the Project result in exposure of sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact. Exposure of sensitive receptors is addressed for the following situations: CO hotspots; criteria pollutants from on-site construction; and TACs from on-site construction.

Carbon Monoxide Hotspot

A CO hotspot is an area of elevated CO concentrations that is caused by severe vehicle congestion on major roadways, typically near intersections. If a project substantially increases average delay at signalized intersections that are operating at Level of Service (LOS) E or F or causes an intersection that would operate at LOS D or better without the Project to operate at LOS E or F with the Project, there is a potential for a CO hotspot. As such, a CO hotspot is an area of localized CO pollution caused by severe vehicle congestion on major roadways, typically near intersections. The Project would not result in a substantial change in vehicle trips associated with the operation of the dam infrastructure. Existing operations of the dam involves minimal amounts of vehicle trips associated with maintenance and inspection operations which does not substantially result in local traffic congestion. Therefore, the proposed Project would not increase congestion or result in a significant impact related to CO hotspots.

Criteria Pollutants from On-Site Construction

In addition to the mass daily emissions thresholds, the SCAQMD has developed localized significance thresholds (LSTs) to evaluate short-term localized impacts to nearby sensitive receptors from on-site emissions of NO_2, CO, PM_{10}, and $PM_{2.5}$. LSTs represent the maximum emissions that can be generated at a project site without expecting to cause or substantially contribute to an exceedance of the most stringent national or state ambient air quality standards. LSTs are based on the distance to the nearest sensitive receptor and the ambient concentrations of pollutants within a project's source receptor area (SRA). The SCAQMD provides LST lookup tables for one-, two-, and five-acre projects emitting CO, NOX, PM2.5, and/or PM10. The assessment of localized air quality impacts was developed to provide a conservative estimate of the level of Project-generated air pollutants that have the potential to exceed the NAAQS or CAAQS, which could consequently result in adverse health impacts. Exceedance of these air quality standards does not describe the prevalence, magnitude, or specific health effects, but rather assesses the potential for a Project-related health effect to occur.

For the purposes of an LST analysis, the SCAQMD considers receptors where it is possible that an individual could remain for 1 hour for NO_2 and CO exposure and 24 hours for PM_{10} and $PM_{2.5}$ exposure. The LSTs utilized for this analysis account for the Project site's location within SRA 19, Saddleback Valley and receptors located at 500 meters (1,640 feet)[4] of the Project site. The nearest residential uses along Jamboree Road are located approximately 2,596 meters (9,500 feet) to the west of the Project site and use of the 500-meter separation distance provides a conservative analysis of potential impacts.

The LST methodology is recommended for projects that have five acres or less of site disturbance per day. Per SCAQMD guidance, site disturbance is calculated by the number of acres a particular piece of equipment would likely disturb per day. The disturbance values provided by the SCAQMD to determine site disturbance are provided below in Table 4.2-5 SCAQMD Disturbance Area by Equipment Type.

TABLE 4.2 5
SCAQMD DISTURBANCE AREA BY EQUIPMENT TYPE

Equipment Type	Acres/8hr-day
Crawler Tractors	*0.5*
Graders	*0.5*
Rubber Tired Dozers	*0.5*
Scrapers	*1*

The Project would actively disturb a maximum of approximately 4 acres during the peak day (Roadway Excavation and Cleanup) of all construction phases. Therefore, the LST thresholds for 4 acres were used for the construction LST analysis. The emissions limits in the lookup tables are based on the SCAQMD's Ambient Air Quality Standards (SCAQMD 2016). As stated above, the Project site is located within SRA 19, Saddleback Valley and the nearest receptors are located along Jamboree Road, approximately 2,596 meters (9,500 feet) to the west of the Project site. The LSTs for receptors located at 500 meters (1,640 feet)[5] of the Project site were utilized and provides a conservative analysis of potential impacts.

Table 4.2-7, Construction-Phase Localized Significance Threshold Emissions shows the maximum daily on-site emissions for construction activities compared with the SCAQMD LST screening thresholds. The thresholds shown are from the lookup tables for a site disturbance area of 4 acres. The Project's maximum daily on-site emissions would occur during the roadway excavation and site preparation phase for all pollutants. As shown in Table 4.2-7, localized unmitigated emissions for all analyzed criteria pollutants would be less than the applicable SCAMD LSTs.

[4] The SCAQMD recommends that, when sensitive receptors are located nearer than 25 meters (82 feet) from the Project site, the minimum 25-meter/82-foot distance threshold should be used.

TABLE 4.2 7
UNMITIGATED CONSTRUCTION-PHASE
LOCALIZED SIGNIFICANCE THRESHOLD EMISSIONS

Emissions and Thresholds	Emissions (lbs/day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Project maximum daily on-site emissions	148	147	37	19
Localized Significance Threshold	263	9,820	142	85
Exceed threshold?	No	No	No	No

lbs/day: pounds per day; NO_x: nitrogen oxides; CO: carbon monoxide; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter.

Note: Data is for SCAQMD Source Receptor Area 19, Saddleback Valley.

Source: SCAQMD 2009 (thresholds); see Appendix B for CalEEMod model outputs.

Mitigated localized construction emissions are presented in Table 4.2-8 and are likewise below the applicable SCAQMD LSTs.

TABLE 4.2 8
MITIGATED CONSTRUCTION-PHASE
LOCALIZED SIGNIFICANCE THRESHOLD EMISSIONS

Emissions and Thresholds	Emissions (lbs/day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Project maximum daily on-site emissions	20	152	34	17
Localized Significance Threshold	263	9,820	142	85
Exceed threshold?	No	No	No	No

lbs/day: pounds per day; NO_x: nitrogen oxides; CO: carbon monoxide; PM_{10}: respirable particulate matter 10 microns or less in diameter; $PM_{2.5}$: fine particulate matter 2.5 microns or less in diameter.

Note: Data is for SCAQMD Source Receptor Area 19, Saddleback Valley.

Source: SCAQMD 2009 (thresholds); see Appendix B for CalEEMod model outputs.

Toxic Air Contaminant Emissions from On-Site Construction

Construction activities would result in short-term, Project-generated emissions of diesel particulate matter (DPM) from the exhaust of off-road, heavy-duty diesel equipment used for site preparation (e.g., excavation and grading); paving; building construction; and other miscellaneous activities. CARB identified DPM as a TAC in 1998. The dose to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer time period. According to the Office of Environmental Health Hazard Assessment, health risk assessments—which determine the exposure of sensitive receptors to TAC emissions—should be based on a 30-year or 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the Project.

Health risks associated with DPM are due to substantial long-term exposure to this pollutant. While there are park uses nearby, exposure to construction related DPM would occur to park visitors on a short-term

(1-7 days) and intermittent basis as compared to the same individuals at residential uses being exposed on a 24-hour basis for a period of 30 or 70-years. DPM does not have any identified health effects associated with short-term acute exposures and is evaluated relative to long-term chronic and carcinogenic exposures. As such, park uses will not be substantially affected by DPM emitted during construction activities due to the relative brevity that individual park visitors are exposed when they are at the park and the infrequency of attendance of an individual park visitor. As such, park visitors are not anticipated to be significantly affected by TACs related to construction activities. The nearest residential uses are located approximately 1.8 miles away from construction activities. This very substantial distance would disperse and dilute air pollutants generated at the Project site. As indicated in CARB's Air Quality And Land Use Handbook: A Community Health Perspective, decreases in D PM emissions occur substantially within the first 300 feet and stabilize to background levels at approximately 500 feet. Considering that the nearest residential uses are approximately 9,500 feet away, Project related construction DPM emissions would have a negligible impact on health risks at the nearest residential uses. In addition, **MM AQ-1** would result in the use of Tier 4 offroad engines which would lead to reductions in exhaust particulate emissions. As such, construction emissions of TACs would not expose sensitive receptors to substantial emissions of TACs. The impact would be less than significant.

Question AQ-4 Would the Project result in other emissions (such as those leading to odors) affecting a substantial number of people?

Less than Significant Impact. According to the SCAQMD's *CEQA Air Quality Handbook*, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding (SCAQMD 1993). The Project does not propose any of these land uses and would not otherwise produce objectionable long-term operational odors. In addition, the SCAQMD has not identified dam/reservoir projects as sources of odors, which implies that dam/reservoir projects are not common sources of odor. Nevertheless, the dewatering of the reservoir for Project construction may result in the exposure organic matter, including vegetation and remains of fish. All residual organic matter would be removed from the reservoir by construction crews, in accordance with **PDF AQ-1**. Furthermore, the substantial distance between the Project site and the nearest sensitive receptors and the presence of SR-241 and SR-261 would further minimize potential odors emanating from the reservoir once the reservoir has been dewatered. During Project operations, the Project consists of dam infrastructure and would not result in any substantial onsite emissions that would result in a public nuisance.

Short-term construction equipment and activities would generate odors, such as diesel exhaust emissions from construction equipment and paving activities. There may be situations where construction activity odors would have an olfactory presence at nearby park uses, but these odors would not rise to the magnitude of a public nuisance. The odors would be temporary and would dissipate rapidly from the source with an increase in distance. The Project use is also regulated from nuisance odors or other objectionable emissions by SCAQMD Rule 402. Rule 402 prohibits discharge from any source of air contaminants or other material, which would cause injury, detriment, nuisance, or annoyance to people or the public. As such, all Project-related odors are construction related and short term in nature; no long-term operational odors would result. Consequently, the proposed Project would have less than significant impact in regard to other emissions, and no mitigation is required.

Mitigation Measures

The proposed Project would result in significant impacts related to exceedance of the SCAQMD's construction phase emission thresholds and consequently result in significant impacts to Air Quality. The following mitigation measures are necessary to minimize Project related impacts.

AQ-1 The Project's plans and specifications shall include the following measures to minimize nitrogen oxide (NOx) and volatile organic compound (VOC) emissions during construction:

- All off-road diesel-powered construction equipment greater than 50 horsepower shall meet U.S. Environmental Protection Agency (USEPA) Tier 4 Final emission standards to the extent that the equipment is available. In addition, all construction equipment shall be outfitted with Best Available Control Technology (BACT) devices certified by the California Air Resources Board (CARB). If Tier 4 Final equipment is not available, the Project Applicant/Developer shall provide the County with documentation showing the reasons for non-availability.
- Require the use of 2010 and newer diesel haul trucks (e.g., material delivery trucks and soil import/export). If the Project Applicant/Developer determines that 2010 model year or newer diesel trucks cannot be obtained, trucks that meet USEPA 2007 model year NOx emissions requirements shall be required. If 2010 model year or newer diesel trucks are not available, the Project Applicant/Developer shall provide the County with documentation showing the reasons for non-availability.
- Construction contractors shall ensure construction equipment is properly serviced and maintained to the manufacturer's standards.
- Construction contractors shall limit non-essential idling of construction equipment to no more than five consecutive minutes.

Level of Significance After Mitigation

Construction emissions from the Project would exceed the SCAQMD's regional construction emissions thresholds and would result in a significant and unavoidable impact regional air quality despite the application of mitigation measures. Localized construction emissions would be less than significant due to the large distance between the Project's construction activities and the nearest sensitive land uses. Because construction emissions would exceed the SCAQMD's regional thresholds, it would also not be consistent with the goals of the AQMP and would result in a significant impact relative to consistency with local air quality plans.

Long-term operational emissions, and exposure of sensitive receptors to long-term criteria pollutant and TAC emissions from stationary or mobile sources would be less than significant due to the lack of additional emission sources attributable to the Project. The Project would also not exceed the growth assumptions in the AQMP and would not result in impacts related to consistent with local air quality plans for the operations phase. The proposed Project would not increase congestion or result in a significant impact related to CO hotspots.

GREENHOUSE GAS EMISSIONS ANALYSIS

Relevant elements of the proposed Project related to the analysis of potential greenhouse gas (GHG) emissions impacts include construction and operations phase activities which emit GHG emissions. Construction activities which emit GHGs are related to fuel combustion from offroad construction equipment as well as worker and truck trips. The operations phase of the Project would involve GHG emissions from energy usage and vehicular trips. California has adopted several initiatives to reduce the State's contribution to global climate change. This information is incorporated by reference into this report, and information that is relevant to the analysis of GHG emissions resulting from the proposed Project is summarized in this section.

General Environmental Effects of Global Climate Change

Executive Order (EO) S-3-05 mandates the preparation of biennial science assessment reports on climate change impacts and adaptation options for California. EO S-13-08 directs the California Natural Resources Agency (CNRA) to develop a State Climate Adaptation Strategy and to provide State land use planning guidance related to sea level rise and other climate change impacts. Current reports resulting from these directed actions are the *Climate Action Team Report to the Governor and Legislature* and the *California Climate Adaptation Strategy* (CalEPA 2010; CNRA 2009). These studies report that global warming in California is anticipated to impact resources, including, but not limited to, those discussed below.

- **Public Health.** Many Californians currently experience the worst air quality in the nation, and climate change is expected to make matters worse. Higher temperatures would increase the frequency, duration, and intensity of conditions conducive to air pollution formation. If global background O_3 levels increase as predicted under some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by more frequent wildfires, which emit fine particulate matter that can travel long distances. Rising temperatures and more frequent heat waves would increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress. Climate change may also increase asthma rates and the spread of infectious diseases and their vectors, as well as challenge food and water supplies. Children, the elderly, people with chronic heart or lung disease, outdoor workers, people who exercise outdoors, and the economically disadvantaged would be particularly vulnerable to these changes. In addition, more frequent extreme weather events could also result in increased injuries and deaths from these phenomena.
- **Energy.** Increasing mean temperature and more frequent heat waves will drive up demand for cooling in summer; this new energy demand will only be partially offset by decreased demand for heating in winter. Hydropower, which currently provides 15 percent of in-state generation, would be threatened by declining snowpack, which serves as a natural reservoir for hydropower generation in the spring and summer. Winter storms, earlier snowmelt, and greater runoff may combine to cause flooding, which could, in turn, damage transmission lines and cause power outages.
- **Water Resources.** Rising temperatures, less precipitation, and more precipitation falling as rain instead of snow could severely diminish snowpack. Because the Sierra Nevada snowpack provides most of California's available water, this potential loss would increase the risk of summer water shortages and would hamper water distribution and hydropower generation. The diminished snowpack would also nearly eliminate all skiing and other snow-related recreation. Rising sea levels would push salt water into California's estuaries, wetlands, and groundwater

aquifers, threatening the water quality and reliability in the Sacramento/San Joaquin River Delta—a major California fresh water supply. Extreme precipitation and flooding could also damage water quality by creating sudden increases in runoff. Moreover, warming would increase evapotranspiration rates from plants, soil, and open water surfaces, which would result in greater demand for irrigation. Overall, climate change would reduce California's water supplies even as its growing population requires additional resources.

- **Sea Level and Flooding.** Sea level at California's coasts is expected to rise by 11 to 18 inches above 2000 levels by 2050 and by 23 to 55 inches by 2100. If realized, these increases would create more frequent and higher storm surges; would erode some coastal areas; and would increase pressure on existing levees. These increases would create a greater risk of flooding in previously untouched inland areas. Consequently, continued development in vulnerable coastal areas would put more people and infrastructure at risk.

- **Agriculture.** Although higher CO_2 levels can stimulate plant production and increase plant water-use efficiency, in the long-term, climate change would reduce the quantity and quality of agricultural products Statewide. As temperatures rise, farmers will face greater water demand for crops and a less reliable water supply, as well as increased competition from urban water users. Sea level rise may cause saltwater intrusion in the Delta region, making it difficult to raise certain crops. Rising temperatures will likely aggravate O_3 pollution, interfering with plant growth and making plants more susceptible to disease and pests. In addition, warming would reduce the number of colder hours needed for fruit and nut production; would shift pest and weed ranges; would alter crop-pollinator timing; and would increase the frequency of droughts, heat waves, and floods. Higher average temperatures would also increase mortality and decrease productivity in livestock.

- **Forestry.** California timber production has declined over the past few decades due, in part, to warming and increased wildfires. While further warming may increase production for some species in some locations, climate change is expected to reduce overall forest growth. Increasing average temperatures and drought frequency would result in more wildfires and greater burned areas, while less frequent and more intense rainfall would increase soil erosion and landslides. Higher temperatures and less water would force many tree species to shift their ranges; those that run out of livable habitat may die out. Pests, diseases, and invasive species may also colonize new areas, further challenging forest health and biodiversity.

- **Ecosystems.** Rising average temperatures would subject plants and animals to greater thermal stress, causing some species to adapt or shift their ranges, while others may face extinction. Invasive species may also shift their ranges, threatening native species. Changing temperatures would alter the timing of plant flowering and insect emergence, damaging species' abilities to reproduce. Changing precipitation patterns would impact aquatic and riparian ecosystems by reducing snow pack, stream flow, and groundwater, while increasing the frequency of droughts, floods, and wildfires. As sea levels rise, some coastal habitats may be permanently flooded or eroded, and saltwater intrusion into freshwater resources may threaten terrestrial species. Changes in ocean circulation and temperature, ocean acidification, and increased runoff and sedimentation would threaten pelagic species. In sum, continued global warming would alter natural ecosystems and threaten California's biological diversity.

Existing Greenhouse Gas Emissions Conditions

GHGs are global pollutants and are therefore unlike criteria air pollutants such as O_3, particulate matter (PM10 and PM2.5), and TACs, which are pollutants of regional and local concern. While pollutants with

localized air quality effects have relatively short atmospheric lifetimes (generally on the order of a few days), GHGs have relatively long atmospheric lifetimes, ranging from one year to several thousand years. Long atmospheric lifetimes allow for GHGs to disperse around the globe. Therefore, GHG effects are global, as opposed to the local and/or regional air quality effects of criteria air pollutant and TAC emissions.

Regulatory Background

Significant changes in global climate patterns have been associated with global warming, which is an average increase in the temperature of the atmosphere near the Earth's surface; this is attributed to an accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere which, in turn, increases the Earth's surface temperature. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities.

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which calls for a reduction in GHG emissions to the year 2000 level by 2010, to year 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

The principal overall State plan and policy adopted for the purpose of reducing GHG emissions is Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 recognizes that California is the source of substantial amounts of GHG emissions. The statute states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

In order to avert these consequences, AB 32 establishes a State goal of reducing GHG emissions to 1990 levels by the year 2020, codifying the Executive Order S-3-05 goal.

CARB approved a *Climate Change Scoping Plan* as required by AB 32 in 2008; this plan is required to be updated every five years. The *Climate Change Scoping Plan* proposes a "comprehensive set of actions designed to reduce overall carbon GHG emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health" (CARB 2008). The *Climate Change Scoping Plan* has a range of GHG-reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 implementation regulation to fund the program. On February 10, 2014, CARB released the Draft Proposed First Update to the *Climate Change Scoping Plan* (CARB 2014). The board approved the final *First Update to the Climate Change Scoping Plan* on May 22, 2014. The first update describes California's progress towards AB 32 goals, stating that "California is on track to meet the near-term 2020 greenhouse gas limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32" (CARB 2014). The latest update occurred in January 2017 and incorporates the 40 percent reduction to 1990 emissions levels by 2030.

California Executive Order B-30-15 (April 29, 2015) set an "interim" statewide emission target to reduce GHG emissions to 40 percent below 1990 levels by 2030, and directed State agencies with jurisdiction over GHG emissions to implement measures pursuant to statutory authority to achieve this 2030 target and the 2050 target of 80 percent below 1990 levels.

On September 8, 2016, the Governor signed Senate Bill 32 (SB 32) to codify the GHG reduction goals of EO B-30-15, requiring the State to reduce GHG emissions by 40 percent below 1990 levels by 2030 (Health and Safety Code Section 38566). This goal is expected to keep the State on track to meeting the goal set by EO S-3-05 of reducing GHG emissions by 80 percent below 1990 levels by 2050 (California Legislative Information 2017a). SB 32's findings state that CARB will "achieve the state's more stringent greenhouse gas emission reductions in a manner that benefits the state's most disadvantaged communities and is transparent and accountable to the public and the Legislature."

AB 197 was signed at the same time and will make sure that the SB 32 goals are met by requiring CARB to provide annual reports of GHGs, criteria pollutants, and TACs by facility, City and subcounty level, and sector for stationary sources and at the County level for mobile sources. It also requires the CARB to prioritize specified emission reduction rules and regulations and to identify specified information for emission reduction measures (e.g., alternative compliance mechanism, market-based compliance mechanism, and potential monetary and nonmonetary incentive) when updating the Scoping Plan (California Legislative Information 2017b).

On April 29, 2015, Governor Brown signed Executive Order (EO) B-30-15, which orders "A new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030 is established in order to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050" (COOG 2015). Five key goals for reducing GHG emissions through 2030 include (1) increasing renewable electricity to 50 percent; (2) doubling the energy efficiency savings achieved in existing buildings and making heating fuels cleaner; (3) reducing petroleum use in cars and trucks by up to 50 percent; (4) reducing emissions of short-lived climate pollutants; and (5) managing farms, rangelands, forests and wetlands to increasingly store carbon. EO B-30-15 also directs CARB to update the *Climate Change Scoping Plan* to express the 2030 target in terms of million metric tons of carbon dioxide equivalent.

Senate Bill (SB) 350, signed October 7, 2015, is the Clean Energy and Pollution Reduction Act of 2015. SB 350 is the implementation of some of the goals of EO B-30-15. The objectives of SB 350 are as follows (California Legislative Information 2015):

1. To increase from 33 percent to 50 percent, the procurement of our electricity from renewable sources.
2. To double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation.

The text of SB 350 sets a December 31, 2030, target for 50 percent of electricity to be generated from renewable sources.

The Sustainable Communities and Climate Protection Act of 2008, Senate Bill (SB) 375, established a process to coordinate land use planning, regional transportation plans, and funding priorities in order to help California meet the GHG reduction goals established in AB 32. SB 375 required SCAG to incorporate a "sustainable communities strategy" (SCS) into its regional transportation plans (RTPs) that will achieve GHG emission reduction targets though several measures, including land use decisions.

SCAG's SCS is included in the SCAG 2020–2045 RTP/SCS (SCAG 2020). The goals and policies of the RTP/SCS that reduce vehicle miles traveled (VMT) focus on transportation and land use planning that include building infill projects; locating residents closer to where they work and play; and designing communities so there is access to high quality transit service.

COUNTY OF ORANGE

The County of Orange's General Plan does not specifically references GHGs, however the following sections of the General Plan is relevant to the effects of climate change as it relates to Project.

General Plan

The County of Orange's General Plan provides the vision of the future and framework for development in the County. The General Plan is comprised of various elements or topical sections that cover different aspects of the County. The two Element that are most relevant to the Project are the Public Services & Facilities Element and Resources Element.

Public Services & Facilities Element

The Public Services and Facilities Element focuses on those publicly managed services and facilities which have a direct influence on the distribution and intensity of development that can be accommodated through the utilization of existing technologies and assumptions that are used to determine adequate service levels. These services include flood control, waste management, water and wastewater, transportation, and community services (fire protection, library, sheriff patrol, local special services districts and public school facilities).

Goals, Objectives, and Policies

Water System

Goal 1	Encourage the planning and development of a water conveyance and distribution system to meet the County's future demand.
Objective 1.1	To achieve desired water system service levels through the coordination of land use and water system planning.
Objective 1.2	To implement state, regional, and local facility plans for water delivery to Orange County
Objective 1.3	To increase storage and delivery capacity for water supplies in Orange County.
Policy 1	System Capacity and Phasing – To ensure the adequacy of water system capacity and phasing, in consultation with the service providing agency(ies), in order to serve existing and future development as defined by the General Plan.
Policy 2	Water Delivery System – To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.
Policy 3	Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and the water agencies through cooperative water facility planning and implementation efforts.

Water Delivery System

Goal 1	To support water facility planning and development efforts for Orange County water supplies conducted by local and regional water agencies.
Policy 1	Intergovernmental Coordination – To actively encourage opportunities for increased coordination between the County and the water agencies through cooperative water facility planning and implementation efforts.

Resources Element

The Resources Element, one of nine elements of the General Plan, contains official County policies on the conservation and management of resources. The Resources Element establishes a strategy for the development, management, preservation, and conservation of resources that are necessary to meet Orange County's existing and future demands. Aspects of this Element that relate to the Project are local water availability and water quality. The Water Resources Component of the Element describes the need to manage local water resources to meet the County's needs. The following have been established in the Water Resources Component.

Goals, Objectives and Policies

Water Resources Component

The use, supply, and conservation of water are critical issues in Orange County. Since almost every urban activity is dependent on water to some extent, it is in the best interests of the general public that the County's water resources are properly planned and managed.

Goal 1	Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.
Objective 1.1	To maintain the adequacy and dependability of imported water supplies.
Objective 1.2	To achieve a reduction in per capita water consumption by the year 2020.
Objective 1.3	To reduce dependence on imported water supplies through both conservation and local water resource development.
Policy 1	Water Supply – To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.
Policy 2	Conservation – To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.
Policy 3	Groundwater Sources – To support groundwater management efforts that are conducted by County water agencies.
Policy 4	Shortage Planning – To ensure that Orange County will not be severely impaired by any potential future water shortages.
Policy 5	Water Quality – Protect and improve water quality through continued management, enforcement, and reporting requirements. Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats.

Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles.

Consider implementation of LID principles to conserve natural features (trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils.

Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources.

Additional water quality policies are also provided in the Land Use Element.

Policy 6 Intergovernmental Coordination – To encourage and support a cooperative effort among all agencies towards the resolution of problems and the utilization of opportunities in the planning management and protection of water resources, including water quality.

Greenhouse Gas Emissions Impact Analysis

Climate change refers to any significant change in measures of climate (e.g., average temperature, precipitation, or wind patterns) over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, which is an average increase in the temperature of the atmosphere near the Earth's surface; this is attributed to an accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere which, in turn, increases the Earth's surface temperature. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emissions of GHGs through fossil fuel combustion in conjunction with other human activities are associated with global warming.

GHGs, as defined under California's Assembly Bill (AB) 32, include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). General discussions on climate change often include water vapor, atmospheric ozone, and aerosols in the GHG category. Water vapor and atmospheric ozone are not gases that are formed directly in the construction or operation of development projects, nor can they be controlled in these projects. Aerosols are not gases. While these elements have a role in climate change, they are not considered by either regulatory bodies, such as CARB, or climate change groups, such as the California Climate Action Registry, as gases to be reported or analyzed for control. Therefore, no further discussion of water vapor, atmospheric ozone, or aerosols is provided.

Thresholds of Significance

On December 5, 2008, the SCAQMD Governing Board adopted its staff proposal for an interim CEQA GHG significance threshold of 10,000 metric tons of CO_2 equivalent per year ($MTCO_2e$/year) for industrial projects where the SCAQMD is the lead agency. In September 2010, the Working Group proposed extending the 10,000 $MTCO_2e$/year screening threshold currently applicable to industrial projects where the SCAQMD is the lead agency, described above, to other lead agency industrial projects. Because the Project's land use is closest to the application of industrial uses as compared to residential and commercial uses, the significance threshold developed for industrial uses will be used for the evaluation of potential GHG impacts.

A. Methodology

Project related GHG emissions were calculated by using CalEEMod. For this analysis, the results are expressed in metric tonnes of CO2 equivalent per year ($MTCO_2e$/yr). Please see the methodology discussion in the Air Quality analysis of this report, for discussion of the CalEEMod inputs, adjustments, outputs, and other characteristics for construction-related and operational emissions.

Greenhouse Gas Emissions Analysis

The following questions correspond to the questions in the GHG Emissions section of the Initial Study Checklist in Appendix G of the State CEQA Guidelines.

Question GHG-1 Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less than Significant Impact. Based on the proposed construction activities described above, the principal source of construction GHG emissions would be internal combustion engines of construction equipment, on-road construction vehicles, and workers' commuting vehicles. GHG emissions from construction activities were obtained from the CalEEMod model, described above. The estimated construction GHG emissions for the proposed Project would be 15,766 $MTCO_2e$, as shown in Table 7, Estimated Greenhouse Gas Emissions from Construction.

TABLE 7
ESTIMATED GREENHOUSE GAS EMISSIONS
FROM CONSTRUCTION

Year	Emissions ($MTCO_2e$)
2024	1,554
2025	7,754
2026	6,298
2027	160
Total	15,766
Amortized	**526**

$MTCO_2e$: metric tons of carbon dioxide equivalent

Notes:
- Totals may not add due to rounding variances.
- Detailed calculations in Attachment A.

Operational phase activities would not change substantively from existing conditions because of the lack of additional energy consumption, stationary sources and mobile vehicle trips. As such, the Project would not result in a substantial change in GHG emissions. The Project involves improvements to existing dam infrastructure and would not result in substantial increases in air pollutant sources such as vehicular or energy consumption. Existing operations related to dam inspection and maintenance activities would be comparable to that which would occur under the Proposed Project. As such, GHG emissions would likewise be essentially the same.

Because impacts from construction activities occur over a relatively short period of time, they contribute a relatively small portion of the overall lifetime Project GHG emissions. In addition, GHG emission

reduction measures for construction equipment are relatively limited. The SCAQMD recommends that construction emissions be amortized over a 30-year Project lifetime so that GHG reduction measures address construction GHG emissions as part of the operational GHG reduction strategies (SCAQMD 2008). Therefore, construction and operational emissions are combined by amortizing the construction and operations over an assumed 30-year Project lifetime. This combination is shown in Table 8, Estimated Total Project Annual Greenhouse Gas Emissions, using the proposed Project's amortized construction and operational emissions.

TABLE 8
ESTIMATED TOTAL PROJECT ANNUAL GREENHOUSE GAS EMISSIONS

Source	Emissions ($MTCO_2e/yr^a$)
Construction (Amortized)	526[a]
Operations	--
Total[b]	**526**
SCAQMD-Recommended Threshold	**10,000**
Exceeds Threshold?	**No**

$MTCO_2e/yr$: metric tons of carbon dioxide equivalent per year; SCAQMD: South Coast Air Quality Management District.

[a] Total derived by dividing construction emissions (see Table 8) by 30.
[b] Total annual emissions are the sum of amortized construction emissions and operational emissions.

It is noted that there are no established applicable quantitative federal, State, regional, or local CEQA significance criteria for GHG emissions for non-industrial projects in the SoCAB. The SCAQMD has adopted an interim threshold of 10,000 $MTCO_2e$ per year for industrial land use projects. As shown, the estimated GHG emissions from the proposed Project would be less than this suggested threshold. The impact would be less than significant, and no mitigation is required.

Question GHG-2 Would the Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less than Significant Impact. The County of Orange has not adopted a Climate Action Plan, and the SCAQMD has not adopted standards for the purpose of reducing GHG emissions. There are a number of GHG reduction plans that have been adopted on the State and regional level. SCAG adopted this 2024–2050 RTP/SCS for the six-county region including Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties.

2022 CARB Scoping Plan

The Project would not impede the State's progress towards carbon neutrality by 2045 under the 2022 Scoping Plan. The Project would be required to comply with applicable current and future regulatory requirements promulgated through the 2022 Scoping Plan. Moreover, and as indicated above, the Project's level of GHG emissions would not exceed the SCAQMD recommended threshold of 10,000 MTCO2e/yr. Moreover, the Project would be consistent with the CAP as demonstrated above; therefore the Project would be consistent with the GHG reduction mandates established by SB 32 and the 2022 Scoping Plan. A less than significant impact would occur. Vehicle trips associated with operations of the

infrastructure are expected to be the same or comparable to existing operating conditions. The minimal amount of vehicle trips would have a negligible effect on GHG emissions. However, the Project's improvements to existing water infrastructure would meet the Project's objectives of meeting the seismic, safety and design requirements; fulfill operational requirements; extend the useful life of the dam, and improve water supply reliability. This is especially important to the challenges posed by climate change which includes increased flooding, heat events, and droughts as discussed in the California Scoping Plan. The California Scoping Plan discusses the need to enact climate change adaptation measures for water resources which includes modernization, conservation, maintaining water quality, groundwater recharge, and minimizing flood risk. Maintaining and improving water infrastructure is part of the adaptation to climate change that is necessary to prevent flooding, and to assist in the provision of adequate water supplies to the region which are goals established within the County's Resource Element of the General Plan and the California Scoping Plan.

SCAG's 2024-2050 RTP/SCS

As discussed above, the principal State plan and policy adopted for the purpose of reducing GHG emissions is AB 32. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocations. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or alternative planning strategy (APS) that will address land use allocation in that Metropolitan Planning Organization's Regional Transportation Plan (RTP). The principles of SB 375 are incorporated in SCAG's adopted 2024-2050 RTP/SCS. The proposed Project is neither a housing development project nor a transportation project that would increase population within the State or increase vehicle miles travelled (VMT). As discussed previously, the Project would also not result in substantial amounts of GHG emissions from either the construction phase or from the operations phase. As shown above, the Project would result in emissions which are below the SCAQMD's draft interim significance threshold for GHGs. As such, GHG emissions generated by the Project are not considered to be substantial. Moreover, the Project would not conflict with the goals outlined in the plan, which are to build and maintain an integrated multimodal transportation network; develop, connect and sustain communities that are livable and thriving; create a healthy region for the people of today and tomorrow; and support a sustainable, efficient and productive regional economic environment that provides opportunities for all residents. A less than significant impact would occur.

Therefore, the Project would have less than significant impacts regarding conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions, and no mitigation measures are required.

CONCLUSION

The Project was analyzed for potential air quality and GHG emissions from both the construction and operational phases. Construction emissions from the Project would exceed the SCAQMD's regional construction emissions thresholds and would result in a significant and unavoidable impact related to regional air quality despite the application of mitigation measures (**MM AQ-1**). Localized construction emissions would be less than significant due to the large distance between the Project's construction activities and the nearest sensitive land uses. Because construction emissions would exceed the SCAQMD's regional thresholds, it would also not be consistent with the goals of the AQMP and would result in a significant and unavoidable impact relative to consistency with local air quality plans.

Long-term operational emissions, and exposure of sensitive receptors to long-term criteria pollutant and TAC emissions from stationary or mobile sources would be less than significant due to the lack of additional emission sources attributable to the Project. The Project would also not exceed the growth assumptions in the AQMP and would not result in impacts related to consistent with local air quality plans for the operations phase. The proposed Project would not increase congestion or result in a significant impact related to CO hotspots.

GHG emissions for the construction and operations phases of the Project would be less than the SCAQMD-recommended threshold of 10,000 $MTCO_2e$ per year. As such, the Project would have less than significant impacts regarding generation of GHG emissions that may have a significant impact on the environment. Additionally, the Project would have less than significant impacts regarding conflict with an applicable plan, policy, or regulation adopted form the purpose of reducing the emissions of GHGs. In conclusion, the Project would have less than significant impacts for all Project-related GHG emissions.

Thank you for the opportunity to assist on this Project. If you have any questions or comments, please contact me at 714.481.8041.

Sincerely,
PSOMAS

Jennifer Y. Marks
Principal

Jordan Werkmeister
Air Quality and GHG Specialist

Enclosures: Exhibits 1-1 through 1-2, Regional Location and Aerial Photograph
Attachment A – CalEEMod Data

REFERENCES

California Air Pollution Control Officers Association (CAPCOA). 2023. California Emission Estimator Model (CalEEMod)™ Version 2022.1.1.20, CAPCOA. https://caleemod.com/release-notes

———. 2016 (May 4). Ambient Air Quality Standards. Sacramento, CA: CARB. http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

———. 2014 (February). Proposed First Update to the Climate Change Scoping Plan: Building on the Framework. Sacramento, CA: CARB. http://www.arb.ca.gov/cc/scopingplan/2013_update/draft_proposed_first_update.pdf.

———. 2008 (December) Climate Change Scoping Plan. Sacramento, CA: CARB. https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/document/adopted_scoping_plan.pdf.

California Energy Commission (CEC). 2021a (October 24, last accessed). Clean Energy and Pollution Reduction Act—SB 350. Sacramento, CA: CEC. https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350.

County of Orange. 2022. General Plan. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan

———. 2013. General Plan Resources Element. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan

South Coast Air Quality Management District (SCAQMD). 2022. Air Quality Management Plan. http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan

———. 2021. Historical Data by Year. http://www.aqmd.gov/home/air-quality/historical-air-quality-data/historical-data-by-year

———. 2019 (April, Revision). SCAQMD Air Quality Significance Thresholds. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.

———. 2016 (February). National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2.

———. 2010 (September 28). Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group Meeting #15 (slide presentation). Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-15/ghg-meeting-15-main-presentation.pdf?sfvrsn=2.

———. 2009 (October). *Mass Rate Localized Significance Thresholds Look-up Tables*. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/appendix-c-mass-rate-lst-look-up-tables.pdf?sfvrsn=2.

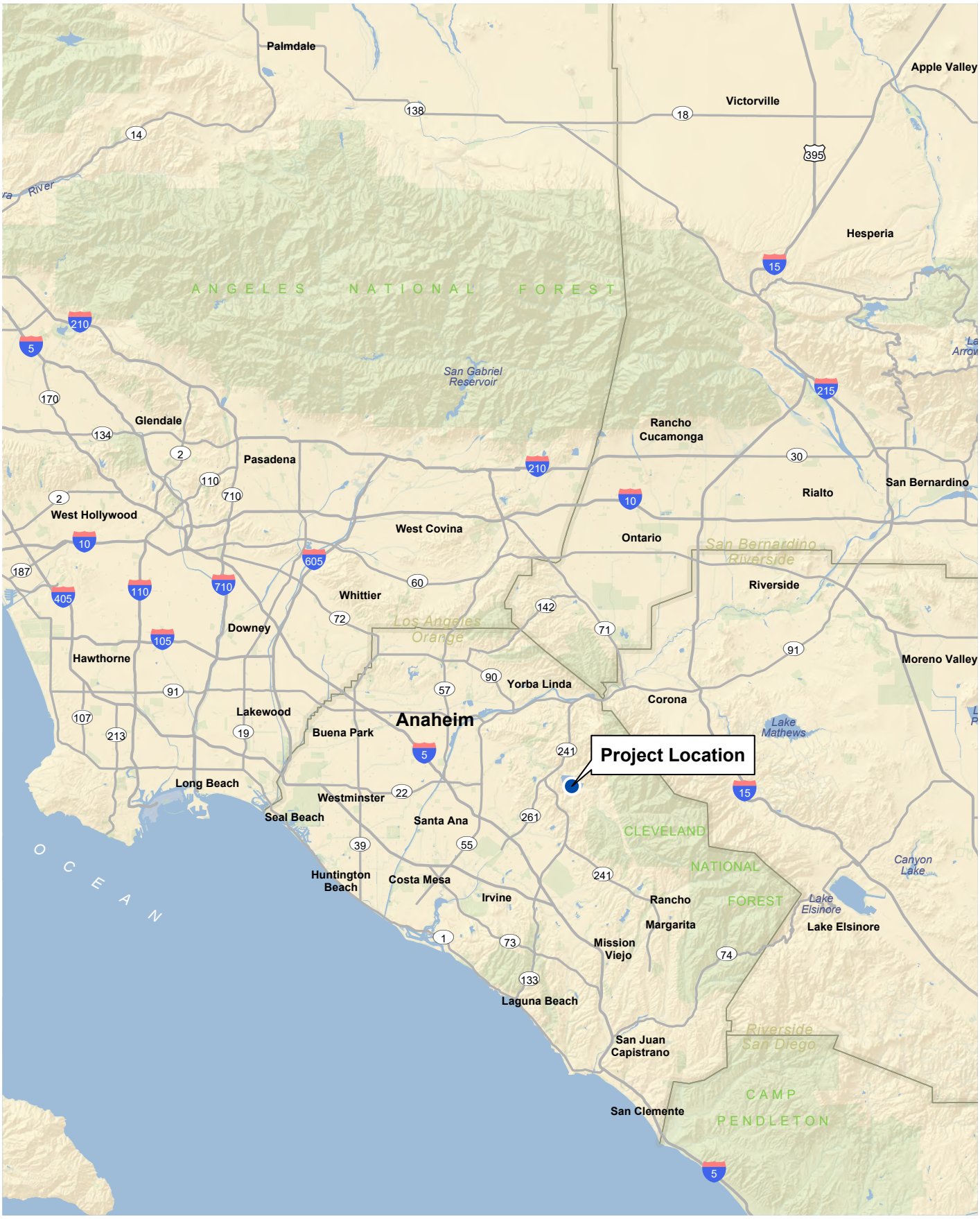
———. 2008 (December 5). PROPOSAL: Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans. Diamond Bar, CA: SCAQMD. http://www.aqmd.gov/hb/2008/December/081231a.htm.

———. 2003 (September 5). Attachment to BOARD MEETING DATE: September 5, 2003, AGENDA NO. 29. White Paper on Regulatory Options for Addressing Cumulative Impacts from Air Pollution Emissions. http://www.aqmd.gov/home/governing-board/agendas-minutes.

———. 1993. *CEQA Air Quality Handbook*. Diamond Bar, CA: SCAQMD.

Southern California Association of Governments (SCAG). 2020 (September 3, Adopted). *2020-2045 Regional transportation Plan/Sustainable Communities Strategy—Connect SoCal.* Los Angeles, CA: SCAG. https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal-plan_0.pdf.

U.S. Environmental Protection Agency (USEPA). 2023. Particle Pollution Exposure Washington D.C.: USEPA. https://www.epa.gov/pmcourse/particle-pollution-exposure#:~:text=The%20scientific%20evidence%20shows%20exposure%20to%20fine%20particles,such%20as%20coughing%2C%20wheezing%2C%20and%20shortness%20of%20breath.



D:\Projects\3IRW\SantiagoCreek\PROVSCD\SCD_Project.aprx\ex_RL

Regional Location

Exhibit 1-1

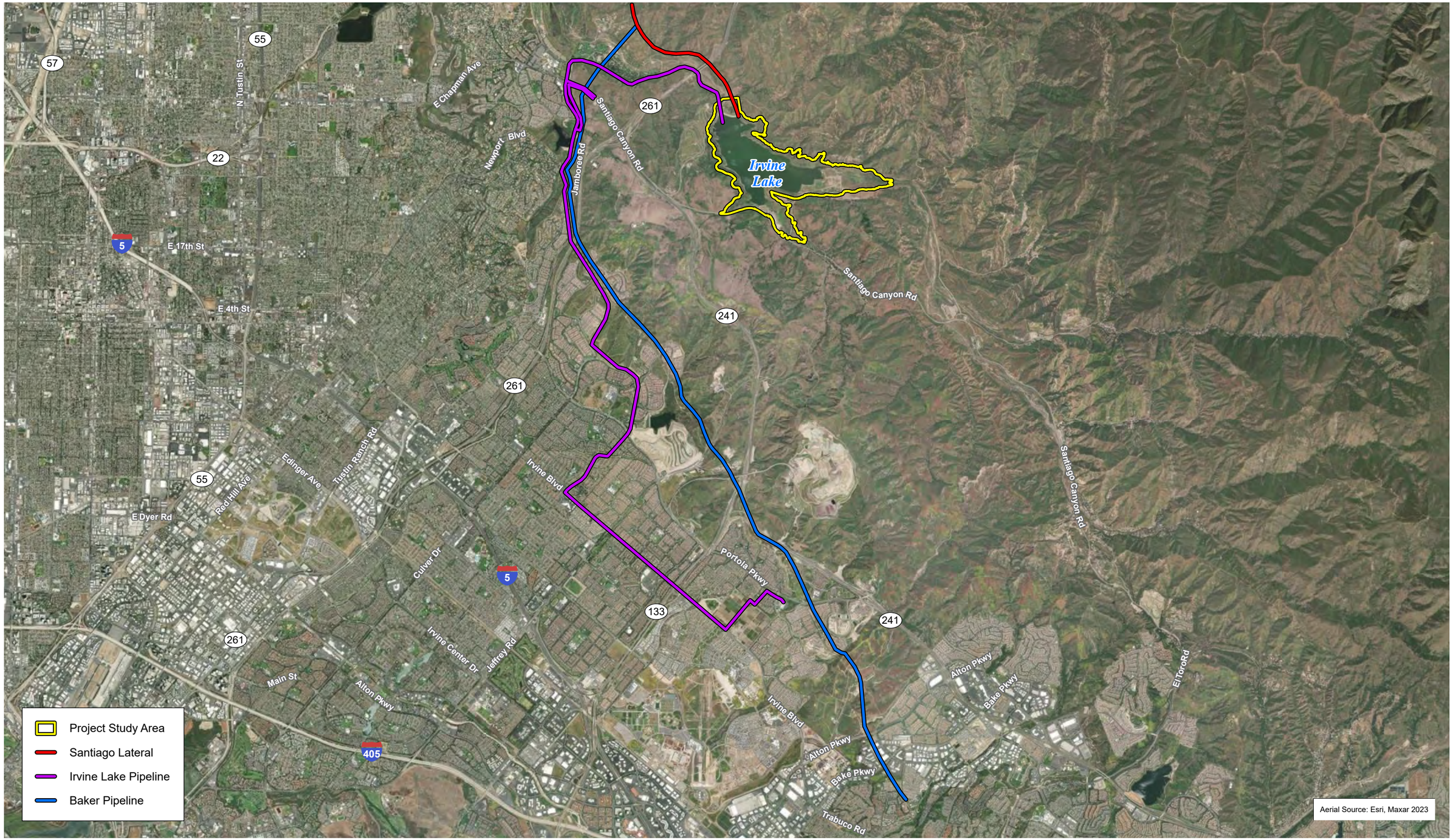
Santiago Creek Dam Improvements Project

N W E S

0 5 10 Miles

PSOMAS

(Rev: 11-14-2024 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_RL.pdf



D:\Projects\3IRWS\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Aerial_11x17L

Aerial Photograph

Exhibit 1-2

Santiago Creek Dam Improvements Project

N W E S

0 0.6 1.2 Miles

PSOMAS

(Rev: 11/27/2024 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Aerial.pdf

ATTACHMENT A

CALEEMOD DATA

Attached is the output data from the CalEEMod criteria air pollutant and GHG model.

Santiago Creek Dam v2 Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

1.2. Land Use Types

1.3. User-Selected Emission Reduction Measures by Emissions Sector

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

2.2. Construction Emissions by Year, Unmitigated

2.3. Construction Emissions by Year, Mitigated

3. Construction Emissions Details

3.1. Part 1 Site Demolition (Excludes Spillway) (2024) - Unmitigated

3.2. Part 1 Site Demolition (Excludes Spillway) (2024) - Mitigated

3.3. Part 2 Site Demolition (Excludes Spillway) (2025) - Unmitigated

3.4. Part 2 Site Demolition (Excludes Spillway) (2025) - Mitigated

3.5. Spillway Demolition: Existing Spillway Demo (2025) - Unmitigated

3.6. Spillway Demolition: Existing Spillway Demo (2025) - Mitigated

3.7. Spillway Demolition: Crush Concrete Demo (2025) - Unmitigated

3.8. Spillway Demolition: Crush Concrete Demo (2025) - Mitigated

3.9. Spillway Demolition: Bridge Pier and Facing Demo (2025) - Unmitigated

3.10. Spillway Demolition: Bridge Pier and Facing Demo (2025) - Mitigated

3.11. Temporary Flood Control Berm (2024) - Unmitigated

3.12. Temporary Flood Control Berm (2024) - Mitigated

3.13. Mobilization (2024) - Unmitigated

3.14. Mobilization (2024) - Mitigated

3.15. Demobilization (2026) - Unmitigated

3.16. Demobilization (2026) - Mitigated

3.17. Cleanup (2027) - Unmitigated

3.18. Cleanup (2027) - Mitigated

3.19. Allowance for Piping Install (2024) - Unmitigated

3.20. Allowance for Piping Install (2024) - Mitigated

3.21. Bypass Pumping Diversion Beam (2024) - Unmitigated

3.22. Bypass Pumping Diversion Beam (2024) - Mitigated

3.23. Inclined Inlet Structure: Steel Pipe and Appurtenances (2025) - Unmitigated

3.24. Inclined Inlet Structure: Steel Pipe and Appurtenances (2025) - Mitigated

3.25. Inclined Inlet Structure: Reinforced Concrete (2025) - Unmitigated

3.26. Inclined Inlet Structure: Reinforced Concrete (2025) - Mitigated

3.27. Inclined Inlet Structure: Drilled Foundation Anchors (2025) - Unmitigated

3.28. Inclined Inlet Structure: Drilled Foundation Anchors (2025) - Mitigated

3.29. Inclined Inlet Structure: Excavation (2025) - Unmitigated

3.30. Inclined Inlet Structure: Excavation (2025) - Mitigated

3.31. Inclined Inlet Structure: Stainless Steel Platform (2025) - Unmitigated

3.32. Inclined Inlet Structure: Stainless Steel Platform (2025) - Mitigated

3.33. Inclined Inlet Structure: Pneumatic Actuation Control System (2025) - Unmitigated

3.34. Inclined Inlet Structure: Pneumatic Actuation Control System (2025) - Mitigated

3.35. Cofferdam Installation and Removal: Install Cofferdam H/King Piles (2025) - Unmitigated

3.36. Cofferdam Installation and Removal: Install Cofferdam H/King Piles (2025) - Mitigated

3.37. Cofferdam Installation and Removal: Dewatering (2025) - Unmitigated

3.38. Cofferdam Installation and Removal: Dewatering (2025) - Mitigated

3.39. Cofferdam Installation and Removal: Remove Cofferdam H/King Piles (2026) - Unmitigated

3.40. Cofferdam Installation and Removal: Remove Cofferdam H/King Piles (2026) - Mitigated

3.41. Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation (2024) - Unmitigated

3.42. Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation (2024) - Mitigated

3.43. Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course (2024) - Unmitigated

3.44. Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course (2024) - Mitigated

3.45. Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course (2024) - Unmitigated

3.46. Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course (2024) - Mitigated

3.47. Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall (2024) - Unmitigated

3.48. Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall (2024) - Mitigated

3.49. Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail (2024) - Unmitigated

3.50. Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail (2024) - Mitigated

3.51. Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall (2024) - Unmitigated

3.52. Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall (2024) - Mitigated

3.53. Dam Control Building: Pt 1 CMU Control Building (2026) - Unmitigated

3.54. Dam Control Building: Pt 1 CMU Control Building (2026) - Mitigated

3.55. Dam Control Building: Pt 2 CMU Control Building (2026) - Unmitigated

3.56. Dam Control Building: Pt 2 CMU Control Building (2026) - Mitigated

3.57. Dam Control Building: Pt 2 CMU Control Building (2027) - Unmitigated

3.58. Dam Control Building: Pt 2 CMU Control Building (2027) - Mitigated

3.59. Dam Control Building: Reinforced Concrete Foundation (2026) - Unmitigated

3.60. Dam Control Building: Reinforced Concrete Foundation (2026) - Mitigated

3.61. Dam Control Building: Metal Frame Roofing (2026) - Unmitigated

3.62. Dam Control Building: Metal Frame Roofing (2026) - Mitigated

3.63. Dam Control Building: Ancillary Features (2027) - Unmitigated

3.64. Dam Control Building: Ancillary Features (2027) - Mitigated

3.65. Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation (2025) - Unmitigated

3.66. Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation (2025) - Mitigated

3.67. Downstream Outlet Works Piping and Vault: Structure Bkfl (2025) - Unmitigated

3.68. Downstream Outlet Works Piping and Vault: Structure Bkfl (2025) - Mitigated

3.69. Downstream Outlet Works Piping and Vault: Reinforced Conc Structures (2025) - Unmitigated

3.70. Downstream Outlet Works Piping and Vault: Reinforced Conc Structures (2025) - Mitigated

3.71. Downstream Outlet Works Piping and Vault: Piping and Valves (2025) - Unmitigated

3.72. Downstream Outlet Works Piping and Vault: Piping and Valves (2025) - Mitigated

3.73. Downstream Outlet Works Piping and Vault: Steel Casing (2025) - Unmitigated

3.74. Downstream Outlet Works Piping and Vault: Steel Casing (2025) - Mitigated

3.75. Downstream Outlet Works Piping and Vault: Ladders and Platforms (2025) - Unmitigated

3.76. Downstream Outlet Works Piping and Vault: Ladders and Platforms (2025) - Mitigated

3.77. Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping (2025) - Unmitigated

3.78. Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping (2025) - Mitigated

3.79. Downstream Outlet Works Piping and Vault: Dewatering (2025) - Unmitigated

3.80. Downstream Outlet Works Piping and Vault: Dewatering (2025) - Mitigated

3.81. Downstream Outlet Works Piping and Vault: ARVs and Valves (2025) - Unmitigated

3.82. Downstream Outlet Works Piping and Vault: ARVs and Valves (2025) - Mitigated

3.83. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation (2026) - Unmitigated

3.84. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation (2026) - Mitigated

3.85. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway (2026) - Unmitigated

3.86. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway (2026) - Mitigated

3.87. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge (2026) - Unmitigated

3.88. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge (2026) - Mitigated

3.89. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation (2026) - Unmitigated

3.90. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation (2026) - Mitigated

3.91. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors (2026) - Unmitigated

3.92. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors (2026) - Mitigated

3.93. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall (2026) - Unmitigated

3.94. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall (2026) - Mitigated

3.95. Spillway Site Excavations (2024) - Unmitigated

3.96. Spillway Site Excavations (2024) - Mitigated

3.97. Spillway Site Excavations (2025) - Unmitigated

3.98. Spillway Site Excavations (2025) - Mitigated

3.99. Rock Slope Stabilization (2024) - Unmitigated

3.100. Rock Slope Stabilization (2024) - Mitigated

3.101. Rock Slope Stabilization (2025) - Unmitigated

3.102. Rock Slope Stabilization (2025) - Mitigated

3.103. RCC Weir Support Block (2026) - Unmitigated

3.104. RCC Weir Support Block (2026) - Mitigated

3.105. Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week (2026) - Unmitigated

3.106. Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week (2026) - Mitigated

3.107. Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC (2026) - Unmitigated

3.108. Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC (2026) - Mitigated

3.109. Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete (2026) - Unmitigated

3.110. Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete (2026) - Mitigated

3.111. Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill (2026) - Unmitigated

3.112. Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill (2026) - Mitigated

3.113. Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction (2026) - Unmitigated

3.114. Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction (2026) - Mitigated

3.115. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing (2026) - Unmitigated

3.116. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing (2026) - Mitigated

3.117. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Unmitigated

3.118. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Mitigated

3.119. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Unmitigated

3.120. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Mitigated

3.121. Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill (2026) - Unmitigated

3.122. Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill (2026) - Mitigated

3.123. Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction (2026) - Unmitigated

3.124. Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction (2026) - Mitigated

3.125. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing (2026) - Unmitigated

3.126. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing (2026) - Mitigated

3.127. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Unmitigated

3.128. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Mitigated

3.129. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Unmitigated

3.130. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Mitigated

3.131. Wall Transitions: Left Secant Pile Walls (2025) - Unmitigated

3.132. Wall Transitions: Left Secant Pile Walls (2025) - Mitigated

3.133. Wall Transitions: Right Secant Pile Wall (2025) - Unmitigated

3.134. Wall Transitions: Right Secant Pile Wall (2025) - Mitigated

3.135. Right Closure Wall: Work Platform Construction (2025) - Unmitigated

3.136. Right Closure Wall: Work Platform Construction (2025) - Mitigated

3.137. Right Closure Wall: Secant Pile Wall (2025) - Unmitigated

3.138. Right Closure Wall: Secant Pile Wall (2025) - Mitigated

3.139. Right Closure Wall: Backfill Concrete (2025) - Unmitigated

3.140. Right Closure Wall: Backfill Concrete (2025) - Mitigated

3.141. Wall Type 2 - Left: Leveling Concrete (2025) - Unmitigated

3.142. Wall Type 2 - Left: Leveling Concrete (2025) - Mitigated

3.143. Wall Type 2 - Left: 1 Inch Concrete Wall (2025) - Unmitigated

3.144. Wall Type 2 - Left: 1 Inch Concrete Wall (2025) - Mitigated

3.145. Wall Type 2 - Left: 2.5 Inch Concrete Wall (2025) - Unmitigated

3.146. Wall Type 2 - Left: 2.5 Inch Concrete Wall (2025) - Mitigated

3.147. Wall Type 2 - Left: Concrete Footing (2025) - Unmitigated

3.148. Wall Type 2 - Left: Concrete Footing (2025) - Mitigated

3.149. Wall Type 2 - Left: Backfill (2025) - Unmitigated

3.150. Wall Type 2 - Left: Backfill (2025) - Mitigated

3.151. Wall Type 2 - Left: Reinforced Concrete Wall (2025) - Unmitigated

3.152. Wall Type 2 - Left: Reinforced Concrete Wall (2025) - Mitigated

3.153. Wall Type 2 - Left: Footing Rock Anchors and Backfill (2025) - Unmitigated

3.154. Wall Type 2 - Left: Footing Rock Anchors and Backfill (2025) - Mitigated

3.155. Wall Type 2 - Wall Right: Leveling Concrete (2025) - Unmitigated

3.156. Wall Type 2 - Wall Right: Leveling Concrete (2025) - Mitigated

3.157. Wall Type 2 - Wall Right: 1 Inch Wall (2025) - Unmitigated

3.158. Wall Type 2 - Wall Right: 1 Inch Wall (2025) - Mitigated

3.159. Wall Type 2 - Wall Right: 2.5 Inch Wall (2025) - Unmitigated

3.160. Wall Type 2 - Wall Right: 2.5 Inch Wall (2025) - Mitigated

3.161. Wall Type 2 - Wall Right: Concrete Footing (2025) - Unmitigated

3.162. Wall Type 2 - Wall Right: Concrete Footing (2025) - Mitigated

3.163. Wall Type 2 - Wall Right: Backfill (2025) - Unmitigated

3.164. Wall Type 2 - Wall Right: Backfill (2025) - Mitigated

3.165. Wall Type 3 - Left: Roller Compacted Concrete (2025) - Unmitigated

3.166. Wall Type 3 - Left: Roller Compacted Concrete (2025) - Mitigated

3.167. Wall Type 3 - Left: CVC Facing (2025) - Unmitigated

3.168. Wall Type 3 - Left: CVC Facing (2025) - Mitigated

3.169. Wall Type 3 - Right: Roller Compacted Concrete (2025) - Unmitigated

3.170. Wall Type 3 - Right: Roller Compacted Concrete (2025) - Mitigated

3.171. Wall Type 3 - Right: CVC Facing (2025) - Unmitigated

3.172. Wall Type 3 - Right: CVC Facing (2025) - Mitigated

3.173. Wall Type 3 - Right: Backfill (2025) - Unmitigated

3.174. Wall Type 3 - Right: Backfill (2025) - Mitigated

3.175. Stilling Basin: RCC (2025) - Unmitigated

3.176. Stilling Basin: RCC (2025) - Mitigated

3.177. Stilling Basin: Upstream/Downstream CVC Facing (2025) - Unmitigated

3.178. Stilling Basin: Upstream/Downstream CVC Facing (2025) - Mitigated

3.179. Stilling Basin: Basin Steps (2025) - Unmitigated

3.180. Stilling Basin: Basin Steps (2025) - Mitigated

3.181. Stilling Basin: Chute Blocks (2025) - Unmitigated

3.182. Stilling Basin: Chute Blocks (2025) - Mitigated

3.183. Stilling Basin: Dentated Sill (2025) - Unmitigated

3.184. Stilling Basin: Dentated Sill (2025) - Mitigated

3.185. Spillway Slab Construction: RCC Foundation Support Block (2025) - Unmitigated

3.186. Spillway Slab Construction: RCC Foundation Support Block (2025) - Mitigated

3.187. Spillway Slab Construction: Spillway Chute Slab (2025) - Unmitigated

3.188. Spillway Slab Construction: Spillway Chute Slab (2025) - Mitigated

3.189. Spillway Slab Construction: Stilling Basin Slab (2025) - Unmitigated

3.190. Spillway Slab Construction: Stilling Basin Slab (2025) - Mitigated

3.191. Spillway Slab Construction: Zone B (2025) - Unmitigated

3.192. Spillway Slab Construction: Zone B (2025) - Mitigated

3.193. Spillway Slab Construction: Zone C (2025) - Unmitigated

3.194. Spillway Slab Construction: Zone C (2025) - Mitigated

3.195. Spillway Drains and Cleanouts: Wall Drains & Cleanouts (2025) - Unmitigated

3.196. Spillway Drains and Cleanouts: Wall Drains & Cleanouts (2025) - Mitigated

3.197. Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts (2025) - Unmitigated

3.198. Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts (2025) - Mitigated

3.199. Spillway Drains and Cleanouts: Transverse Drains & Cleanouts (2025) - Unmitigated

3.200. Spillway Drains and Cleanouts: Transverse Drains & Cleanouts (2025) - Mitigated

3.201. Spillway Drains and Cleanouts: Drain Gravel (2025) - Unmitigated

3.202. Spillway Drains and Cleanouts: Drain Gravel (2025) - Mitigated

3.203. Spillway Drains and Cleanouts: Filter Sand (2025) - Unmitigated

3.204. Spillway Drains and Cleanouts: Filter Sand (2025) - Mitigated

3.205. Surface Ditch from Landfill: Excavation (2026) - Unmitigated

3.206. Surface Ditch from Landfill: Excavation (2026) - Mitigated

3.207. Surface Ditch from Landfill: Drop Structures (2026) - Unmitigated

3.208. Surface Ditch from Landfill: Drop Structures (2026) - Mitigated

3.209. Surface Ditch from Landfill: Ditch Lining (2026) - Unmitigated

3.210. Surface Ditch from Landfill: Ditch Lining (2026) - Mitigated

3.211. Downstream Apron: Concrete Apron (2025) - Unmitigated

3.212. Downstream Apron: Concrete Apron (2025) - Mitigated

3.213. Downstream Apron: Zone C (2025) - Unmitigated

3.214. Downstream Apron: Zone C (2025) - Mitigated

3.215. Downstream Apron: Riprap Apron (2025) - Unmitigated

3.216. Downstream Apron: Riprap Apron (2025) - Mitigated

3.217. Downstream Apron: Riprap Bedding (2025) - Unmitigated

3.218. Downstream Apron: Riprap Bedding (2025) - Mitigated

3.219. Furnish and Install Electrical / Controls and Instrumentation (2026) - Unmitigated

3.220. Furnish and Install Electrical / Controls and Instrumentation (2026) - Mitigated

3.221. Furnish and Install Aeration System (2026) - Unmitigated

3.222. Furnish and Install Aeration System (2026) - Mitigated

3.223. Part 1 Furnish and Install Erosion Control Measures (2024) - Unmitigated

3.224. Part 1 Furnish and Install Erosion Control Measures (2024) - Mitigated

3.225. Part 2 Furnish and Install Erosion Control Measures (2025) - Unmitigated

3.226. Part 2 Furnish and Install Erosion Control Measures (2025) - Mitigated

3.227. Part 3 Furnish and Install Erosion Control Measures (2026) - Unmitigated

3.228. Part 3 Furnish and Install Erosion Control Measures (2026) - Mitigated

3.229. Embankment Mitigation (2025) - Unmitigated

3.230. Embankment Mitigation (2025) - Mitigated

3.231. Embankment Mitigation (2026) - Unmitigated

3.232. Embankment Mitigation (2026) - Mitigated

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

5. Activity Data

5.1. Construction Schedule

5.2. Off-Road Equipment

5.2.1. Unmitigated

5.2.2. Mitigated

5.3. Construction Vehicles

5.3.1. Unmitigated

5.3.2. Mitigated

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

5.5. Architectural Coatings

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

5.6.2. Construction Earthmoving Control Strategies

5.7. Construction Paving

5.8. Construction Electricity Consumption and Emissions Factors

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

5.18.1.2. Mitigated

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

5.18.1.2. Mitigated

5.18.2. Sequestration

5.18.2.1. Unmitigated

5.18.2.2. Mitigated

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

6.2. Initial Climate Risk Scores

6.3. Adjusted Climate Risk Scores

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

7.2. Healthy Places Index Scores

7.3. Overall Health & Equity Scores

7.4. Health & Equity Measures

7.5. Evaluation Scorecard

7.6. Health & Equity Custom Measures

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Santiago Creek Dam v2
Construction Start Date	9/1/2024
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.50
Precipitation (days)	2.20
Location	Irvine Lake, California 92676, USA
County	Orange
City	Unincorporated
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5797
EDFZ	7
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.28

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Linear	0.09	Mile	0.00	0.00	—	—	—	Irvine Lake Pipeline
General Light Industry	16.0	1000sqft	0.37	16,000	0.00	—	—	Inlet/Outlet Structure

Road Construction	0.06	Mile	0.09	0.00	—	—	—	Access Roadway
Bridge/Overpass Construction	0.03	Mile	0.06	0.00	—	—	—	Spillway Vehicle Bridge
User Defined Linear	0.25	Mile	0.40	0.00	—	—	—	MSE Wall (Dam Crest Widening)
General Light Industry	0.94	1000sqft	0.02	936	936	0.00	—	Dam Control Building
User Defined Linear	0.08	Mile	0.00	0.00	—	—	—	Emergency Outlet Pipe
User Defined Linear	0.20	Mile	2.97	0.00	—	—	—	Spillway Chute

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-5	Use Advanced Engine Tiers

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	241	468	573	1.40	18.1	55.5	68.1	16.6	20.5	34.6	154,101
Mit.	221	147	749	1.40	5.53	55.5	61.0	4.58	20.5	25.1	154,101
% Reduced	8%	69%	-31%	—	69%	—	10%	72%	—	27%	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	54.9	472	501	1.32	18.8	43.0	55.6	17.3	21.4	34.9	144,033
Mit.	19.3	137	733	1.32	4.41	43.0	43.9	4.26	21.4	22.3	144,033
% Reduced	65%	71%	-46%	—	76%	—	21%	75%	—	36%	—

Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	30.2	149	178	0.42	6.03	23.8	29.9	5.51	11.2	16.7	46,835
Mit.	18.9	46.5	244	0.42	1.58	23.8	25.4	1.48	11.2	12.7	46,835
% Reduced	38%	69%	-37%	—	74%	—	15%	73%	—	24%	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.51	27.2	32.4	0.08	1.10	4.35	5.45	1.01	2.04	3.05	7,754
Mit.	3.44	8.50	44.5	0.08	0.29	4.35	4.64	0.27	2.04	2.31	7,754
% Reduced	38%	69%	-37%	—	74%	—	15%	73%	—	24%	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
2024	4.74	49.2	42.8	0.17	1.71	3.64	5.35	1.58	0.88	2.46	22,433
2025	241	468	573	1.40	18.1	55.5	68.1	16.6	20.5	34.6	154,101
2026	46.4	374	433	1.11	15.2	36.9	52.1	14.0	17.7	31.7	121,889
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
2024	22.8	205	179	0.59	7.75	13.4	21.2	7.14	5.41	12.5	68,598
2025	54.9	472	501	1.32	18.8	43.0	55.6	17.3	21.4	34.9	144,033
2026	33.9	280	349	1.01	10.9	34.3	36.9	10.1	17.1	19.4	110,312
2027	6.87	59.2	55.8	0.14	2.51	28.5	31.0	2.31	13.1	15.4	16,013
Average Daily	—	—	—	—	—	—	—	—	—	—	—
2024	2.79	25.5	23.1	0.08	0.94	2.25	3.19	0.87	0.95	1.82	9,388
2025	30.2	149	178	0.42	6.03	23.8	29.9	5.51	11.2	16.7	46,835
2026	13.2	108	129	0.34	4.42	14.2	18.6	4.07	6.70	10.8	38,043

2027	0.42	3.58	3.38	0.01	0.15	1.72	1.87	0.14	0.79	0.93	969
Annual	—	—	—	—	—	—	—	—	—	—	—
2024	0.51	4.66	4.21	0.01	0.17	0.41	0.58	0.16	0.17	0.33	1,554
2025	5.51	27.2	32.4	0.08	1.10	4.35	5.45	1.01	2.04	3.05	7,754
2026	2.42	19.7	23.5	0.06	0.81	2.59	3.39	0.74	1.22	1.97	6,298
2027	0.08	0.65	0.62	< 0.005	0.03	0.31	0.34	0.03	0.14	0.17	160

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
2024	1.73	21.8	69.0	0.17	0.44	3.64	4.07	0.43	0.88	1.31	22,433
2025	221	147	749	1.40	5.53	55.5	61.0	4.58	20.5	25.1	154,101
2026	15.9	112	617	1.11	3.62	36.9	40.5	3.50	17.7	21.2	121,889
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
2024	6.11	45.7	293	0.59	1.29	13.4	14.7	1.28	5.41	6.69	68,598
2025	19.3	137	733	1.32	4.41	43.0	43.9	4.26	21.4	22.3	144,033
2026	13.5	87.4	560	1.01	2.99	34.3	34.7	2.91	17.1	17.4	110,312
2027	1.52	9.04	76.0	0.14	0.29	28.5	28.8	0.29	13.1	13.4	16,013
Average Daily	—	—	—	—	—	—	—	—	—	—	—
2024	0.84	7.41	36.8	0.08	0.19	2.25	2.44	0.19	0.95	1.14	9,388
2025	18.9	46.5	244	0.42	1.58	23.8	25.4	1.48	11.2	12.7	46,835
2026	4.68	32.7	190	0.34	1.04	14.2	15.2	1.01	6.70	7.71	38,043
2027	0.09	0.55	4.60	0.01	0.02	1.72	1.74	0.02	0.79	0.81	969
Annual	—	—	—	—	—	—	—	—	—	—	—
2024	0.15	1.35	6.72	0.01	0.04	0.41	0.45	0.03	0.17	0.21	1,554

2025	3.44	8.50	44.5	0.08	0.29	4.35	4.64	0.27	2.04	2.31	7,754
2026	0.85	5.97	34.8	0.06	0.19	2.59	2.78	0.18	1.22	1.41	6,298
2027	0.02	0.10	0.84	< 0.005	< 0.005	0.31	0.32	< 0.005	0.14	0.15	160

3. Construction Emissions Details

3.1. Part 1 Site Demolition (Excludes Spillway) (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.84	6.78	6.59	0.03	0.24	—	0.24	0.22	—	0.22	3,114
Demolition	—	—	—	—	—	0.78	0.78	—	0.12	0.12	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.41	0.40	< 0.005	0.01	—	0.01	0.01	—	0.01	188
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	31.1
Demolition	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.26	0.00	0.00	0.07	0.07	0.00	0.02	0.02	65.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.99
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.2. Part 1 Site Demolition (Excludes Spillway) (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	1.53	15.3	0.03	0.06	—	0.06	0.06	—	0.06	3,114
Demolition	—	—	—	—	—	0.78	0.78	—	0.12	0.12	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.02	0.09	0.92	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	188
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	31.1
Demolition	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.26	0.00	0.00	0.07	0.07	0.00	0.02	0.02	65.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.99
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Part 2 Site Demolition (Excludes Spillway) (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.79	5.81	6.56	0.03	0.21	—	0.21	0.20	—	0.20	3,116
Demolition	—	—	—	—	—	0.78	0.78	—	0.12	0.12	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.35	0.40	< 0.005	0.01	—	0.01	0.01	—	0.01	188
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	31.1
Demolition	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.28	0.00	0.00	0.07	0.07	0.00	0.02	0.02	67.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.91
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.65
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Part 2 Site Demolition (Excludes Spillway) (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	1.53	15.3	0.03	0.06	—	0.06	0.06	—	0.06	3,116
Demolition	—	—	—	—	—	0.78	0.78	—	0.12	0.12	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.09	0.92	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	188
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	31.1
Demolition	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.28	0.00	0.00	0.07	0.07	0.00	0.02	0.02	67.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.91
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.65
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Spillway Demolition: Existing Spillway Demo (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	87.9	26.0	147	0.06	2.24	—	2.24	1.82	—	1.82	5,619
Demolition	—	—	—	—	—	4.41	4.41	—	0.67	0.67	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.30	1.57	8.89	< 0.005	0.14	—	0.14	0.11	—	0.11	339
Demolition	—	—	—	—	—	0.27	0.27	—	0.04	0.04	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.97	0.29	1.62	< 0.005	0.02	—	0.02	0.02	—	0.02	56.1
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.12	0.12	1.96	0.00	0.00	0.46	0.46	0.00	0.11	0.11	471
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	1.36	0.64	0.01	0.01	0.26	0.28	0.01	0.07	0.09	1,082
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.11	0.00	0.00	0.03	0.03	0.00	0.01	0.01	27.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	65.2
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	4.53
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	10.8

3.6. Spillway Demolition: Existing Spillway Demo (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	85.4	15.5	152	0.06	1.57	—	1.57	1.21	—	1.21	5,619
Demolition	—	—	—	—	—	4.41	4.41	—	0.67	0.67	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.15	0.94	9.19	< 0.005	0.09	—	0.09	0.07	—	0.07	339
Demolition	—	—	—	—	—	0.27	0.27	—	0.04	0.04	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.94	0.17	1.68	< 0.005	0.02	—	0.02	0.01	—	0.01	56.1
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.12	0.12	1.96	0.00	0.00	0.46	0.46	0.00	0.11	0.11	471
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	1.36	0.64	0.01	0.01	0.26	0.28	0.01	0.07	0.09	1,082
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.11	0.00	0.00	0.03	0.03	0.00	0.01	0.01	27.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	65.2
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	4.53
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	10.8

3.7. Spillway Demolition: Crush Concrete Demo (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	44.6	15.3	75.8	0.07	1.25	—	1.25	1.03	—	1.03	7,337
Demolition	—	—	—	—	—	9.80	9.80	—	1.48	1.48	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.69	0.92	4.57	< 0.005	0.08	—	0.08	0.06	—	0.06	442
Demolition	—	—	—	—	—	0.59	0.59	—	0.09	0.09	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	0.17	0.83	< 0.005	0.01	—	0.01	0.01	—	0.01	73.2
Demolition	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.70	0.00	0.00	0.16	0.16	0.00	0.04	0.04	168
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	9.77
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.8. Spillway Demolition: Crush Concrete Demo (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	43.1	4.62	95.7	0.07	0.87	—	0.87	0.69	—	0.69	7,337
Demolition	—	—	—	—	—	9.80	9.80	—	1.48	1.48	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.60	0.28	5.77	< 0.005	0.05	—	0.05	0.04	—	0.04	442
Demolition	—	—	—	—	—	0.59	0.59	—	0.09	0.09	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.47	0.05	1.05	< 0.005	0.01	—	0.01	0.01	—	0.01	73.2
Demolition	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.70	0.00	0.00	0.16	0.16	0.00	0.04	0.04	168
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	9.77
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Spillway Demolition: Bridge Pier and Facing Demo (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	87.9	26.0	147	0.06	2.24	—	2.24	1.82	—	1.82	5,619
Demolition	—	—	—	—	—	4.41	4.41	—	0.67	0.67	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.30	1.57	8.89	< 0.005	0.14	—	0.14	0.11	—	0.11	339
Demolition	—	—	—	—	—	0.27	0.27	—	0.04	0.04	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.97	0.29	1.62	< 0.005	0.02	—	0.02	0.02	—	0.02	56.1
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.12	0.12	1.96	0.00	0.00	0.46	0.46	0.00	0.11	0.11	471
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.11	0.00	0.00	0.03	0.03	0.00	0.01	0.01	27.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	4.53
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.10. Spillway Demolition: Bridge Pier and Facing Demo (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	85.4	15.5	152	0.06	1.57	—	1.57	1.21	—	1.21	5,619
Demolition	—	—	—	—	—	4.41	4.41	—	0.67	0.67	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.15	0.94	9.19	< 0.005	0.09	—	0.09	0.07	—	0.07	339
Demolition	—	—	—	—	—	0.27	0.27	—	0.04	0.04	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.94	0.17	1.68	< 0.005	0.02	—	0.02	0.01	—	0.01	56.1
Demolition	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.12	0.12	1.96	0.00	0.00	0.46	0.46	0.00	0.11	0.11	471
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.11	0.00	0.00	0.03	0.03	0.00	0.01	0.01	27.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	4.53
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Temporary Flood Control Berm (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.13	40.2	38.8	0.12	1.60	—	1.60	1.47	—	1.47	12,868
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	2.42	2.34	0.01	0.10	—	0.10	0.09	—	0.09	776
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.44	0.43	< 0.005	0.02	—	0.02	0.02	—	0.02	128
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.08	0.91	0.00	0.00	0.23	0.23	0.00	0.05	0.05	228
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	14.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.31
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Temporary Flood Control Berm (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	6.31	64.2	0.12	0.24	—	0.24	0.24	—	0.24	12,868
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.38	3.87	0.01	0.01	—	0.01	0.01	—	0.01	776

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.71	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	128
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.08	0.91	0.00	0.00	0.23	0.23	0.00	0.05	0.05	228
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	14.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.31
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Mobilization (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.56	29.5	28.9	0.10	1.10	—	1.10	1.01	—	1.01	10,589

Dust From Material Movement	—	—	—	—	—	0.67	0.67	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.56	29.5	28.9	0.10	1.10	—	1.10	1.01	—	1.01	10,589
Dust From Material Movement	—	—	—	—	—	0.67	0.67	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	1.78	1.74	0.01	0.07	—	0.07	0.06	—	0.06	638
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.32	0.32	< 0.005	0.01	—	0.01	0.01	—	0.01	106
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.09	1.35	0.00	0.00	0.29	0.29	0.00	0.07	0.07	309
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.82	0.38	< 0.005	0.01	0.15	0.16	0.01	0.04	0.05	642
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.08	0.10	1.17	0.00	0.00	0.29	0.29	0.00	0.07	0.07	294
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.85	0.39	< 0.005	0.01	0.15	0.16	0.01	0.04	0.05	641
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	18.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.05	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	38.6
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.97
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.40

3.14. Mobilization (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.00	5.20	54.6	0.10	0.20	—	0.20	0.20	—	0.20	10,589
Dust From Material Movement	—	—	—	—	—	0.67	0.67	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.00	5.20	54.6	0.10	0.20	—	0.20	0.20	—	0.20	10,589
Dust From Material Movement	—	—	—	—	—	0.67	0.67	—	0.07	0.07	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.31	3.29	0.01	0.01	—	0.01	0.01	—	0.01	638
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.60	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	106
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.09	1.35	0.00	0.00	0.29	0.29	0.00	0.07	0.07	309
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	0.82	0.38	< 0.005	0.01	0.15	0.16	0.01	0.04	0.05	642
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.10	1.17	0.00	0.00	0.29	0.29	0.00	0.07	0.07	294
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.85	0.39	< 0.005	0.01	0.15	0.16	0.01	0.04	0.05	641
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	18.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.05	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	38.6
Annual	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.97
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.40

3.15. Demobilization (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.28	23.7	28.5	0.10	0.89	—	0.89	0.81	—	0.81	10,606
Dust From Material Movement	—	—	—	—	—	0.67	0.67	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.43	1.72	0.01	0.05	—	0.05	0.05	—	0.05	639
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.26	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	106
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	1.02	0.00	0.00	0.29	0.29	0.00	0.07	0.07	282
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.68	0.31	< 0.005	0.01	0.13	0.14	0.01	0.04	0.04	530
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	17.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.0
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.86
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.29

3.16. Demobilization (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.00	5.20	54.6	0.10	0.20	—	0.20	0.20	—	0.20	10,606
Dust From Material Movement	—	—	—	—	—	0.67	0.67	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.31	3.29	0.01	0.01	—	0.01	0.01	—	0.01	639
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.60	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	106
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	1.02	0.00	0.00	0.29	0.29	0.00	0.07	0.07	282
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.68	0.31	< 0.005	0.01	0.13	0.14	0.01	0.04	0.04	530
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	17.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.0
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.86
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.29

3.17. Cleanup (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	6.16	53.3	47.6	0.12	2.20	—	2.20	2.03	—	2.03	13,529
Dust From Material Movement	—	—	—	—	—	27.9	27.9	—	13.0	13.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.37	3.21	2.87	0.01	0.13	—	0.13	0.12	—	0.12	815
Dust From Material Movement	—	—	—	—	—	1.68	1.68	—	0.78	0.78	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.59	0.52	< 0.005	0.02	—	0.02	0.02	—	0.02	135
Dust From Material Movement	—	—	—	—	—	0.31	0.31	—	0.14	0.14	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.05	0.05	0.74	0.00	0.00	0.23	0.23	0.00	0.05	0.05	216
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.22	0.10	< 0.005	< 0.005	0.04	0.05	< 0.005	0.01	0.01	174
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	13.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	10.5
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.19
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.73

3.18. Cleanup (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.27	6.61	66.1	0.12	0.25	—	0.25	0.25	—	0.25	13,529
Dust From Material Movement	—	—	—	—	—	27.9	27.9	—	13.0	13.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.40	3.99	0.01	0.02	—	0.02	0.02	—	0.02	815

Dust From Material Movement	—	—	—	—	—	1.68	1.68	—	0.78	0.78	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.73	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	135
Dust From Material Movement	—	—	—	—	—	0.31	0.31	—	0.14	0.14	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.74	0.00	0.00	0.23	0.23	0.00	0.05	0.05	216
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.22	0.10	< 0.005	< 0.005	0.04	0.05	< 0.005	0.01	0.01	174
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	13.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	10.5
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.19
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.73

3.19. Allowance for Piping Install (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.76	6.40	7.55	0.03	0.24	—	0.24	0.22	—	0.22	2,828
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.39	0.46	< 0.005	0.01	—	0.01	0.01	—	0.01	170
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	28.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.39	0.00	0.00	0.10	0.10	0.00	0.02	0.02	97.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.99
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.99
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.20. Allowance for Piping Install (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	1.39	14.9	0.03	0.05	—	0.05	0.05	—	0.05	2,828
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.08	0.90	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	170
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.16	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	28.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.39	0.00	0.00	0.10	0.10	0.00	0.02	0.02	97.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.99

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.99
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.21. Bypass Pumping Diversion Beam (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.40	1.58	< 0.005	0.10	—	0.10	0.09	—	0.09	313
Dust From Material Movement	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.40	1.58	< 0.005	0.10	—	0.10	0.09	—	0.09	313
Dust From Material Movement	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.51	0.34	< 0.005	0.02	—	0.02	0.02	—	0.02	66.8

Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	11.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.15	0.00	0.00	0.03	0.03	0.00	0.01	0.01	34.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.19	11.3	4.92	0.06	0.11	2.32	2.43	0.11	0.65	0.76	9,565
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.18	11.7	4.96	0.06	0.11	2.32	2.43	0.11	0.65	0.76	9,550
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	7.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	2.52	1.06	0.01	0.02	0.50	0.52	0.02	0.14	0.16	2,042
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.17
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.46	0.19	< 0.005	< 0.005	0.09	0.09	< 0.005	0.03	0.03	338

3.22. Bypass Pumping Diversion Beam (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.40	1.58	< 0.005	0.10	—	0.10	0.09	—	0.09	313
Dust From Material Movement	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.40	1.58	< 0.005	0.10	—	0.10	0.09	—	0.09	313
Dust From Material Movement	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.51	0.34	< 0.005	0.02	—	0.02	0.02	—	0.02	66.8
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	11.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.15	0.00	0.00	0.03	0.03	0.00	0.01	0.01	34.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.19	11.3	4.92	0.06	0.11	2.32	2.43	0.11	0.65	0.76	9,565
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.18	11.7	4.96	0.06	0.11	2.32	2.43	0.11	0.65	0.76	9,550
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	7.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	2.52	1.06	0.01	0.02	0.50	0.52	0.02	0.14	0.16	2,042
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.17
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.46	0.19	< 0.005	< 0.005	0.09	0.09	< 0.005	0.03	0.03	338

3.23. Inclined Inlet Structure: Steel Pipe and Appurtenances (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.49	12.9	14.7	0.03	0.47	—	0.47	0.43	—	0.43	2,755

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.49	12.9	14.7	0.03	0.47	—	0.47	0.43	—	0.43	2,755
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	2.37	2.69	< 0.005	0.09	—	0.09	0.08	—	0.08	506
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.43	0.49	< 0.005	0.02	—	0.02	0.01	—	0.01	83.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.80

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.81
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.24. Inclined Inlet Structure: Steel Pipe and Appurtenances (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	6.19	16.7	0.03	0.05	—	0.05	0.05	—	0.05	2,755
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	6.19	16.7	0.03	0.05	—	0.05	0.05	—	0.05	2,755
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	1.14	3.06	< 0.005	0.01	—	0.01	0.01	—	0.01	506
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.21	0.56	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	83.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.81
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.25. Inclined Inlet Structure: Reinforced Concrete (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.25	21.6	21.9	0.07	0.80	—	0.80	0.73	—	0.73	6,749
Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.25	21.6	21.9	0.07	0.80	—	0.80	0.73	—	0.73	6,749

Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	2.60	2.65	0.01	0.10	—	0.10	0.09	—	0.09	814
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.47	0.48	< 0.005	0.02	—	0.02	0.02	—	0.02	135
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.09	4.70	2.22	0.02	0.04	0.91	0.95	0.04	0.25	0.30	3,742
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.09	4.88	2.24	0.02	0.04	0.91	0.95	0.04	0.25	0.30	3,736
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1

Hauling	0.01	0.59	0.27	< 0.005	0.01	0.11	0.11	0.01	0.03	0.04	451
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	< 0.005	0.11	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	74.6

3.26. Inclined Inlet Structure: Reinforced Concrete (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	7.35	35.2	0.07	0.29	—	0.29	0.28	—	0.28	6,749
Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	7.35	35.2	0.07	0.29	—	0.29	0.28	—	0.28	6,749
Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.89	4.25	0.01	0.04	—	0.04	0.03	—	0.03	814
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	0.78	< 0.005	0.01	—	0.01	0.01	—	0.01	135
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.09	4.70	2.22	0.02	0.04	0.91	0.95	0.04	0.25	0.30	3,742
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.09	4.88	2.24	0.02	0.04	0.91	0.95	0.04	0.25	0.30	3,736
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.01	0.59	0.27	< 0.005	0.01	0.11	0.11	0.01	0.03	0.04	451
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	< 0.005	0.11	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	74.6

3.27. Inclined Inlet Structure: Drilled Foundation Anchors (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.09	8.92	12.8	0.05	0.34	—	0.34	0.31	—	0.31	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.54	0.77	< 0.005	0.02	—	0.02	0.02	—	0.02	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.28. Inclined Inlet Structure: Drilled Foundation Anchors (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	2.60	27.6	0.05	0.10	—	0.10	0.10	—	0.10	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	1.66	< 0.005	0.01	—	0.01	0.01	—	0.01	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.30	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.29. Inclined Inlet Structure: Excavation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.79	11.0	12.8	0.06	0.39	—	0.39	0.36	—	0.36	6,006
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.66	0.77	< 0.005	0.02	—	0.02	0.02	—	0.02	362
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.12	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	59.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.30. Inclined Inlet Structure: Excavation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.57	2.95	29.5	0.06	0.11	—	0.11	0.11	—	0.11	6,006
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.18	1.78	< 0.005	0.01	—	0.01	0.01	—	0.01	362
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.03	0.32	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	59.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.31. Inclined Inlet Structure: Stainless Steel Platform (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.70	6.49	8.40	0.02	0.27	—	0.27	0.25	—	0.25	2,035

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.39	0.51	< 0.005	0.02	—	0.02	0.02	—	0.02	123
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	20.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.32. Inclined Inlet Structure: Stainless Steel Platform (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	1.00	11.6	0.02	0.04	—	0.04	0.04	—	0.04	2,035
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.70	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	123
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.13	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	20.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.33. Inclined Inlet Structure: Pneumatic Actuation Control System (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.70	6.49	8.40	0.02	0.27	—	0.27	0.25	—	0.25	2,035
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.39	0.51	< 0.005	0.02	—	0.02	0.02	—	0.02	123
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	20.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56

Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.34. Inclined Inlet Structure: Pneumatic Actuation Control System (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	1.00	11.6	0.02	0.04	—	0.04	0.04	—	0.04	2,035
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.70	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	123
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.13	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	20.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.35. Cofferdam Installation and Removal: Install Cofferdam H/King Piles (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	12.4	12.5	0.03	0.41	—	0.41	0.38	—	0.38	3,304
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	2.24	2.25	0.01	0.08	—	0.08	0.07	—	0.07	597
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.41	0.41	< 0.005	0.01	—	0.01	0.01	—	0.01	98.9

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.7
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.76
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.77
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.36. Cofferdam Installation and Removal: Install Cofferdam H/King Piles (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	3.17	17.9	0.03	0.06	—	0.06	0.06	—	0.06	3,304
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.06	0.57	3.24	0.01	0.01	—	0.01	0.01	—	0.01	597
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.59	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	98.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.7
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.76
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.77
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.37. Cofferdam Installation and Removal: Dewatering (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.59	4.77	3.15	0.01	0.19	—	0.19	0.18	—	0.18	625
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.57	0.38	< 0.005	0.02	—	0.02	0.02	—	0.02	75.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	12.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.38. Cofferdam Installation and Removal: Dewatering (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.59	4.77	3.15	0.01	0.19	—	0.19	0.18	—	0.18	625
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.57	0.38	< 0.005	0.02	—	0.02	0.02	—	0.02	75.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	12.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.39. Cofferdam Installation and Removal: Remove Cofferdam H/King Piles (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.12	11.8	12.3	0.03	0.39	—	0.39	0.36	—	0.36	3,303
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.71	0.74	< 0.005	0.02	—	0.02	0.02	—	0.02	199
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.13	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	33.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.40. Cofferdam Installation and Removal: Remove Cofferdam H/King Piles (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	3.17	17.9	0.03	0.06	—	0.06	0.06	—	0.06	3,303
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.19	1.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	199
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.20	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	33.0

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.41. Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.66	58.6	40.1	0.10	2.30	—	2.30	2.12	—	2.12	11,306
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.34	3.53	2.42	0.01	0.14	—	0.14	0.13	—	0.13	681
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.64	0.44	< 0.005	0.03	—	0.03	0.02	—	0.02	113
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.42. Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	5.54	55.4	0.10	0.21	—	0.21	0.21	—	0.21	11,306
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.33	3.34	0.01	0.01	—	0.01	0.01	—	0.01	681
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.61	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	113
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.43. Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.90	26.5	23.0	0.06	1.09	—	1.09	1.00	—	1.00	6,097
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.60	1.39	< 0.005	0.07	—	0.07	0.06	—	0.06	367
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.29	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	60.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.44. Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.57	2.98	29.8	0.06	0.11	—	0.11	0.11	—	0.11	6,097
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.18	1.80	< 0.005	0.01	—	0.01	0.01	—	0.01	367
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	60.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.45. Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	10.7	7.86	0.02	0.38	—	0.38	0.35	—	0.35	2,674
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.65	0.47	< 0.005	0.02	—	0.02	0.02	—	0.02	161
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	26.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.46. Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	1.31	14.2	0.02	0.05	—	0.05	0.05	—	0.05	2,674
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.02	0.08	0.85	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	161
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.16	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	26.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.47. Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.52	18.7	18.2	0.06	0.80	—	0.80	0.73	—	0.73	6,737
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.12	1.10	< 0.005	0.05	—	0.05	0.04	—	0.04	406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.21	0.20	< 0.005	0.01	—	0.01	0.01	—	0.01	67.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.48. Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	3.60	34.7	0.06	0.14	—	0.14	0.14	—	0.14	6,737
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.22	2.09	< 0.005	0.01	—	0.01	0.01	—	0.01	406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.38	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	67.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.49. Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	2.25	4.48	0.01	0.11	—	0.11	0.10	—	0.10	788
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.14	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	47.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.86
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.50. Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.39	5.52	0.01	0.01	—	0.01	0.01	—	0.01	788
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.86
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.51. Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.32	11.5	17.1	0.04	0.48	—	0.48	0.44	—	0.44	3,806
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.08	0.69	1.03	< 0.005	0.03	—	0.03	0.03	—	0.03	229
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.13	0.19	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	38.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.52. Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.63	4.02	23.5	0.04	0.16	—	0.16	0.15	—	0.15	3,806
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.24	1.42	< 0.005	0.01	—	0.01	0.01	—	0.01	229
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.26	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	38.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.68
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.66
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.94
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.53. Dam Control Building: Pt 1 CMU Control Building (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	2.55	3.55	0.01	0.21	—	0.21	0.19	—	0.19	563
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	2.55	3.55	0.01	0.21	—	0.21	0.19	—	0.19	563
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.47	0.65	< 0.005	0.04	—	0.04	0.04	—	0.04	103
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	17.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.01	0.64	0.28	< 0.005	0.01	0.14	0.15	0.01	0.04	0.05	564
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.01	0.66	0.29	< 0.005	0.01	0.14	0.15	0.01	0.04	0.05	564
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.6
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.7
Hauling	< 0.005	0.12	0.05	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	104
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.75
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.76
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.1

3.54. Dam Control Building: Pt 1 CMU Control Building (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	1.04	3.92	0.01	0.01	—	0.01	0.01	—	0.01	563

Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	1.04	3.92	0.01	0.01	—	0.01	0.01	—	0.01	563
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.19	0.72	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	103
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.13	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	17.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.01	0.64	0.28	< 0.005	0.01	0.14	0.15	0.01	0.04	0.05	564
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.01	0.66	0.29	< 0.005	0.01	0.14	0.15	0.01	0.04	0.05	564
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.6
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.7
Hauling	< 0.005	0.12	0.05	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	104
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.75
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.76
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.1

3.55. Dam Control Building: Pt 2 CMU Control Building (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	2.55	3.55	0.01	0.21	—	0.21	0.19	—	0.19	563
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	34.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	5.65

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.49
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.52
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.91
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.56. Dam Control Building: Pt 2 CMU Control Building (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	1.04	3.92	0.01	0.01	—	0.01	0.01	—	0.01	563
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.06	0.24	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	34.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	5.65
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.49
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.52
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.91
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.57. Dam Control Building: Pt 2 CMU Control Building (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.32	2.44	3.56	0.01	0.20	—	0.20	0.18	—	0.18	564
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.16	0.23	< 0.005	0.01	—	0.01	0.01	—	0.01	36.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.03
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.30	0.00	0.00	0.09	0.09	0.00	0.02	0.02	87.7
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	89.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.75
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.76
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.95
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.95
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.58. Dam Control Building: Pt 2 CMU Control Building (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	1.04	3.92	0.01	0.01	—	0.01	0.01	—	0.01	564
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.07	0.25	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	36.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.03
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.30	0.00	0.00	0.09	0.09	0.00	0.02	0.02	87.7
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	89.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.75
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.76

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.95
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.95
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.59. Dam Control Building: Reinforced Concrete Foundation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.80	6.38	10.6	0.02	0.26	—	0.26	0.24	—	0.24	2,287
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.38	0.64	< 0.005	0.02	—	0.02	0.01	—	0.01	138
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.12	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	22.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.60. Dam Control Building: Reinforced Concrete Foundation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	3.25	14.2	0.02	0.13	—	0.13	0.12	—	0.12	2,287
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.20	0.85	< 0.005	0.01	—	0.01	0.01	—	0.01	138
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.16	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	22.8

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.61. Dam Control Building: Metal Frame Roofing (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.52	4.76	4.83	0.01	0.20	—	0.20	0.18	—	0.18	1,408
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.03	0.29	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	84.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	14.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.62. Dam Control Building: Metal Frame Roofing (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.69	7.26	0.01	0.03	—	0.03	0.03	—	0.03	1,408
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	84.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	14.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.63. Dam Control Building: Ancillary Features (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.28	2.44	2.90	0.01	0.10	—	0.10	0.10	—	0.10	787
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.17	< 0.005	0.01	—	0.01	0.01	—	0.01	47.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.85
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.30	0.00	0.00	0.09	0.09	0.00	0.02	0.02	87.7
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	89.1
Hauling	0.01	0.50	0.23	< 0.005	< 0.005	0.10	0.10	< 0.005	0.03	0.03	390
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.36
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.37

Hauling	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	23.5
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.89
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.89
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.90

3.64. Dam Control Building: Ancillary Features (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.39	4.21	0.01	0.01	—	0.01	0.01	—	0.01	787
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.25	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.85
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.30	0.00	0.00	0.09	0.09	0.00	0.02	0.02	87.7

Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	89.1
Hauling	0.01	0.50	0.23	< 0.005	< 0.005	0.10	0.10	< 0.005	0.03	0.03	390
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.36
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.37
Hauling	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	23.5
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.89
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.89
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.90

3.65. Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.45	16.9	17.3	0.06	0.80	—	0.80	0.73	—	0.73	6,247
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.02	1.04	< 0.005	0.05	—	0.05	0.04	—	0.04	377
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.19	0.19	< 0.005	0.01	—	0.01	0.01	—	0.01	62.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.66. Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.59	3.06	32.3	0.06	0.12	—	0.12	0.12	—	0.12	6,247
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.18	1.95	< 0.005	0.01	—	0.01	0.01	—	0.01	377
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.36	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	62.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.67. Downstream Outlet Works Piping and Vault: Structure Bkfl (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	2.03	13.3	14.4	0.06	0.48	—	0.48	0.44	—	0.44	6,535
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.80	0.87	< 0.005	0.03	—	0.03	0.03	—	0.03	394
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.16	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	65.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.68. Downstream Outlet Works Piping and Vault: Structure Bkfl (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.65	3.50	32.1	0.06	0.13	—	0.13	0.13	—	0.13	6,535
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.21	1.94	< 0.005	0.01	—	0.01	0.01	—	0.01	394
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.35	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	65.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.69. Downstream Outlet Works Piping and Vault: Reinforced Conc Structures (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.52	12.9	18.8	0.04	0.52	—	0.52	0.48	—	0.48	4,403
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.37	3.10	4.54	0.01	0.13	—	0.13	0.12	—	0.12	1,062
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.57	0.83	< 0.005	0.02	—	0.02	0.02	—	0.02	176
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	22.2
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	22.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.68
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.69
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.70. Downstream Outlet Works Piping and Vault: Reinforced Conc Structures (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.81	5.27	26.2	0.04	0.21	—	0.21	0.20	—	0.20	4,403
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	1.27	6.31	0.01	0.05	—	0.05	0.05	—	0.05	1,062
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.23	1.15	< 0.005	0.01	—	0.01	0.01	—	0.01	176

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	22.2
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	22.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.68
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.69
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.71. Downstream Outlet Works Piping and Vault: Piping and Valves (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	7.28	9.50	0.01	0.25	—	0.25	0.23	—	0.23	1,335
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.16	1.32	1.72	< 0.005	0.05	—	0.05	0.04	—	0.04	241
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.24	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	40.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.7
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.76
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.77
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.72. Downstream Outlet Works Piping and Vault: Piping and Valves (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.18	4.75	9.35	0.01	0.02	—	0.02	0.02	—	0.02	1,335
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.86	1.69	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	241
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.16	0.31	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	40.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.7
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.76
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.77
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.73. Downstream Outlet Works Piping and Vault: Steel Casing (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	7.28	9.50	0.01	0.25	—	0.25	0.23	—	0.23	1,335
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.44	0.57	< 0.005	0.02	—	0.02	0.01	—	0.01	80.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.74. Downstream Outlet Works Piping and Vault: Steel Casing (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	4.75	9.35	0.01	0.02	—	0.02	0.02	—	0.02	1,335
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.29	0.56	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	80.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.05	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.75. Downstream Outlet Works Piping and Vault: Ladders and Platforms (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.81	2.94	0.01	0.12	—	0.12	0.11	—	0.11	787
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.17	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	47.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.85

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.76. Downstream Outlet Works Piping and Vault: Ladders and Platforms (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.39	4.21	0.01	0.01	—	0.01	0.01	—	0.01	787
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.02	0.25	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.85
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.77. Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41	2.97	3.43	0.01	0.11	—	0.11	0.10	—	0.10	1,604
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.21	< 0.005	0.01	—	0.01	0.01	—	0.01	96.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	16.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.78. Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	0.94	7.91	0.01	0.04	—	0.04	0.04	—	0.04	1,604
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.48	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	96.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	16.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56

Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.79. Downstream Outlet Works Piping and Vault: Dewatering (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.38	1.57	< 0.005	0.10	—	0.10	0.09	—	0.09	313
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.14	0.09	< 0.005	0.01	—	0.01	0.01	—	0.01	18.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	3.12
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.80. Downstream Outlet Works Piping and Vault: Dewatering (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.38	1.57	< 0.005	0.10	—	0.10	0.09	—	0.09	313
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.14	0.09	< 0.005	0.01	—	0.01	0.01	—	0.01	18.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.03	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	3.12
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.81. Downstream Outlet Works Piping and Vault: ARVs and Valves (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	2.43	2.64	0.01	0.09	—	0.09	0.08	—	0.08	1,206
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.16	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	72.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	12.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.10	4.99	2.35	0.03	0.05	0.96	1.01	0.05	0.27	0.32	3,967
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.01	0.31	0.14	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	239
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	< 0.005	0.06	0.03	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	39.6

3.82. Downstream Outlet Works Piping and Vault: ARVs and Valves (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.74	5.95	0.01	0.03	—	0.03	0.03	—	0.03	1,206
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.36	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	72.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	12.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.10	4.99	2.35	0.03	0.05	0.96	1.01	0.05	0.27	0.32	3,967
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.01	0.31	0.14	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	239
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92

Hauling	< 0.005	0.06	0.03	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	39.6

3.83. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.65	9.57	11.8	0.05	0.34	—	0.34	0.31	—	0.31	5,457
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.58	0.71	< 0.005	0.02	—	0.02	0.02	—	0.02	329
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.11	0.13	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	54.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46

Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.84. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	2.67	26.7	0.05	0.10	—	0.10	0.10	—	0.10	5,457
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	1.61	< 0.005	0.01	—	0.01	0.01	—	0.01	329
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.29	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	54.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.85. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.96	7.98	11.8	0.03	0.33	—	0.33	0.30	—	0.30	2,764
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.48	0.71	< 0.005	0.02	—	0.02	0.02	—	0.02	167
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.13	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	27.6

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.86. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	3.13	16.3	0.03	0.12	—	0.12	0.12	—	0.12	2,764
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.03	0.19	0.98	< 0.005	0.01	—	0.01	0.01	—	0.01	167
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.18	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	27.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.87. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.75	15.7	16.1	0.04	0.66	—	0.66	0.61	—	0.61	4,519
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.95	0.97	< 0.005	0.04	—	0.04	0.04	—	0.04	272
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.17	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	45.1
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.88. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.88	6.84	21.3	0.04	0.28	—	0.28	0.26	—	0.26	4,519
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.41	1.29	< 0.005	0.02	—	0.02	0.02	—	0.02	272
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.23	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.1
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.89. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.89	45.9	36.6	0.10	1.82	—	1.82	1.68	—	1.68	11,303
Dust From Material Movement	—	—	—	—	—	12.8	12.8	—	4.71	4.71	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	2.77	2.21	0.01	0.11	—	0.11	0.10	—	0.10	681
Dust From Material Movement	—	—	—	—	—	0.77	0.77	—	0.28	0.28	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.50	0.40	< 0.005	0.02	—	0.02	0.02	—	0.02	113

Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.05	0.05	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.02	1.44	0.62	0.01	0.02	0.31	0.32	0.02	0.09	0.10	1,226
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	73.9
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	12.2

3.90. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	5.54	55.4	0.10	0.21	—	0.21	0.21	—	0.21	11,303

Dust From Material Movement	—	—	—	—	—	12.8	12.8	—	4.71	4.71	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.33	3.34	0.01	0.01	—	0.01	0.01	—	0.01	681
Dust From Material Movement	—	—	—	—	—	0.77	0.77	—	0.28	0.28	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.61	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	113
Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.05	0.05	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.02	1.44	0.62	0.01	0.02	0.31	0.32	0.02	0.09	0.10	1,226
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	73.9
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	12.2

3.91. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.06	8.26	12.8	0.05	0.31	—	0.31	0.28	—	0.28	5,232
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.50	0.77	< 0.005	0.02	—	0.02	0.02	—	0.02	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.92. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	2.60	27.6	0.05	0.10	—	0.10	0.10	—	0.10	5,232
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	1.66	< 0.005	0.01	—	0.01	0.01	—	0.01	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.30	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.93. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.01	15.4	22.2	0.07	0.57	—	0.57	0.52	—	0.52	7,716
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.93	1.34	< 0.005	0.03	—	0.03	0.03	—	0.03	465
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.02	0.17	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	77.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.94. Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.17	8.61	34.6	0.07	0.29	—	0.29	0.27	—	0.27	7,716

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.52	2.09	< 0.005	0.02	—	0.02	0.02	—	0.02	465
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.38	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	77.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.95. Spillway Site Excavations (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.48	42.3	40.2	0.13	1.65	—	1.65	1.52	—	1.52	14,498
Dust From Material Movement	—	—	—	—	—	8.19	8.19	—	4.21	4.21	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.99	7.61	7.23	0.02	0.30	—	0.30	0.27	—	0.27	2,610
Dust From Material Movement	—	—	—	—	—	1.48	1.48	—	0.76	0.76	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	1.39	1.32	< 0.005	0.05	—	0.05	0.05	—	0.05	432
Dust From Material Movement	—	—	—	—	—	0.27	0.27	—	0.14	0.14	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.02	1.10	0.50	0.01	0.01	0.20	0.21	0.01	0.06	0.06	824

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	17.0
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.9
Hauling	< 0.005	0.20	0.09	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	148
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.80
Hauling	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	24.6

3.96. Spillway Site Excavations (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.37	7.11	71.1	0.13	0.27	—	0.27	0.27	—	0.27	14,498
Dust From Material Movement	—	—	—	—	—	8.19	8.19	—	4.21	4.21	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	1.28	12.8	0.02	0.05	—	0.05	0.05	—	0.05	2,610
Dust From Material Movement	—	—	—	—	—	1.48	1.48	—	0.76	0.76	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.23	2.34	< 0.005	0.01	—	0.01	0.01	—	0.01	432
Dust From Material Movement	—	—	—	—	—	0.27	0.27	—	0.14	0.14	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.02	1.10	0.50	0.01	0.01	0.20	0.21	0.01	0.06	0.06	824
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	17.0
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.9
Hauling	< 0.005	0.20	0.09	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	148
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.80
Hauling	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	24.6

3.97. Spillway Site Excavations (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	5.18	37.0	38.3	0.13	1.43	—	1.43	1.32	—	1.32	14,511
Dust From Material Movement	—	—	—	—	—	8.19	8.19	—	4.21	4.21	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.64	4.56	4.73	0.02	0.18	—	0.18	0.16	—	0.16	1,789
Dust From Material Movement	—	—	—	—	—	1.01	1.01	—	0.52	0.52	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.83	0.86	< 0.005	0.03	—	0.03	0.03	—	0.03	296
Dust From Material Movement	—	—	—	—	—	0.18	0.18	—	0.09	0.09	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.02	1.06	0.49	0.01	0.01	0.20	0.21	0.01	0.06	0.06	810
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.4
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.4
Hauling	< 0.005	0.13	0.06	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	99.9

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.88
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.89
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.5

3.98. Spillway Site Excavations (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.37	7.11	71.1	0.13	0.27	—	0.27	0.27	—	0.27	14,511
Dust From Material Movement	—	—	—	—	—	8.19	8.19	—	4.21	4.21	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	0.88	8.77	0.02	0.03	—	0.03	0.03	—	0.03	1,789
Dust From Material Movement	—	—	—	—	—	1.01	1.01	—	0.52	0.52	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	1.60	< 0.005	0.01	—	0.01	0.01	—	0.01	296
Dust From Material Movement	—	—	—	—	—	0.18	0.18	—	0.09	0.09	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.02	1.06	0.49	0.01	0.01	0.20	0.21	0.01	0.06	0.06	810
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.4
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.4
Hauling	< 0.005	0.13	0.06	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	99.9
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.88
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.89
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.5

3.99. Rock Slope Stabilization (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.45	19.9	26.5	0.08	0.76	—	0.76	0.70	—	0.70	8,851
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.15	1.20	1.61	0.01	0.05	—	0.05	0.04	—	0.04	537
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.22	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	88.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.72
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.69
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.95
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.100. Rock Slope Stabilization (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.28	9.19	41.2	0.08	0.31	—	0.31	0.30	—	0.30	8,851
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.56	2.50	0.01	0.02	—	0.02	0.02	—	0.02	537
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.46	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	88.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.72
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.69
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.95
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.94
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.101. Rock Slope Stabilization (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.37	18.9	26.4	0.08	0.71	—	0.71	0.65	—	0.65	8,839
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.37	18.9	26.4	0.08	0.71	—	0.71	0.65	—	0.65	8,839
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.56	4.46	6.25	0.02	0.17	—	0.17	0.15	—	0.15	2,093
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.81	1.14	< 0.005	0.03	—	0.03	0.03	—	0.03	347
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	21.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	21.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.62
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.62
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.102. Rock Slope Stabilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.29	9.43	41.2	0.08	0.32	—	0.32	0.30	—	0.30	8,839
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.29	9.43	41.2	0.08	0.32	—	0.32	0.30	—	0.30	8,839
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	2.23	9.76	0.02	0.08	—	0.08	0.07	—	0.07	2,093
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.06	0.41	1.78	< 0.005	0.01	—	0.01	0.01	—	0.01	347
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	21.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	21.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.62
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.62
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.103. RCC Weir Support Block (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	8.90	69.3	71.5	0.18	2.82	—	2.82	2.60	—	2.60	18,611
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	8.35	8.61	0.02	0.34	—	0.34	0.31	—	0.31	2,243
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.52	1.57	< 0.005	0.06	—	0.06	0.06	—	0.06	371
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	10.9
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.82
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.104. RCC Weir Support Block (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.82	19.7	96.8	0.18	0.69	—	0.69	0.66	—	0.66	18,611
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	2.37	11.7	0.02	0.08	—	0.08	0.08	—	0.08	2,243
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.43	2.13	< 0.005	0.02	—	0.02	0.01	—	0.01	371
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	10.9
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.0

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.82
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.105. Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	8.90	69.3	71.5	0.18	2.82	—	2.82	2.60	—	2.60	18,611
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.54	4.18	4.31	0.01	0.17	—	0.17	0.16	—	0.16	1,122
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.76	0.79	< 0.005	0.03	—	0.03	0.03	—	0.03	186
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.106. Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.82	19.7	96.8	0.18	0.69	—	0.69	0.66	—	0.66	18,611
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.18	5.83	0.01	0.04	—	0.04	0.04	—	0.04	1,122
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.22	1.06	< 0.005	0.01	—	0.01	0.01	—	0.01	186

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.107. Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.34	21.4	25.2	0.07	0.79	—	0.79	0.73	—	0.73	7,735
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	2.34	21.4	25.2	0.07	0.79	—	0.79	0.73	—	0.73	7,735
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	3.87	4.55	0.01	0.14	—	0.14	0.13	—	0.13	1,399
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.71	0.83	< 0.005	0.03	—	0.03	0.02	—	0.02	232
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.4
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.71
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.72
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.108. Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	6.85	41.0	0.07	0.27	—	0.27	0.26	—	0.26	7,735
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	6.85	41.0	0.07	0.27	—	0.27	0.26	—	0.26	7,735
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.24	7.41	0.01	0.05	—	0.05	0.05	—	0.05	1,399
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.23	1.35	< 0.005	0.01	—	0.01	0.01	—	0.01	232
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.4
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	16.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.71
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.72
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.109. Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.79	24.9	34.6	0.09	0.95	—	0.95	0.87	—	0.87	9,803
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.50	2.09	0.01	0.06	—	0.06	0.05	—	0.05	591
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.27	0.38	< 0.005	0.01	—	0.01	0.01	—	0.01	97.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.110. Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.24	7.38	54.2	0.09	0.29	—	0.29	0.28	—	0.28	9,803
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.07	0.44	3.27	0.01	0.02	—	0.02	0.02	—	0.02	591
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.60	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	97.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.111. Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.63	5.03	8.10	0.02	0.20	—	0.20	0.19	—	0.19	1,831
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.63	5.03	8.10	0.02	0.20	—	0.20	0.19	—	0.19	1,831
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	1.82	2.93	0.01	0.07	—	0.07	0.07	—	0.07	662
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.33	0.53	< 0.005	0.01	—	0.01	0.01	—	0.01	110
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.112. Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.39	2.59	11.1	0.02	0.10	—	0.10	0.10	—	0.10	1,831
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.39	2.59	11.1	0.02	0.10	—	0.10	0.10	—	0.10	1,831
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.94	4.03	0.01	0.04	—	0.04	0.03	—	0.03	662
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.17	0.73	< 0.005	0.01	—	0.01	0.01	—	0.01	110
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0

Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.113. Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.01	27.0	30.0	0.11	1.04	—	1.04	0.96	—	0.96	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.01	27.0	30.0	0.11	1.04	—	1.04	0.96	—	0.96	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.45	9.77	10.8	0.04	0.38	—	0.38	0.35	—	0.35	4,220
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	1.78	1.98	0.01	0.07	—	0.07	0.06	—	0.06	699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.114. Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	6.01	57.2	0.11	0.23	—	0.23	0.23	—	0.23	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	6.01	57.2	0.11	0.23	—	0.23	0.23	—	0.23	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41	2.17	20.7	0.04	0.08	—	0.08	0.08	—	0.08	4,220
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.40	3.78	0.01	0.02	—	0.02	0.02	—	0.02	699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.115. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.81	6.37	10.9	0.02	0.24	—	0.24	0.22	—	0.22	2,214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.81	6.37	10.9	0.02	0.24	—	0.24	0.22	—	0.22	2,214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	2.31	3.92	0.01	0.09	—	0.09	0.08	—	0.08	801
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.05	0.42	0.72	< 0.005	0.02	—	0.02	0.01	—	0.01	133
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.116. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.38	3.26	13.9	0.02	0.09	—	0.09	0.09	—	0.09	2,214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.38	3.26	13.9	0.02	0.09	—	0.09	0.09	—	0.09	2,214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	1.18	5.04	0.01	0.03	—	0.03	0.03	—	0.03	801
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.22	0.92	< 0.005	0.01	—	0.01	0.01	—	0.01	133
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.117. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.39	21.8	26.4	0.08	0.81	—	0.81	0.75	—	0.75	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.39	21.8	26.4	0.08	0.81	—	0.81	0.75	—	0.75	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.86	7.90	9.56	0.03	0.29	—	0.29	0.27	—	0.27	2,881
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	1.44	1.75	< 0.005	0.05	—	0.05	0.05	—	0.05	477
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0

Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.118. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.96	42.6	0.08	0.27	—	0.27	0.26	—	0.26	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.96	42.6	0.08	0.27	—	0.27	0.26	—	0.26	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41	2.52	15.4	0.03	0.10	—	0.10	0.10	—	0.10	2,881
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.46	2.81	< 0.005	0.02	—	0.02	0.02	—	0.02	477
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.119. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.28	9.81	14.7	0.06	0.36	—	0.36	0.33	—	0.33	6,125
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.28	9.81	14.7	0.06	0.36	—	0.36	0.33	—	0.33	6,125
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.46	3.55	5.31	0.02	0.13	—	0.13	0.12	—	0.12	2,215
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.65	0.97	< 0.005	0.02	—	0.02	0.02	—	0.02	367
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.120. Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.58	3.03	32.0	0.06	0.12	—	0.12	0.12	—	0.12	6,125
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.58	3.03	32.0	0.06	0.12	—	0.12	0.12	—	0.12	6,125
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	1.10	11.6	0.02	0.04	—	0.04	0.04	—	0.04	2,215
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.20	2.11	< 0.005	0.01	—	0.01	0.01	—	0.01	367
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.121. Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.82	6.50	10.2	0.02	0.26	—	0.26	0.24	—	0.24	2,203
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.82	6.50	10.2	0.02	0.26	—	0.26	0.24	—	0.24	2,203
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.35	3.68	0.01	0.09	—	0.09	0.09	—	0.09	797
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.43	0.67	< 0.005	0.02	—	0.02	0.02	—	0.02	132
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.122. Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	3.74	13.5	0.02	0.15	—	0.15	0.14	—	0.14	2,203
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	3.74	13.5	0.02	0.15	—	0.15	0.14	—	0.14	2,203
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.35	4.90	0.01	0.05	—	0.05	0.05	—	0.05	797
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.25	0.89	< 0.005	0.01	—	0.01	0.01	—	0.01	132
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0

Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.123. Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.01	27.0	30.0	0.11	1.04	—	1.04	0.96	—	0.96	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.01	27.0	30.0	0.11	1.04	—	1.04	0.96	—	0.96	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.45	9.77	10.8	0.04	0.38	—	0.38	0.35	—	0.35	4,220
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	1.78	1.98	0.01	0.07	—	0.07	0.06	—	0.06	699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.124. Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	6.01	57.2	0.11	0.23	—	0.23	0.23	—	0.23	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.14	6.01	57.2	0.11	0.23	—	0.23	0.23	—	0.23	11,670
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41	2.17	20.7	0.04	0.08	—	0.08	0.08	—	0.08	4,220
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.40	3.78	0.01	0.02	—	0.02	0.02	—	0.02	699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.125. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.16	9.15	16.4	0.03	0.35	—	0.35	0.32	—	0.32	3,570
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.16	9.15	16.4	0.03	0.35	—	0.35	0.32	—	0.32	3,570
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	3.31	5.91	0.01	0.13	—	0.13	0.12	—	0.12	1,291
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.08	0.60	1.08	< 0.005	0.02	—	0.02	0.02	—	0.02	214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.126. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.50	3.92	22.1	0.03	0.12	—	0.12	0.11	—	0.11	3,570
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	3.92	22.1	0.03	0.12	—	0.12	0.11	—	0.11	3,570
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	1.42	8.00	0.01	0.04	—	0.04	0.04	—	0.04	1,291
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	1.46	< 0.005	0.01	—	0.01	0.01	—	0.01	214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.127. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.39	21.8	26.4	0.08	0.81	—	0.81	0.75	—	0.75	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.39	21.8	26.4	0.08	0.81	—	0.81	0.75	—	0.75	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.86	7.90	9.56	0.03	0.29	—	0.29	0.27	—	0.27	2,881
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	1.44	1.75	< 0.005	0.05	—	0.05	0.05	—	0.05	477
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0

Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.128. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.96	42.6	0.08	0.27	—	0.27	0.26	—	0.26	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.96	42.6	0.08	0.27	—	0.27	0.26	—	0.26	7,967
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41	2.52	15.4	0.03	0.10	—	0.10	0.10	—	0.10	2,881
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.46	2.81	< 0.005	0.02	—	0.02	0.02	—	0.02	477
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.129. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	6.32	12.3	0.02	0.20	—	0.20	0.19	—	0.19	2,650
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	6.32	12.3	0.02	0.20	—	0.20	0.19	—	0.19	2,650
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	2.29	4.45	0.01	0.07	—	0.07	0.07	—	0.07	959
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.42	0.81	< 0.005	0.01	—	0.01	0.01	—	0.01	159
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.130. Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	1.30	16.7	0.02	0.05	—	0.05	0.05	—	0.05	2,650
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	1.30	16.7	0.02	0.05	—	0.05	0.05	—	0.05	2,650
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.47	6.04	0.01	0.02	—	0.02	0.02	—	0.02	959
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.02	0.09	1.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	159
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	0.03	0.03	0.00	0.01	0.01	32.7
Vendor	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	32.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.131. Wall Transitions: Left Secant Pile Walls (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.76	13.3	20.2	0.06	0.52	—	0.52	0.48	—	0.48	6,676
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.80	1.22	< 0.005	0.03	—	0.03	0.03	—	0.03	402
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	66.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.132. Wall Transitions: Left Secant Pile Walls (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	4.25	36.1	0.06	0.16	—	0.16	0.16	—	0.16	6,676
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.26	2.18	< 0.005	0.01	—	0.01	0.01	—	0.01	402
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	66.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.133. Wall Transitions: Right Secant Pile Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.76	13.3	20.2	0.06	0.52	—	0.52	0.48	—	0.48	6,676
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.80	1.22	< 0.005	0.03	—	0.03	0.03	—	0.03	402
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	66.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.134. Wall Transitions: Right Secant Pile Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	4.25	36.1	0.06	0.16	—	0.16	0.16	—	0.16	6,676
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.26	2.18	< 0.005	0.01	—	0.01	0.01	—	0.01	402
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	66.6

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.135. Right Closure Wall: Work Platform Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.99	22.2	22.2	0.07	0.88	—	0.88	0.81	—	0.81	7,717
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.18	1.34	1.34	< 0.005	0.05	—	0.05	0.05	—	0.05	465
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.24	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	77.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.136. Right Closure Wall: Work Platform Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.76	4.07	37.9	0.07	0.16	—	0.16	0.16	—	0.16	7,717
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.25	2.28	< 0.005	0.01	—	0.01	0.01	—	0.01	465
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.42	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	77.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.137. Right Closure Wall: Secant Pile Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.19	17.2	23.5	0.07	0.67	—	0.67	0.62	—	0.62	7,914
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.19	17.2	23.5	0.07	0.67	—	0.67	0.62	—	0.62	7,914
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.40	3.15	4.32	0.01	0.12	—	0.12	0.11	—	0.11	1,453
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.58	0.79	< 0.005	0.02	—	0.02	0.02	—	0.02	241
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.81
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.138. Right Closure Wall: Secant Pile Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	4.86	42.2	0.07	0.19	—	0.19	0.18	—	0.18	7,914
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	4.86	42.2	0.07	0.19	—	0.19	0.18	—	0.18	7,914
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.89	7.74	0.01	0.03	—	0.03	0.03	—	0.03	1,453
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.03	0.16	1.41	< 0.005	0.01	—	0.01	0.01	—	0.01	241
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.81
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.139. Right Closure Wall: Backfill Concrete (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.70	5.75	9.48	0.02	0.23	—	0.23	0.21	—	0.21	2,080
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.35	0.57	< 0.005	0.01	—	0.01	0.01	—	0.01	125
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	20.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.140. Right Closure Wall: Backfill Concrete (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.43	2.84	12.9	0.02	0.11	—	0.11	0.10	—	0.10	2,080
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.17	0.78	< 0.005	0.01	—	0.01	0.01	—	0.01	125
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	20.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.141. Wall Type 2 - Left: Leveling Concrete (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.63	5.18	8.09	0.02	0.21	—	0.21	0.19	—	0.19	1,830
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.31	0.49	< 0.005	0.01	—	0.01	0.01	—	0.01	110
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	18.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.142. Wall Type 2 - Left: Leveling Concrete (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.39	2.59	11.1	0.02	0.10	—	0.10	0.10	—	0.10	1,830
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.16	0.67	< 0.005	0.01	—	0.01	0.01	—	0.01	110
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.12	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	18.3

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.143. Wall Type 2 - Left: 1 Inch Concrete Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.15	1.41	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.144. Wall Type 2 - Left: 1 Inch Concrete Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.42	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.145. Wall Type 2 - Left: 2.5 Inch Concrete Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.34	22.5	26.0	0.07	0.83	—	0.83	0.77	—	0.77	7,833
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	1.35	1.57	< 0.005	0.05	—	0.05	0.05	—	0.05	472
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	78.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.146. Wall Type 2 - Left: 2.5 Inch Concrete Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	5.99	42.0	0.07	0.24	—	0.24	0.23	—	0.23	7,833
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.36	2.53	< 0.005	0.01	—	0.01	0.01	—	0.01	472
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.46	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	78.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.147. Wall Type 2 - Left: Concrete Footing (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.41	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	79.5

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.148. Wall Type 2 - Left: Concrete Footing (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.07	0.42	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.149. Wall Type 2 - Left: Backfill (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	4.28	28.5	28.3	0.11	1.02	—	1.02	0.94	—	0.94	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.28	28.5	28.3	0.11	1.02	—	1.02	0.94	—	0.94	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.52	3.44	3.41	0.01	0.12	—	0.12	0.11	—	0.11	1,397
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.63	0.62	< 0.005	0.02	—	0.02	0.02	—	0.02	231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.150. Wall Type 2 - Left: Backfill (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.73	18.3	39.9	0.11	0.58	—	0.58	0.54	—	0.54	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.73	18.3	39.9	0.11	0.58	—	0.58	0.54	—	0.54	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	2.21	4.81	0.01	0.07	—	0.07	0.06	—	0.06	1,397
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.40	0.88	< 0.005	0.01	—	0.01	0.01	—	0.01	231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.151. Wall Type 2 - Left: Reinforced Concrete Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.45	4.31	4.89	0.01	0.16	—	0.16	0.15	—	0.15	1,462
Dust From Material Movement	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.79	0.89	< 0.005	0.03	—	0.03	0.03	—	0.03	242
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.81
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.152. Wall Type 2 - Left: Reinforced Concrete Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963
Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	1.28	7.82	0.01	0.05	—	0.05	0.05	—	0.05	1,462
Dust From Material Movement	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.23	1.43	< 0.005	0.01	—	0.01	0.01	—	0.01	242
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	16.9
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.81
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.153. Wall Type 2 - Left: Footing Rock Anchors and Backfill (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.37	37.5	41.1	0.15	1.36	—	1.36	1.25	—	1.25	16,817
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.37	37.5	41.1	0.15	1.36	—	1.36	1.25	—	1.25	16,817
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.65	4.52	4.96	0.02	0.16	—	0.16	0.15	—	0.15	2,027

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.82	0.90	< 0.005	0.03	—	0.03	0.03	—	0.03	336
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.154. Wall Type 2 - Left: Footing Rock Anchors and Backfill (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.62	10.5	85.5	0.15	0.32	—	0.32	0.32	—	0.32	16,817
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.62	10.5	85.5	0.15	0.32	—	0.32	0.32	—	0.32	16,817
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.27	10.3	0.02	0.04	—	0.04	0.04	—	0.04	2,027
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.23	1.88	< 0.005	0.01	—	0.01	0.01	—	0.01	336
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1

Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.155. Wall Type 2 - Wall Right: Leveling Concrete (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.41	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.156. Wall Type 2 - Wall Right: Leveling Concrete (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.42	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.157. Wall Type 2 - Wall Right: 1 Inch Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.41	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.158. Wall Type 2 - Wall Right: 1 Inch Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.42	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.159. Wall Type 2 - Wall Right: 2.5 Inch Wall (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.41	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56

Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.160. Wall Type 2 - Wall Right: 2.5 Inch Wall (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.42	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.161. Wall Type 2 - Wall Right: Concrete Footing (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.47	23.5	26.6	0.08	0.87	—	0.87	0.80	—	0.80	7,963
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.41	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.03	0.26	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.162. Wall Type 2 - Wall Right: Concrete Footing (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	6.98	42.6	0.08	0.28	—	0.28	0.26	—	0.26	7,963

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.42	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	480
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.163. Wall Type 2 - Wall Right: Backfill (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.28	28.5	28.3	0.11	1.02	—	1.02	0.94	—	0.94	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	1.72	1.71	0.01	0.06	—	0.06	0.06	—	0.06	698
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.31	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	116
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.03	1.82	0.84	0.01	0.02	0.34	0.36	0.02	0.10	0.11	1,395
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	< 0.005	0.11	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	84.2
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92

Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	13.9

3.164. Wall Type 2 - Wall Right: Backfill (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.12	7.91	57.9	0.11	0.22	—	0.22	0.22	—	0.22	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.48	3.49	0.01	0.01	—	0.01	0.01	—	0.01	698
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.64	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	116
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.03	1.82	0.84	0.01	0.02	0.34	0.36	0.02	0.10	0.11	1,395
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56

Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	< 0.005	0.11	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	84.2
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	13.9

3.165. Wall Type 3 - Left: Roller Compacted Concrete (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	9.16	73.8	73.2	0.18	3.04	—	3.04	2.80	—	2.80	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	9.16	73.8	73.2	0.18	3.04	—	3.04	2.80	—	2.80	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.10	8.90	8.82	0.02	0.37	—	0.37	0.34	—	0.34	2,242
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.62	1.61	< 0.005	0.07	—	0.07	0.06	—	0.06	371
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.166. Wall Type 3 - Left: Roller Compacted Concrete (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.83	19.7	96.8	0.18	0.70	—	0.70	0.67	—	0.67	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	2.83	19.7	96.8	0.18	0.70	—	0.70	0.67	—	0.67	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	2.37	11.7	0.02	0.08	—	0.08	0.08	—	0.08	2,242
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.43	2.13	< 0.005	0.02	—	0.02	0.01	—	0.01	371
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.1
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.84
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.167. Wall Type 3 - Left: CVC Facing (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.69	26.2	30.5	0.08	0.96	—	0.96	0.88	—	0.88	8,570
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	1.58	1.84	< 0.005	0.06	—	0.06	0.05	—	0.05	517
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.29	0.34	< 0.005	0.01	—	0.01	0.01	—	0.01	85.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.168. Wall Type 3 - Left: CVC Facing (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.31	11.4	46.8	0.08	0.31	—	0.31	0.29	—	0.29	8,570
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.68	2.82	< 0.005	0.02	—	0.02	0.02	—	0.02	517
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.51	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	85.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.169. Wall Type 3 - Right: Roller Compacted Concrete (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	9.16	73.8	73.2	0.18	3.04	—	3.04	2.80	—	2.80	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	9.16	73.8	73.2	0.18	3.04	—	3.04	2.80	—	2.80	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	9.10	9.02	0.02	0.37	—	0.37	0.34	—	0.34	2,293
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.21	1.66	1.65	< 0.005	0.07	—	0.07	0.06	—	0.06	380
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.4
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.88
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.89
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.170. Wall Type 3 - Right: Roller Compacted Concrete (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	2.83	19.7	96.8	0.18	0.70	—	0.70	0.67	—	0.67	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.83	19.7	96.8	0.18	0.70	—	0.70	0.67	—	0.67	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.35	2.43	11.9	0.02	0.09	—	0.09	0.08	—	0.08	2,293
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.44	2.18	< 0.005	0.02	—	0.02	0.01	—	0.01	380
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.4
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.88
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.89
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.171. Wall Type 3 - Right: CVC Facing (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.53	24.0	27.0	0.08	0.89	—	0.89	0.82	—	0.82	8,033
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.45	1.63	< 0.005	0.05	—	0.05	0.05	—	0.05	484
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	80.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.172. Wall Type 3 - Right: CVC Facing (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	7.50	43.0	0.08	0.30	—	0.30	0.28	—	0.28	8,033
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.45	2.59	< 0.005	0.02	—	0.02	0.02	—	0.02	484
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	80.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.173. Wall Type 3 - Right: Backfill (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.28	28.5	28.3	0.11	1.02	—	1.02	0.94	—	0.94	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	1.72	1.71	0.01	0.06	—	0.06	0.06	—	0.06	698

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.31	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	116
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.174. Wall Type 3 - Right: Backfill (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.12	7.91	57.9	0.11	0.22	—	0.22	0.22	—	0.22	11,586
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.48	3.49	0.01	0.01	—	0.01	0.01	—	0.01	698
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.64	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	116
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.175. Stilling Basin: RCC (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	9.16	73.8	73.2	0.18	3.04	—	3.04	2.80	—	2.80	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	4.45	4.41	0.01	0.18	—	0.18	0.17	—	0.17	1,121
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.81	0.81	< 0.005	0.03	—	0.03	0.03	—	0.03	186
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.176. Stilling Basin: RCC (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.83	19.7	96.8	0.18	0.70	—	0.70	0.67	—	0.67	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.19	5.83	0.01	0.04	—	0.04	0.04	—	0.04	1,121
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.22	1.06	< 0.005	0.01	—	0.01	0.01	—	0.01	186
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.177. Stilling Basin: Upstream/Downstream CVC Facing (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.53	24.0	27.0	0.08	0.89	—	0.89	0.82	—	0.82	8,033
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.45	1.63	< 0.005	0.05	—	0.05	0.05	—	0.05	484
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	80.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.178. Stilling Basin: Upstream/Downstream CVC Facing (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	7.50	43.0	0.08	0.30	—	0.30	0.28	—	0.28	8,033
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.45	2.59	< 0.005	0.02	—	0.02	0.02	—	0.02	484
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	80.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.179. Stilling Basin: Basin Steps (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.53	24.0	27.0	0.08	0.89	—	0.89	0.82	—	0.82	8,033

Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.45	1.63	< 0.005	0.05	—	0.05	0.05	—	0.05	484
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	80.2
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.180. Stilling Basin: Basin Steps (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	7.50	43.0	0.08	0.30	—	0.30	0.28	—	0.28	8,033
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.45	2.59	< 0.005	0.02	—	0.02	0.02	—	0.02	484
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	80.2
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.181. Stilling Basin: Chute Blocks (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.03	19.6	21.5	0.06	0.72	—	0.72	0.66	—	0.66	6,610
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.12	1.18	1.30	< 0.005	0.04	—	0.04	0.04	—	0.04	398
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.22	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	66.0
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.182. Stilling Basin: Chute Blocks (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.97	6.03	35.0	0.06	0.24	—	0.24	0.23	—	0.23	6,610
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.36	2.11	< 0.005	0.01	—	0.01	0.01	—	0.01	398
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.39	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	66.0
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.183. Stilling Basin: Dentated Sill (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.22	21.4	23.1	0.07	0.79	—	0.79	0.73	—	0.73	7,107
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	1.29	1.39	< 0.005	0.05	—	0.05	0.04	—	0.04	428
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.24	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	70.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.184. Stilling Basin: Dentated Sill (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	6.27	37.5	0.07	0.25	—	0.25	0.24	—	0.24	7,107
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.06	0.38	2.26	< 0.005	0.01	—	0.01	0.01	—	0.01	428
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.41	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	70.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.185. Spillway Slab Construction: RCC Foundation Support Block (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	9.16	73.8	73.2	0.18	3.04	—	3.04	2.80	—	2.80	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	4.45	4.41	0.01	0.18	—	0.18	0.17	—	0.17	1,121
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.81	0.81	< 0.005	0.03	—	0.03	0.03	—	0.03	186
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.186. Spillway Slab Construction: RCC Foundation Support Block (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.83	19.7	96.8	0.18	0.70	—	0.70	0.67	—	0.67	18,600
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.19	5.83	0.01	0.04	—	0.04	0.04	—	0.04	1,121
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.22	1.06	< 0.005	0.01	—	0.01	0.01	—	0.01	186
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.187. Spillway Slab Construction: Spillway Chute Slab (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.60	24.5	27.4	0.08	0.91	—	0.91	0.84	—	0.84	8,104
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	1.48	1.65	< 0.005	0.06	—	0.06	0.05	—	0.05	488
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.27	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	80.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.188. Spillway Slab Construction: Spillway Chute Slab (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.27	8.02	43.4	0.08	0.32	—	0.32	0.30	—	0.30	8,104
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.48	2.62	< 0.005	0.02	—	0.02	0.02	—	0.02	488
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.48	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	80.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.189. Spillway Slab Construction: Stilling Basin Slab (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.60	24.5	27.4	0.08	0.91	—	0.91	0.84	—	0.84	8,104
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.16	1.48	1.65	< 0.005	0.06	—	0.06	0.05	—	0.05	488
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.27	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	80.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.190. Spillway Slab Construction: Stilling Basin Slab (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.27	8.02	43.4	0.08	0.32	—	0.32	0.30	—	0.30	8,104
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.48	2.62	< 0.005	0.02	—	0.02	0.02	—	0.02	488
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.09	0.48	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	80.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.191. Spillway Slab Construction: Zone B (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.09	8.92	12.8	0.05	0.34	—	0.34	0.31	—	0.31	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.54	0.77	< 0.005	0.02	—	0.02	0.02	—	0.02	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.192. Spillway Slab Construction: Zone B (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	2.60	27.6	0.05	0.10	—	0.10	0.10	—	0.10	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	1.66	< 0.005	0.01	—	0.01	0.01	—	0.01	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.30	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.193. Spillway Slab Construction: Zone C (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.09	8.92	12.8	0.05	0.34	—	0.34	0.31	—	0.31	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.54	0.77	< 0.005	0.02	—	0.02	0.02	—	0.02	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.194. Spillway Slab Construction: Zone C (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	2.60	27.6	0.05	0.10	—	0.10	0.10	—	0.10	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.03	0.16	1.66	< 0.005	0.01	—	0.01	0.01	—	0.01	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.30	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.195. Spillway Drains and Cleanouts: Wall Drains & Cleanouts (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	2.44	4.58	0.01	0.12	—	0.12	0.11	—	0.11	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.15	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	47.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.88
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.196. Spillway Drains and Cleanouts: Wall Drains & Cleanouts (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.88
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.197. Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	2.44	4.58	0.01	0.12	—	0.12	0.11	—	0.11	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.15	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	47.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.88
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.198. Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.88
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.199. Spillway Drains and Cleanouts: Transverse Drains & Cleanouts (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	2.44	4.58	0.01	0.12	—	0.12	0.11	—	0.11	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.15	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	47.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.88
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.200. Spillway Drains and Cleanouts: Transverse Drains & Cleanouts (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.88
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.201. Spillway Drains and Cleanouts: Drain Gravel (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	13.4	12.1	0.03	0.68	—	0.68	0.62	—	0.62	3,699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.81	0.73	< 0.005	0.04	—	0.04	0.04	—	0.04	223
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.13	< 0.005	0.01	—	0.01	0.01	—	0.01	36.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.202. Spillway Drains and Cleanouts: Drain Gravel (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.35	1.82	19.8	0.03	0.07	—	0.07	0.07	—	0.07	3,699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.11	1.19	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	223
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.22	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	36.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.203. Spillway Drains and Cleanouts: Filter Sand (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	13.4	12.1	0.03	0.68	—	0.68	0.62	—	0.62	3,699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.81	0.73	< 0.005	0.04	—	0.04	0.04	—	0.04	223
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.13	< 0.005	0.01	—	0.01	0.01	—	0.01	36.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.204. Spillway Drains and Cleanouts: Filter Sand (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.35	1.82	19.8	0.03	0.07	—	0.07	0.07	—	0.07	3,699
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.02	0.11	1.19	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	223
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.22	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	36.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.205. Surface Ditch from Landfill: Excavation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.55	4.20	5.12	0.01	0.38	—	0.38	0.35	—	0.35	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.31	< 0.005	0.02	—	0.02	0.02	—	0.02	47.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.93
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.206. Surface Ditch from Landfill: Excavation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.93
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.207. Surface Ditch from Landfill: Drop Structures (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	4.20	5.12	0.01	0.38	—	0.38	0.35	—	0.35	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.31	< 0.005	0.02	—	0.02	0.02	—	0.02	47.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.93
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.208. Surface Ditch from Landfill: Drop Structures (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	47.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.93

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.209. Surface Ditch from Landfill: Ditch Lining (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.28	10.3	13.4	0.04	0.41	—	0.41	0.38	—	0.38	4,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.28	10.3	13.4	0.04	0.41	—	0.41	0.38	—	0.38	4,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.24	1.61	< 0.005	0.05	—	0.05	0.05	—	0.05	531
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.23	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	87.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	10.9
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.82
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.210. Surface Ditch from Landfill: Ditch Lining (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	2.16	23.3	0.04	0.08	—	0.08	0.08	—	0.08	4,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	2.16	23.3	0.04	0.08	—	0.08	0.08	—	0.08	4,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.26	2.81	< 0.005	0.01	—	0.01	0.01	—	0.01	531
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.51	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	87.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2

Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	10.9
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.82
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.211. Downstream Apron: Concrete Apron (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.90	16.4	19.5	0.06	0.65	—	0.65	0.60	—	0.60	6,252
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.99	1.18	< 0.005	0.04	—	0.04	0.04	—	0.04	377
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.21	< 0.005	0.01	—	0.01	0.01	—	0.01	62.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.212. Downstream Apron: Concrete Apron (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.86	5.23	33.6	0.06	0.21	—	0.21	0.20	—	0.20	6,252
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.05	0.31	2.02	< 0.005	0.01	—	0.01	0.01	—	0.01	377
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.37	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	62.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.213. Downstream Apron: Zone C (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.09	8.92	12.8	0.05	0.34	—	0.34	0.31	—	0.31	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.54	0.77	< 0.005	0.02	—	0.02	0.02	—	0.02	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.214. Downstream Apron: Zone C (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	2.60	27.6	0.05	0.10	—	0.10	0.10	—	0.10	5,231
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.16	1.66	< 0.005	0.01	—	0.01	0.01	—	0.01	315
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.03	0.30	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	52.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.215. Downstream Apron: Riprap Apron (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.82	6.23	6.10	0.03	0.23	—	0.23	0.21	—	0.21	2,716
Dust From Material Movement	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.38	0.37	< 0.005	0.01	—	0.01	0.01	—	0.01	164
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	27.1

Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.07	3.34	1.58	0.02	0.03	0.65	0.68	0.03	0.18	0.21	2,660
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	< 0.005	0.21	0.10	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	160
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	26.5

3.216. Downstream Apron: Riprap Apron (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.40	2.43	13.2	0.03	0.09	—	0.09	0.09	—	0.09	2,716

Dust From Material Movement	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.80	< 0.005	0.01	—	0.01	0.01	—	0.01	164
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.15	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	27.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.07	3.34	1.58	0.02	0.03	0.65	0.68	0.03	0.18	0.21	2,660
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	< 0.005	0.21	0.10	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	160

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	26.5

3.217. Downstream Apron: Riprap Bedding (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.82	6.23	6.10	0.03	0.23	—	0.23	0.21	—	0.21	2,716
Dust From Material Movement	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.38	0.37	< 0.005	0.01	—	0.01	0.01	—	0.01	164
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	27.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.11	6.50	2.88	0.04	0.07	1.39	1.46	0.07	0.39	0.46	5,631
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.01	0.41	0.17	< 0.005	< 0.005	0.08	0.09	< 0.005	0.02	0.03	339
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	< 0.005	0.08	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	56.1

3.218. Downstream Apron: Riprap Bedding (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.40	2.43	13.2	0.03	0.09	—	0.09	0.09	—	0.09	2,716
Dust From Material Movement	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.80	< 0.005	0.01	—	0.01	0.01	—	0.01	164
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.15	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	27.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.11	6.50	2.88	0.04	0.07	1.39	1.46	0.07	0.39	0.46	5,631
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.56
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.57
Hauling	0.01	0.41	0.17	< 0.005	< 0.005	0.08	0.09	< 0.005	0.02	0.03	339
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.92
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.92
Hauling	< 0.005	0.08	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	56.1

3.219. Furnish and Install Electrical / Controls and Instrumentation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	5.09	7.10	0.01	0.42	—	0.42	0.39	—	0.39	1,126
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	5.09	7.10	0.01	0.42	—	0.42	0.39	—	0.39	1,126
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.28	2.15	3.00	< 0.005	0.18	—	0.18	0.16	—	0.16	475
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.39	0.55	< 0.005	0.03	—	0.03	0.03	—	0.03	78.7
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.03	1.87	0.88	0.01	0.02	0.37	0.39	0.02	0.10	0.12	1,504
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.03	1.93	0.89	0.01	0.02	0.37	0.39	0.02	0.10	0.12	1,502
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.14	0.00	0.00	0.04	0.04	0.00	0.01	0.01	38.2
Vendor	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	38.4
Hauling	0.01	0.82	0.37	< 0.005	0.01	0.16	0.16	0.01	0.04	0.05	634
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.32
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.35
Hauling	< 0.005	0.15	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	105

3.220. Furnish and Install Electrical / Controls and Instrumentation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	2.09	7.84	0.01	0.02	—	0.02	0.02	—	0.02	1,126

Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	2.09	7.84	0.01	0.02	—	0.02	0.02	—	0.02	1,126
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.88	3.31	< 0.005	0.01	—	0.01	0.01	—	0.01	475
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.16	0.60	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	78.7
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.03	1.87	0.88	0.01	0.02	0.37	0.39	0.02	0.10	0.12	1,504
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.03	1.93	0.89	0.01	0.02	0.37	0.39	0.02	0.10	0.12	1,502
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.14	0.00	0.00	0.04	0.04	0.00	0.01	0.01	38.2
Vendor	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	38.4
Hauling	0.01	0.82	0.37	< 0.005	0.01	0.16	0.16	0.01	0.04	0.05	634
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.32
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.35
Hauling	< 0.005	0.15	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	105

3.221. Furnish and Install Aeration System (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	5.09	7.10	0.01	0.42	—	0.42	0.39	—	0.39	1,126
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.31	0.43	< 0.005	0.03	—	0.03	0.02	—	0.02	67.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	11.2

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.222. Furnish and Install Aeration System (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	2.09	7.84	0.01	0.02	—	0.02	0.02	—	0.02	1,126
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.13	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	67.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	11.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.46
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.48
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.90
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.223. Part 1 Furnish and Install Erosion Control Measures (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.55	5.05	5.06	0.01	0.39	—	0.39	0.36	—	0.36	789
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	5.05	5.06	0.01	0.39	—	0.39	0.36	—	0.36	789
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.61	0.61	< 0.005	0.05	—	0.05	0.04	—	0.04	95.1
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.11	0.11	< 0.005	0.01	—	0.01	0.01	—	0.01	15.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.43	0.00	0.00	0.09	0.09	0.00	0.02	0.02	97.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	94.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.4
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.88
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.87
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.224. Part 1 Furnish and Install Erosion Control Measures (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	789
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	789
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.23	0.67	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	95.1
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	0.12	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	15.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.43	0.00	0.00	0.09	0.09	0.00	0.02	0.02	97.8

Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	94.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	92.8
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	93.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	11.4
Vendor	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	11.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.88
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.87
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.225. Part 2 Furnish and Install Erosion Control Measures (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	2.44	4.58	0.01	0.12	—	0.12	0.11	—	0.11	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	2.44	4.58	0.01	0.12	—	0.12	0.11	—	0.11	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.03	1.93	< 0.005	0.05	—	0.05	0.05	—	0.05	333
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.19	0.35	< 0.005	0.01	—	0.01	0.01	—	0.01	55.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.15	0.00	0.00	0.04	0.04	0.00	0.01	0.01	38.9
Vendor	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	39.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.45
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.226. Part 2 Furnish and Install Erosion Control Measures (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	790
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.81	2.33	< 0.005	0.01	—	0.01	0.01	—	0.01	333
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.15	0.43	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	55.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.40	0.00	0.00	0.09	0.09	0.00	0.02	0.02	95.8
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.34	0.00	0.00	0.09	0.09	0.00	0.02	0.02	90.9
Vendor	< 0.005	0.10	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	92.3

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.15	0.00	0.00	0.04	0.04	0.00	0.01	0.01	38.9
Vendor	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	39.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.45
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.227. Part 3 Furnish and Install Erosion Control Measures (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	4.20	5.12	0.01	0.38	—	0.38	0.35	—	0.35	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.55	4.20	5.12	0.01	0.38	—	0.38	0.35	—	0.35	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	1.77	2.16	< 0.005	0.16	—	0.16	0.15	—	0.15	335
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.32	0.39	< 0.005	0.03	—	0.03	0.03	—	0.03	55.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.14	0.00	0.00	0.04	0.04	0.00	0.01	0.01	38.2
Vendor	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	38.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.32
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.35
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.228. Part 3 Furnish and Install Erosion Control Measures (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	1.93	5.52	0.01	0.01	—	0.01	0.01	—	0.01	795
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.81	2.33	< 0.005	0.01	—	0.01	0.01	—	0.01	335
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.15	0.43	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	55.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.37	0.00	0.00	0.09	0.09	0.00	0.02	0.02	94.0
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	91.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.32	0.00	0.00	0.09	0.09	0.00	0.02	0.02	89.2
Vendor	< 0.005	0.09	0.05	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	90.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.14	0.00	0.00	0.04	0.04	0.00	0.01	0.01	38.2
Vendor	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	38.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.32
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.35
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.229. Embankment Mitigation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	6.65	61.2	56.1	0.09	2.71	—	2.71	2.50	—	2.50	9,861
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	6.65	61.2	56.1	0.09	2.71	—	2.71	2.50	—	2.50	9,861
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.98	36.6	33.6	0.06	1.63	—	1.63	1.50	—	1.50	5,905
Dust From Material Movement	—	—	—	—	—	20.4	20.4	—	10.2	10.2	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.73	6.68	6.13	0.01	0.30	—	0.30	0.27	—	0.27	978
Dust From Material Movement	—	—	—	—	—	3.73	3.73	—	1.86	1.86	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15	0.15	2.38	0.00	0.00	0.03	0.03	0.00	0.00	0.00	572
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	3.63	1.61	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,145
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15	0.17	2.06	0.00	0.00	0.03	0.03	0.00	0.00	0.00	543
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	3.77	1.62	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,140
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.10	1.29	0.00	0.00	0.02	0.02	0.00	0.00	0.00	330
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	2.28	0.97	0.01	0.02	0.12	0.15	0.02	0.05	0.07	1,882
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.24	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	54.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.42	0.18	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	312

3.230. Embankment Mitigation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.33	9.36	53.2	0.09	0.30	—	0.30	0.29	—	0.29	9,861
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.33	9.36	53.2	0.09	0.30	—	0.30	0.29	—	0.29	9,861
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.80	5.61	31.8	0.06	0.18	—	0.18	0.17	—	0.17	5,905
Dust From Material Movement	—	—	—	—	—	20.4	20.4	—	10.2	10.2	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	1.02	5.81	0.01	0.03	—	0.03	0.03	—	0.03	978
Dust From Material Movement	—	—	—	—	—	3.73	3.73	—	1.86	1.86	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.15	0.15	2.38	0.00	0.00	0.03	0.03	0.00	0.00	0.00	572
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	3.63	1.61	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,145
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15	0.17	2.06	0.00	0.00	0.03	0.03	0.00	0.00	0.00	543
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.06	3.77	1.62	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,140
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.10	1.29	0.00	0.00	0.02	0.02	0.00	0.00	0.00	330
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	2.28	0.97	0.01	0.02	0.12	0.15	0.02	0.05	0.07	1,882
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.24	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	54.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.42	0.18	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	312

3.231. Embankment Mitigation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	6.32	56.4	53.8	0.09	2.49	—	2.49	2.29	—	2.29	9,864
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	6.32	56.4	53.8	0.09	2.49	—	2.49	2.29	—	2.29	9,864
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.29	20.4	19.5	0.03	0.90	—	0.90	0.83	—	0.83	3,571
Dust From Material Movement	—	—	—	—	—	12.3	12.3	—	6.15	6.15	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	3.73	3.55	0.01	0.16	—	0.16	0.15	—	0.15	591
Dust From Material Movement	—	—	—	—	—	2.25	2.25	—	1.12	1.12	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14	0.13	2.24	0.00	0.00	0.03	0.03	0.00	0.00	0.00	562
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	3.51	1.55	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,087
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14	0.15	1.93	0.00	0.00	0.03	0.03	0.00	0.00	0.00	533
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	3.63	1.56	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,082

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.73	0.00	0.00	0.01	0.01	0.00	0.00	0.00	196
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.33	0.56	0.01	0.01	0.08	0.09	0.01	0.03	0.04	1,117
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	32.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.24	0.10	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	0.01	185

3.232. Embankment Mitigation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.33	9.36	53.2	0.09	0.30	—	0.30	0.29	—	0.29	9,864
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.33	9.36	53.2	0.09	0.30	—	0.30	0.29	—	0.29	9,864
Dust From Material Movement	—	—	—	—	—	34.1	34.1	—	17.0	17.0	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.48	3.39	19.2	0.03	0.11	—	0.11	0.11	—	0.11	3,571
Dust From Material Movement	—	—	—	—	—	12.3	12.3	—	6.15	6.15	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.62	3.51	0.01	0.02	—	0.02	0.02	—	0.02	591
Dust From Material Movement	—	—	—	—	—	2.25	2.25	—	1.12	1.12	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14	0.13	2.24	0.00	0.00	0.03	0.03	0.00	0.00	0.00	562
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	3.51	1.55	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,087
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14	0.15	1.93	0.00	0.00	0.03	0.03	0.00	0.00	0.00	533
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.04	3.63	1.56	0.02	0.04	0.21	0.25	0.04	0.08	0.11	3,082
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.73	0.00	0.00	0.01	0.01	0.00	0.00	0.00	196
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.33	0.56	0.01	0.01	0.08	0.09	0.01	0.03	0.04	1,117
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	32.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	< 0.005	0.24	0.10	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	0.01	185

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Part 1 Site Demolition (Excludes Spillway)	Demolition	10/1/2024	10/30/2024	5.00	22.0	—
Part 2 Site Demolition (Excludes Spillway)	Demolition	9/1/2025	9/30/2025	5.00	22.0	—
Spillway Demolition: Existing Spillway Demo	Demolition	4/1/2025	4/30/2025	5.00	22.0	—
Spillway Demolition: Crush Concrete Demo	Demolition	4/1/2025	4/30/2025	5.00	22.0	—
Spillway Demolition: Bridge Pier and Facing Demo	Demolition	4/1/2025	4/30/2025	5.00	22.0	—
Temporary Flood Control Berm	Site Preparation	10/1/2024	10/30/2024	5.00	22.0	—
Mobilization	Site Preparation	9/1/2024	10/1/2024	5.00	22.0	—
Demobilization	Site Preparation	12/1/2026	12/30/2026	5.00	22.0	—
Cleanup	Site Preparation	2/1/2027	3/2/2027	5.00	22.0	—
Allowance for Piping Install	Site Preparation	10/1/2024	10/30/2024	5.00	22.0	—
Bypass Pumping Diversion Beam	Site Preparation	9/1/2024	12/18/2024	5.00	78.0	—
Inclined Inlet Structure: Steel Pipe and Appurtenances	Building Construction	09/1/2025	12/2/2025	5.00	67.0	—
Inclined Inlet Structure: Reinforced Concrete	Building Construction	08/1/2025	10/1/2025	5.00	44.0	—
Inclined Inlet Structure: Drilled Foundation Anchors	Building Construction	8/1/2025	9/1/2025	5.00	22.0	—
Inclined Inlet Structure: Excavation	Building Construction	8/1/2025	9/1/2025	5.00	22.0	—
Inclined Inlet Structure: Stainless Steel Platform	Building Construction	10/1/2025	10/30/2025	5.00	22.0	—

Inclined Inlet Structure: Pneumatic Actuation Control System	Building Construction	10/1/2025	10/30/2025	5.00	22.0	—
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Building Construction	4/1/2025	7/1/2025	5.00	66.0	—
Cofferdam Installation and Removal: Dewatering	Building Construction	5/1/2025	7/1/2025	5.00	44.0	—
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Building Construction	7/1/2026	7/30/2026	5.00	22.0	—
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Building Construction	10/1/2024	10/30/2024	5.00	22.0	—
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Building Construction	11/1/2024	12/2/2024	5.00	22.0	—
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Building Construction	12/1/2024	12/31/2024	5.00	22.0	—
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Building Construction	12/1/2024	12/31/2024	5.00	22.0	—
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Building Construction	12/1/2024	12/31/2024	5.00	22.0	—
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Building Construction	12/1/2024	12/31/2024	5.00	22.0	—
Dam Control Building: Pt 1 CMU Control Building	Building Construction	7/1/2026	10/1/2026	5.00	67.0	—

Dam Control Building: Pt 2 CMU Control Building	Building Construction	12/1/2026	2/2/2027	5.00	46.0	—
Dam Control Building: Reinforced Concrete Foundation	Building Construction	7/1/2026	7/30/2026	5.00	22.0	—
Dam Control Building: Metal Frame Roofing	Building Construction	12/1/2026	12/30/2026	5.00	22.0	—
Dam Control Building: Ancillary Features	Building Construction	1/1/2027	2/1/2027	5.00	22.0	—
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Building Construction	4/1/2025	4/30/2025	5.00	22.0	—
Downstream Outlet Works Piping and Vault: Structure Bkfl	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Building Construction	4/1/2025	7/31/2025	5.00	88.0	—
Downstream Outlet Works Piping and Vault: Piping and Valves	Building Construction	4/1/2025	7/1/2025	5.00	66.0	—
Downstream Outlet Works Piping and Vault: Steel Casing	Building Construction	4/1/2025	4/30/2025	5.00	22.0	—
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Building Construction	8/1/2025	9/1/2025	5.00	22.0	—
Downstream Outlet Works Piping and Vault: Dewatering	Building Construction	4/1/2025	4/30/2025	5.00	22.0	—

Downstream Outlet Works Piping and Vault: ARVs and Valves	Building Construction	6/1/2025	7/1/2025	5.00	22.0	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Building Construction	10/1/2026	10/30/2026	5.00	22.0	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Building Construction	11/1/2026	12/1/2026	5.00	22.0	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Building Construction	12/2/2026	12/30/2026	5.00	22.0	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Building Construction	11/1/2026	12/1/2026	5.00	22.0	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Building Construction	11/1/2026	12/1/2026	5.00	22.0	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Building Construction	11/1/2026	12/1/2026	5.00	22.0	—
Spillway Site Excavations	Building Construction	10/1/2024	3/4/2025	5.00	111	—
Rock Slope Stabilization	Building Construction	12/1/2024	5/1/2025	5.00	109	—
RCC Weir Support Block	Building Construction	5/1/2026	7/1/2026	5.00	44.0	—
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Building Construction	7/1/2026	7/30/2026	5.00	22.0	—
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Building Construction	8/1/2026	11/2/2026	5.00	66.0	—

Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Building Construction	11/1/2026	12/1/2026	5.00	22.0	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Building Construction	5/1/2026	11/2/2026	5.00	132	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Building Construction	5/1/2026	11/2/2026	5.00	132	—

Wall Transitions: Left Secant Pile Walls	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Wall Transitions: Right Secant Pile Wall	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Right Closure Wall: Work Platform Construction	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Right Closure Wall: Secant Pile Wall	Building Construction	7/1/2025	10/1/2025	5.00	67.0	—
Right Closure Wall: Backfill Concrete	Building Construction	9/1/2025	9/30/2025	5.00	22.0	—
Wall Type 2 - Left: Leveling Concrete	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Wall Type 2 - Left: 1 Inch Concrete Wall	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Wall Type 2 - Left: Concrete Footing	Building Construction	7/1/2025	7/30/2025	5.00	22.0	—
Wall Type 2 - Left: Backfill	Building Construction	8/1/2025	10/1/2025	5.00	44.0	—
Wall Type 2 - Left: Reinforced Concrete Wall	Building Construction	6/1/2025	9/2/2025	5.00	67.0	—
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Building Construction	8/1/2025	10/1/2025	5.00	44.0	—
Wall Type 2 - Wall Right: Leveling Concrete	Building Construction	9/1/2025	9/30/2025	5.00	22.0	—
Wall Type 2 - Wall Right: 1 Inch Wall	Building Construction	9/1/2025	9/30/2025	5.00	22.0	—
Wall Type 2 - Wall Right: 2.5 Inch Wall	Building Construction	9/1/2025	9/30/2025	5.00	22.0	—
Wall Type 2 - Wall Right: Concrete Footing	Building Construction	10/1/2025	10/30/2025	5.00	22.0	—
Wall Type 2 - Wall Right: Backfill	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Wall Type 3 - Left: Roller Compacted Concrete	Building Construction	8/1/2025	10/1/2025	5.00	44.0	—

Wall Type 3 - Left: CVC Facing	Building Construction	10/1/2025	10/30/2025	5.00	22.0	—
Wall Type 3 - Right: Roller Compacted Concrete	Building Construction	9/1/2025	10/31/2025	5.00	45.0	—
Wall Type 3 - Right: CVC Facing	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Wall Type 3 - Right: Backfill	Building Construction	10/1/2025	10/30/2025	5.00	22.0	—
Stilling Basin: RCC	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Stilling Basin: Upstream/Downstream CVC Facing	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Stilling Basin: Basin Steps	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Stilling Basin: Chute Blocks	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—
Stilling Basin: Dentated Sill	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Spillway Slab Construction: RCC Foundation Support Block	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Spillway Slab Construction: Spillway Chute Slab	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—
Spillway Slab Construction: Stilling Basin Slab	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—
Spillway Slab Construction: Zone B	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Spillway Slab Construction: Zone C	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—

Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—
Spillway Drains and Cleanouts: Drain Gravel	Building Construction	11/1/2025	12/2/2025	5.00	22.0	—
Spillway Drains and Cleanouts: Filter Sand	Building Construction	12/1/2025	12/30/2025	5.00	22.0	—
Surface Ditch from Landfill: Excavation	Building Construction	8/1/2026	9/1/2026	5.00	22.0	—
Surface Ditch from Landfill: Drop Structures	Building Construction	8/1/2026	9/1/2026	5.00	22.0	—
Surface Ditch from Landfill: Ditch Lining	Building Construction	8/1/2026	10/1/2026	5.00	44.0	—
Downstream Apron: Concrete Apron	Building Construction	4/1/2025	4/30/2025	5.00	22.0	—
Downstream Apron: Zone C	Building Construction	4/1/2025	4/30/2025	5.00	22.0	—
Downstream Apron: Riprap Apron	Building Construction	5/1/2025	5/30/2025	5.00	22.0	—
Downstream Apron: Riprap Bedding	Building Construction	5/1/2025	5/30/2025	5.00	22.0	—
Furnish and Install Electrical / Controls and Instrumentation	Building Construction	4/1/2026	11/2/2026	5.00	154	—
Furnish and Install Aeration System	Building Construction	10/1/2026	10/30/2026	5.00	22.0	—
Part 1 Furnish and Install Erosion Control Measures	Building Construction	9/1/2024	10/31/2024	5.00	44.0	—
Part 2 Furnish and Install Erosion Control Measures	Building Construction	4/1/2025	10/31/2025	5.00	154	—
Part 3 Furnish and Install Erosion Control Measures	Building Construction	4/1/2026	11/2/2026	5.00	154	—
Embankment Mitigation	Trenching	3/1/2025	7/4/2026	5.00	350	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Part 1 Site Demolition (Excludes Spillway)	Excavators	Diesel	Average	1.00	10.0	425	0.38
Part 1 Site Demolition (Excludes Spillway)	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Part 2 Site Demolition (Excludes Spillway)	Excavators	Diesel	Average	1.00	10.0	425	0.38
Part 2 Site Demolition (Excludes Spillway)	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Spillway Demolition: Existing Spillway Demo	Concrete/Industrial Saws	Diesel	Average	4.00	10.0	33.0	0.73
Spillway Demolition: Existing Spillway Demo	Cranes	Diesel	Average	1.00	10.0	367	0.29
Spillway Demolition: Existing Spillway Demo	Crushing/Proc. Equipment	Gasoline	Average	2.00	10.0	12.0	0.85
Spillway Demolition: Existing Spillway Demo	Excavators	Diesel	Average	2.00	10.0	36.0	0.38
Spillway Demolition: Existing Spillway Demo	Off-Highway Trucks	Diesel	Average	1.00	10.0	376	0.38
Spillway Demolition: Existing Spillway Demo	Welders	Diesel	Average	1.00	10.0	46.0	0.45
Spillway Demolition: Existing Spillway Demo	Air Compressors	Diesel	Average	3.00	10.0	37.0	0.48
Spillway Demolition: Crush Concrete Demo	Crushing/Proc. Equipment	Gasoline	Average	1.00	10.0	12.0	0.85

Spillway Demolition: Crush Concrete Demo	Excavators	Diesel	Average	1.00	10.0	425	0.38
Spillway Demolition: Crush Concrete Demo	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Spillway Demolition: Crush Concrete Demo	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Spillway Demolition: Bridge Pier and Facing Demo	Concrete/Industrial Saws	Diesel	Average	4.00	10.0	33.0	0.73
Spillway Demolition: Bridge Pier and Facing Demo	Cranes	Diesel	Average	1.00	10.0	367	0.29
Spillway Demolition: Bridge Pier and Facing Demo	Crushing/Proc. Equipment	Gasoline	Average	2.00	10.0	12.0	0.85
Spillway Demolition: Bridge Pier and Facing Demo	Excavators	Diesel	Average	2.00	10.0	36.0	0.38
Spillway Demolition: Bridge Pier and Facing Demo	Off-Highway Trucks	Diesel	Average	1.00	10.0	376	0.38
Spillway Demolition: Bridge Pier and Facing Demo	Welders	Diesel	Average	1.00	10.0	46.0	0.45
Spillway Demolition: Bridge Pier and Facing Demo	Air Compressors	Diesel	Average	3.00	10.0	37.0	0.48
Temporary Flood Control Berm	Excavators	Diesel	Average	1.00	10.0	425	0.38
Temporary Flood Control Berm	Off-Highway Trucks	Diesel	Average	4.00	10.0	464	0.38
Temporary Flood Control Berm	Rubber Tired Dozers	Diesel	Average	1.00	10.0	474	0.40
Temporary Flood Control Berm	Rollers	Diesel	Average	1.00	10.0	117	0.38
Mobilization	Forklifts	Diesel	Average	1.00	10.0	142	0.20

Mobilization	Tractors/Loaders/Back	Diesel	Average	1.00	10.0	286	0.37
Mobilization	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Mobilization	Graders	Diesel	Average	1.00	10.0	180	0.41
Mobilization	Excavators	Diesel	Average	1.00	10.0	425	0.38
Mobilization	Skid Steer Loaders	Diesel	Average	2.00	10.0	107	0.37
Mobilization	Cranes	Diesel	Average	1.00	10.0	367	0.29
Demobilization	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Demobilization	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Demobilization	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Demobilization	Graders	Diesel	Average	1.00	10.0	180	0.41
Demobilization	Excavators	Diesel	Average	1.00	10.0	425	0.38
Demobilization	Skid Steer Loaders	Diesel	Average	2.00	10.0	107	0.37
Demobilization	Cranes	Diesel	Average	1.00	10.0	367	0.29
Cleanup	Scrapers	Diesel	Average	2.00	10.0	515	0.48
Cleanup	Rubber Tired Dozers	Diesel	Average	3.00	10.0	354	0.40
Cleanup	Graders	Diesel	Average	1.00	10.0	290	0.41
Cleanup	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	313	0.37
Allowance for Piping Install	Excavators	Diesel	Average	1.00	10.0	300	0.38
Allowance for Piping Install	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	241	0.37
Allowance for Piping Install	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Bypass Pumping Diversion Beam	Generator Sets	Diesel	Average	1.00	24.0	14.0	0.74
Inclined Inlet Structure: Steel Pipe and Appurtenances	Rollers	Diesel	Average	1.00	10.0	36.0	0.38

Inclined Inlet Structure: Steel Pipe and Appurtenances	Excavators	Diesel	Average	2.00	20.0	36.0	0.38
Inclined Inlet Structure: Steel Pipe and Appurtenances	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	84.0	0.37
Inclined Inlet Structure: Steel Pipe and Appurtenances	Welders	Diesel	Average	1.00	10.0	46.0	0.45
Inclined Inlet Structure: Steel Pipe and Appurtenances	Cranes	Diesel	Average	1.00	10.0	367	0.29
Inclined Inlet Structure: Reinforced Concrete	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Inclined Inlet Structure: Reinforced Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Inclined Inlet Structure: Reinforced Concrete	Cranes	Diesel	Average	2.00	10.0	367	0.29
Inclined Inlet Structure: Reinforced Concrete	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Inclined Inlet Structure: Reinforced Concrete	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Inclined Inlet Structure: Reinforced Concrete	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Inclined Inlet Structure: Drilled Foundation Anchors	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Inclined Inlet Structure: Drilled Foundation Anchors	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37

Inclined Inlet Structure: Drilled Foundation Anchors	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Inclined Inlet Structure: Excavation	Excavators	Diesel	Average	1.00	10.0	425	0.38
Inclined Inlet Structure: Excavation	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Inclined Inlet Structure: Stainless Steel Platform	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Inclined Inlet Structure: Stainless Steel Platform	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Inclined Inlet Structure: Stainless Steel Platform	Cranes	Diesel	Average	1.00	10.0	367	0.29
Inclined Inlet Structure: Pneumatic Actuation Control System	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Inclined Inlet Structure: Pneumatic Actuation Control System	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Inclined Inlet Structure: Pneumatic Actuation Control System	Cranes	Diesel	Average	1.00	10.0	367	0.29
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Cranes	Diesel	Average	2.00	10.0	367	0.29
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Rough Terrain Forklifts	Diesel	Average	1.00	10.0	96.0	0.40

Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Aerial Lifts	Diesel	Average	2.00	10.0	46.0	0.31
Cofferdam Installation and Removal: Dewatering	Generator Sets	Diesel	Average	2.00	24.0	14.0	0.74
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Cranes	Diesel	Average	2.00	10.0	367	0.29
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Rough Terrain Forklifts	Diesel	Average	1.00	10.0	96.0	0.40
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Aerial Lifts	Diesel	Average	2.00	10.0	46.0	0.31
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Graders	Diesel	Average	1.00	10.0	290	0.41
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Scrapers	Diesel	Average	3.00	10.0	515	0.48
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Rubber Tired Dozers	Diesel	Average	1.00	10.0	265	0.40
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Off-Highway Trucks	Diesel	Average	1.00	10.0	464	0.38

Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Rubber Tired Dozers	Diesel	Average	1.00	10.0	474	0.40
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Rollers	Diesel	Average	1.00	10.0	405	0.38
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Graders	Diesel	Average	1.00	10.0	238	0.41
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	241	0.37
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Rollers	Diesel	Average	1.00	10.0	112	0.38
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Excavators	Diesel	Average	1.00	10.0	300	0.38
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Rubber Tired Dozers	Diesel	Average	1.00	5.00	170	0.40
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Forklifts	Diesel	Average	1.00	10.0	142	0.20

Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	241	0.37
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Skid Steer Loaders	Diesel	Average	1.00	10.0	106	0.37
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37

Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Dam Control Building: Pt 1 CMU Control Building	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Dam Control Building: Pt 1 CMU Control Building	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Dam Control Building: Pt 1 CMU Control Building	Excavators	Diesel	Average	1.00	5.00	74.0	0.38
Dam Control Building: Pt 2 CMU Control Building	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Dam Control Building: Pt 2 CMU Control Building	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Dam Control Building: Pt 2 CMU Control Building	Excavators	Diesel	Average	1.00	5.00	74.0	0.38
Dam Control Building: Reinforced Concrete Foundation	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Dam Control Building: Reinforced Concrete Foundation	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Dam Control Building: Reinforced Concrete Foundation	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Dam Control Building: Reinforced Concrete Foundation	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Dam Control Building: Reinforced Concrete Foundation	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Dam Control Building: Reinforced Concrete Foundation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Dam Control Building: Reinforced Concrete Foundation	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Dam Control Building: Reinforced Concrete Foundation	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Dam Control Building: Metal Frame Roofing	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Dam Control Building: Metal Frame Roofing	Cranes	Diesel	Average	1.00	10.0	367	0.29
Dam Control Building: Ancillary Features	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Dam Control Building: Ancillary Features	Cranes	Diesel	Average	1.00	5.00	367	0.29
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Excavators	Diesel	Average	1.00	10.0	300	0.38
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Rubber Tired Dozers	Diesel	Average	1.00	10.0	170	0.40
Downstream Outlet Works Piping and Vault: Structure Bkfl	Excavators	Diesel	Average	1.00	10.0	300	0.38

Downstream Outlet Works Piping and Vault: Structure Bkfl	Tractors/Loaders/Back	Diesel	Average	1.00	10.0	241	0.37
Downstream Outlet Works Piping and Vault: Structure Bkfl	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Downstream Outlet Works Piping and Vault: Structure Bkfl	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Cranes	Diesel	Average	1.00	5.00	367	0.29
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Tractors/Loaders/Back hoes	Diesel	Average	1.00	10.0	286	0.37

Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Downstream Outlet Works Piping and Vault: Piping and Valves	Rollers	Diesel	Average	1.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Piping and Valves	Excavators	Diesel	Average	3.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Piping and Valves	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	84.0	0.37
Downstream Outlet Works Piping and Vault: Piping and Valves	Welders	Diesel	Average	1.00	10.0	46.0	0.45
Downstream Outlet Works Piping and Vault: Steel Casing	Rollers	Diesel	Average	1.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Steel Casing	Excavators	Diesel	Average	3.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Steel Casing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	84.0	0.37
Downstream Outlet Works Piping and Vault: Steel Casing	Welders	Diesel	Average	1.00	10.0	46.0	0.45

Downstream Outlet Works Piping and Vault: Ladders and Platforms	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Cranes	Diesel	Average	1.00	5.00	367	0.29
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Excavators	Diesel	Average	1.00	8.00	300	0.38
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	241	0.37
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Plate Compactors	Diesel	Average	1.00	5.00	8.00	0.43
Downstream Outlet Works Piping and Vault: Dewatering	Generator Sets	Diesel	Average	1.00	24.0	14.0	0.74
Downstream Outlet Works Piping and Vault: ARVs and Valves	Excavators	Diesel	Average	1.00	5.00	300	0.38
Downstream Outlet Works Piping and Vault: ARVs and Valves	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	241	0.37

Downstream Outlet Works Piping and Vault: ARVs and Valves	Plate Compactors	Diesel	Average	1.00	5.00	8.00	0.43
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Excavators	Diesel	Average	1.00	10.0	300	0.38
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Cranes	Diesel	Average	1.00	5.00	367	0.29
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Forklifts	Diesel	Average	1.00	5.00	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Skid Steer Loaders	Diesel	Average	1.00	8.00	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Pumps	Diesel	Average	1.00	5.00	11.0	0.74

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Cranes	Diesel	Average	2.00	10.0	367	0.29
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Cranes	Diesel	Average	1.00	10.0	367	0.29

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Graders	Diesel	Average	1.00	10.0	290	0.41
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Scrapers	Diesel	Average	3.00	10.0	515	0.48
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Rubber Tired Dozers	Diesel	Average	1.00	10.0	265	0.40
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Forklifts	Diesel	Average	1.00	10.0	142	0.20

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Excavators	Diesel	Average	1.00	10.0	201	0.38
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Air Compressors	Diesel	Average	1.00	10.0	37.0	0.48
Spillway Site Excavations	Excavators	Diesel	Average	1.00	10.0	485	0.38
Spillway Site Excavations	Excavators	Diesel	Average	1.00	10.0	425	0.38
Spillway Site Excavations	Off-Highway Trucks	Diesel	Average	4.00	10.0	464	0.38
Spillway Site Excavations	Rubber Tired Dozers	Diesel	Average	1.00	10.0	474	0.40
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Rock Slope Stabilization	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Rock Slope Stabilization	Forklifts	Diesel	Average	1.00	10.0	142	0.20

Rock Slope Stabilization	Excavators	Diesel	Average	1.00	10.0	201	0.38
Rock Slope Stabilization	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Rock Slope Stabilization	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Rock Slope Stabilization	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Rock Slope Stabilization	Air Compressors	Diesel	Average	1.00	10.0	37.0	0.48
RCC Weir Support Block	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
RCC Weir Support Block	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
RCC Weir Support Block	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
RCC Weir Support Block	Cranes	Diesel	Average	1.00	10.0	367	0.29
RCC Weir Support Block	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
RCC Weir Support Block	Tractors/Loaders/Backhoes	Diesel	Average	3.00	10.0	84.0	0.37
RCC Weir Support Block	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
RCC Weir Support Block	Rollers	Diesel	Average	3.00	10.0	36.0	0.38
RCC Weir Support Block	Rubber Tired Dozers	Diesel	Average	3.00	10.0	367	0.40
RCC Weir Support Block	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38

Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Tractors/Loaders/Back hoes	Diesel	Average	3.00	10.0	84.0	0.37
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Rollers	Diesel	Average	3.00	10.0	36.0	0.38
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Rubber Tired Dozers	Diesel	Average	3.00	10.0	367	0.40
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Cranes	Diesel	Average	1.00	10.0	367	0.29
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38

Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Cranes	Diesel	Average	2.00	10.0	367	0.29
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Cement and Mortar Mixers	Diesel	Average	2.00	5.00	10.0	0.56
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Cranes	Diesel	Average	2.00	10.0	367	0.29
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Bore/Drill Rigs	Diesel	Average	2.00	10.0	173	0.50
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Excavators	Diesel	Average	2.00	10.0	425	0.38

Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Off-Highway Trucks	Diesel	Average	3.00	10.0	464	0.38
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Rubber Tired Dozers	Diesel	Average	1.00	10.0	354	0.40
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Air Compressors	Diesel	Average	1.00	10.0	37.0	0.48

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Excavators	Diesel	Average	1.00	10.0	201	0.38
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Cement and Mortar Mixers	Diesel	Average	4.00	10.0	10.0	0.56

Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Excavators	Diesel	Average	2.00	10.0	425	0.38
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Off-Highway Trucks	Diesel	Average	3.00	10.0	464	0.38
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Rubber Tired Dozers	Diesel	Average	1.00	10.0	354	0.40
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56

Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Air Compressors	Diesel	Average	1.00	10.0	37.0	0.48
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37

Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Bore/Drill Rigs	Diesel	Average	2.00	10.0	83.0	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Excavators	Diesel	Average	1.00	10.0	201	0.38
Wall Transitions: Left Secant Pile Walls	Excavators	Diesel	Average	1.00	10.0	425	0.38
Wall Transitions: Left Secant Pile Walls	Cranes	Diesel	Average	1.00	5.00	367	0.29
Wall Transitions: Left Secant Pile Walls	Excavators	Diesel	Average	1.00	10.0	425	0.38
Wall Transitions: Left Secant Pile Walls	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Wall Transitions: Left Secant Pile Walls	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Transitions: Left Secant Pile Walls	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50

Wall Transitions: Left Secant Pile Walls	Tractors/Loaders/Back	Diesel	Average	1.00	5.00	286	0.37
Wall Transitions: Left Secant Pile Walls	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Transitions: Left Secant Pile Walls	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Transitions: Right Secant Pile Wall	Excavators	Diesel	Average	2.00	10.0	425	0.38
Wall Transitions: Right Secant Pile Wall	Cranes	Diesel	Average	1.00	5.00	367	0.29
Wall Transitions: Right Secant Pile Wall	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Wall Transitions: Right Secant Pile Wall	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Transitions: Right Secant Pile Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Transitions: Right Secant Pile Wall	Tractors/Loaders/Back hoes	Diesel	Average	1.00	5.00	286	0.37
Wall Transitions: Right Secant Pile Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Transitions: Right Secant Pile Wall	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Right Closure Wall: Work Platform Construction	Excavators	Diesel	Average	1.00	10.0	425	0.38
Right Closure Wall: Work Platform Construction	Off-Highway Trucks	Diesel	Average	2.00	10.0	464	0.38
Right Closure Wall: Work Platform Construction	Rubber Tired Dozers	Diesel	Average	1.00	10.0	354	0.40
Right Closure Wall: Work Platform Construction	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Right Closure Wall: Secant Pile Wall	Excavators	Diesel	Average	1.00	10.0	425	0.38

Right Closure Wall: Secant Pile Wall	Cranes	Diesel	Average	1.00	10.0	367	0.29
Right Closure Wall: Secant Pile Wall	Excavators	Diesel	Average	1.00	10.0	425	0.38
Right Closure Wall: Secant Pile Wall	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Right Closure Wall: Secant Pile Wall	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Right Closure Wall: Secant Pile Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Right Closure Wall: Secant Pile Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Right Closure Wall: Secant Pile Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Right Closure Wall: Secant Pile Wall	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Right Closure Wall: Backfill Concrete	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Right Closure Wall: Backfill Concrete	Pumps	Diesel	Average	1.00	5.00	11.0	0.74
Right Closure Wall: Backfill Concrete	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Right Closure Wall: Backfill Concrete	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Right Closure Wall: Backfill Concrete	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Right Closure Wall: Backfill Concrete	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Wall Type 2 - Left: Leveling Concrete	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 2 - Left: Leveling Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: Leveling Concrete	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50

Wall Type 2 - Left: Leveling Concrete	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 2 - Left: Leveling Concrete	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Left: 1 Inch Concrete Wall	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Left: 1 Inch Concrete Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: 1 Inch Concrete Wall	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Left: 1 Inch Concrete Wall	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Left: 1 Inch Concrete Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Left: 1 Inch Concrete Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Left: 1 Inch Concrete Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Left: 1 Inch Concrete Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Left: 1 Inch Concrete Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50

Wall Type 2 - Left: 2.5 Inch Concrete Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: Concrete Footing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Left: Concrete Footing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: Concrete Footing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Left: Concrete Footing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Left: Concrete Footing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Left: Concrete Footing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Left: Concrete Footing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Left: Concrete Footing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Left: Concrete Footing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: Backfill	Graders	Diesel	Average	1.00	10.0	215	0.41
Wall Type 2 - Left: Backfill	Excavators	Diesel	Average	1.00	10.0	36.0	0.38
Wall Type 2 - Left: Backfill	Rollers	Diesel	Average	2.00	10.0	36.0	0.38
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Average	1.00	10.0	376	0.38

Wall Type 2 - Left: Reinforced Concrete Wall	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Left: Reinforced Concrete Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: Reinforced Concrete Wall	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Left: Reinforced Concrete Wall	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Left: Reinforced Concrete Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Left: Reinforced Concrete Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Left: Reinforced Concrete Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Left: Reinforced Concrete Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Left: Reinforced Concrete Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Forklifts	Diesel	Average	1.00	10.0	142	0.20

Wall Type 2 - Left: Footing Rock Anchors and Backfill	Graders	Diesel	Average	1.00	10.0	215	0.41
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Excavators	Diesel	Average	1.00	10.0	36.0	0.38
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Rollers	Diesel	Average	2.00	10.0	36.0	0.38
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Off-Highway Trucks	Diesel	Average	6.00	10.0	376	0.38
Wall Type 2 - Wall Right: Leveling Concrete	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: Leveling Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: Leveling Concrete	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: Leveling Concrete	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: Leveling Concrete	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: Leveling Concrete	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: Leveling Concrete	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: Leveling Concrete	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37

Wall Type 2 - Wall Right: Leveling Concrete	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: 1 Inch Wall	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: 1 Inch Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: 1 Inch Wall	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: 1 Inch Wall	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: 1 Inch Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: 1 Inch Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: 1 Inch Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: 1 Inch Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: 1 Inch Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: 2.5 Inch Wall	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: 2.5 Inch Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: 2.5 Inch Wall	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: 2.5 Inch Wall	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: 2.5 Inch Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: 2.5 Inch Wall	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: 2.5 Inch Wall	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37

Wall Type 2 - Wall Right: 2.5 Inch Wall	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: 2.5 Inch Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: Concrete Footing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: Concrete Footing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: Concrete Footing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: Concrete Footing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: Concrete Footing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: Concrete Footing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: Concrete Footing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: Concrete Footing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: Concrete Footing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: Backfill	Graders	Diesel	Average	1.00	10.0	215	0.41
Wall Type 2 - Wall Right: Backfill	Excavators	Diesel	Average	1.00	10.0	36.0	0.38
Wall Type 2 - Wall Right: Backfill	Rollers	Diesel	Average	2.00	10.0	36.0	0.38

Wall Type 2 - Wall Right: Backfill	Off-Highway Trucks	Diesel	Average	6.00	10.0	376	0.38
Wall Type 3 - Left: Roller Compacted Concrete	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Wall Type 3 - Left: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Left: Roller Compacted Concrete	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 3 - Left: Roller Compacted Concrete	Cranes	Diesel	Average	1.00	10.0	367	0.29
Wall Type 3 - Left: Roller Compacted Concrete	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Wall Type 3 - Left: Roller Compacted Concrete	Tractors/Loaders/Backhoes	Diesel	Average	3.00	10.0	84.0	0.37
Wall Type 3 - Left: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Left: Roller Compacted Concrete	Rollers	Diesel	Average	3.00	10.0	36.0	0.38
Wall Type 3 - Left: Roller Compacted Concrete	Rubber Tired Dozers	Diesel	Average	3.00	10.0	367	0.40
Wall Type 3 - Left: Roller Compacted Concrete	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38
Wall Type 3 - Left: CVC Facing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 3 - Left: CVC Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Wall Type 3 - Left: CVC Facing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 3 - Left: CVC Facing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 3 - Left: CVC Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 3 - Left: CVC Facing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 3 - Left: CVC Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 3 - Left: CVC Facing	Skid Steer Loaders	Diesel	Average	5.00	5.00	71.0	0.37
Wall Type 3 - Left: CVC Facing	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 3 - Right: Roller Compacted Concrete	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Wall Type 3 - Right: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Right: Roller Compacted Concrete	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 3 - Right: Roller Compacted Concrete	Cranes	Diesel	Average	1.00	10.0	367	0.29
Wall Type 3 - Right: Roller Compacted Concrete	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Wall Type 3 - Right: Roller Compacted Concrete	Tractors/Loaders/Backhoes	Diesel	Average	3.00	10.0	84.0	0.37
Wall Type 3 - Right: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74

Wall Type 3 - Right: Roller Compacted Concrete	Rollers	Diesel	Average	3.00	10.0	36.0	0.38
Wall Type 3 - Right: Roller Compacted Concrete	Rubber Tired Dozers	Diesel	Average	3.00	10.0	367	0.40
Wall Type 3 - Right: Roller Compacted Concrete	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38
Wall Type 3 - Right: CVC Facing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Wall Type 3 - Right: CVC Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 3 - Right: CVC Facing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Wall Type 3 - Right: CVC Facing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Wall Type 3 - Right: CVC Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 3 - Right: CVC Facing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Wall Type 3 - Right: CVC Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Wall Type 3 - Right: CVC Facing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Wall Type 3 - Right: CVC Facing	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 3 - Right: Backfill	Graders	Diesel	Average	1.00	10.0	215	0.41
Wall Type 3 - Right: Backfill	Excavators	Diesel	Average	1.00	10.0	36.0	0.38
Wall Type 3 - Right: Backfill	Rollers	Diesel	Average	2.00	10.0	36.0	0.38
Wall Type 3 - Right: Backfill	Off-Highway Trucks	Diesel	Average	6.00	10.0	376	0.38

Stilling Basin: RCC	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Stilling Basin: RCC	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Stilling Basin: RCC	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Stilling Basin: RCC	Cranes	Diesel	Average	1.00	10.0	367	0.29
Stilling Basin: RCC	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Stilling Basin: RCC	Tractors/Loaders/Backhoes	Diesel	Average	3.00	10.0	84.0	0.37
Stilling Basin: RCC	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Stilling Basin: RCC	Rollers	Diesel	Average	3.00	10.0	36.0	0.38
Stilling Basin: RCC	Rubber Tired Dozers	Diesel	Average	3.00	10.0	367	0.40
Stilling Basin: RCC	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38
Stilling Basin: Upstream/Downstream CVC Facing	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Stilling Basin: Upstream/Downstream CVC Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Upstream/Downstream CVC Facing	Cranes	Diesel	Average	2.00	10.0	367	0.29
Stilling Basin: Upstream/Downstream CVC Facing	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Stilling Basin: Upstream/Downstream CVC Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Upstream/Downstream CVC Facing	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Stilling Basin: Upstream/Downstream CVC Facing	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Stilling Basin: Upstream/Downstream CVC Facing	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37

Stilling Basin: Upstream/Downstream CVC Facing	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Stilling Basin: Basin Steps	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Stilling Basin: Basin Steps	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Basin Steps	Cranes	Diesel	Average	2.00	10.0	367	0.29
Stilling Basin: Basin Steps	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Stilling Basin: Basin Steps	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Basin Steps	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Stilling Basin: Basin Steps	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Stilling Basin: Basin Steps	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Stilling Basin: Basin Steps	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Stilling Basin: Chute Blocks	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Stilling Basin: Chute Blocks	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Chute Blocks	Cranes	Diesel	Average	2.00	8.00	367	0.29
Stilling Basin: Chute Blocks	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Stilling Basin: Chute Blocks	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Chute Blocks	Bore/Drill Rigs	Diesel	Average	1.00	2.00	173	0.50
Stilling Basin: Chute Blocks	Tractors/Loaders/Backhoes	Diesel	Average	1.00	2.00	286	0.37

Stilling Basin: Chute Blocks	Skid Steer Loaders	Diesel	Average	1.00	2.00	107	0.37
Stilling Basin: Chute Blocks	Cement and Mortar Mixers	Diesel	Average	2.00	2.00	10.0	0.56
Stilling Basin: Dentated Sill	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Stilling Basin: Dentated Sill	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Dentated Sill	Cranes	Diesel	Average	2.00	10.0	367	0.29
Stilling Basin: Dentated Sill	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Stilling Basin: Dentated Sill	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Dentated Sill	Bore/Drill Rigs	Diesel	Average	1.00	2.00	173	0.50
Stilling Basin: Dentated Sill	Tractors/Loaders/Backhoes	Diesel	Average	1.00	2.00	286	0.37
Stilling Basin: Dentated Sill	Skid Steer Loaders	Diesel	Average	1.00	2.00	107	0.37
Stilling Basin: Dentated Sill	Cement and Mortar Mixers	Diesel	Average	2.00	2.00	10.0	0.56
Spillway Slab Construction: RCC Foundation Support Block	Bore/Drill Rigs	Diesel	Average	1.00	10.0	173	0.50
Spillway Slab Construction: RCC Foundation Support Block	Pumps	Diesel	Average	6.00	10.0	11.0	0.74
Spillway Slab Construction: RCC Foundation Support Block	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43

Spillway Slab Construction: RCC Foundation Support Block	Cranes	Diesel	Average	1.00	10.0	367	0.29
Spillway Slab Construction: RCC Foundation Support Block	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Spillway Slab Construction: RCC Foundation Support Block	Tractors/Loaders/Backhoes	Diesel	Average	3.00	10.0	84.0	0.37
Spillway Slab Construction: RCC Foundation Support Block	Rollers	Diesel	Average	3.00	10.0	36.0	0.38
Spillway Slab Construction: RCC Foundation Support Block	Rubber Tired Dozers	Diesel	Average	3.00	10.0	367	0.40
Spillway Slab Construction: RCC Foundation Support Block	Off-Highway Trucks	Diesel	Average	5.00	10.0	376	0.38
Spillway Slab Construction: Spillway Chute Slab	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Spillway Slab Construction: Spillway Chute Slab	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Spillway Slab Construction: Spillway Chute Slab	Cranes	Diesel	Average	2.00	10.0	367	0.29
Spillway Slab Construction: Spillway Chute Slab	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Spillway Slab Construction: Spillway Chute Slab	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74

Spillway Slab Construction: Spillway Chute Slab	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Spillway Slab Construction: Spillway Chute Slab	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Spillway Slab Construction: Spillway Chute Slab	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37
Spillway Slab Construction: Spillway Chute Slab	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Spillway Slab Construction: Stilling Basin Slab	Surfacing Equipment	Diesel	Average	2.00	10.0	399	0.30
Spillway Slab Construction: Stilling Basin Slab	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Spillway Slab Construction: Stilling Basin Slab	Cranes	Diesel	Average	2.00	10.0	367	0.29
Spillway Slab Construction: Stilling Basin Slab	Rough Terrain Forklifts	Diesel	Average	2.00	10.0	96.0	0.40
Spillway Slab Construction: Stilling Basin Slab	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Spillway Slab Construction: Stilling Basin Slab	Bore/Drill Rigs	Diesel	Average	1.00	5.00	173	0.50
Spillway Slab Construction: Stilling Basin Slab	Tractors/Loaders/Backhoes	Diesel	Average	1.00	5.00	286	0.37
Spillway Slab Construction: Stilling Basin Slab	Skid Steer Loaders	Diesel	Average	1.00	5.00	107	0.37

Spillway Slab Construction: Stilling Basin Slab	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Spillway Slab Construction: Zone B	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Spillway Slab Construction: Zone B	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Spillway Slab Construction: Zone B	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Spillway Slab Construction: Zone C	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Spillway Slab Construction: Zone C	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Spillway Slab Construction: Zone C	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37

Spillway Drains and Cleanouts: Drain Gravel	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Spillway Drains and Cleanouts: Drain Gravel	Rubber Tired Dozers	Diesel	Average	1.00	10.0	170	0.40
Spillway Drains and Cleanouts: Drain Gravel	Off-Highway Trucks	Diesel	Average	1.00	10.0	376	0.38
Spillway Drains and Cleanouts: Filter Sand	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Spillway Drains and Cleanouts: Filter Sand	Rubber Tired Dozers	Diesel	Average	1.00	10.0	170	0.40
Spillway Drains and Cleanouts: Filter Sand	Off-Highway Trucks	Diesel	Average	1.00	10.0	376	0.38
Surface Ditch from Landfill: Excavation	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Surface Ditch from Landfill: Excavation	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Surface Ditch from Landfill: Drop Structures	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Surface Ditch from Landfill: Drop Structures	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Surface Ditch from Landfill: Ditch Lining	Excavators	Diesel	Average	1.00	10.0	300	0.38
Surface Ditch from Landfill: Ditch Lining	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Surface Ditch from Landfill: Ditch Lining	Cranes	Diesel	Average	1.00	10.0	367	0.29
Surface Ditch from Landfill: Ditch Lining	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	241	0.37
Surface Ditch from Landfill: Ditch Lining	Forklifts	Diesel	Average	1.00	10.0	142	0.20

Downstream Apron: Concrete Apron	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Downstream Apron: Concrete Apron	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Downstream Apron: Concrete Apron	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Downstream Apron: Concrete Apron	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Downstream Apron: Concrete Apron	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Downstream Apron: Concrete Apron	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Downstream Apron: Concrete Apron	Cranes	Diesel	Average	1.00	10.0	367	0.29
Downstream Apron: Concrete Apron	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Downstream Apron: Concrete Apron	Bore/Drill Rigs	Diesel	Average	1.00	10.0	385	0.50
Downstream Apron: Zone C	Bore/Drill Rigs	Diesel	Average	2.00	10.0	385	0.50
Downstream Apron: Zone C	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Downstream Apron: Zone C	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Downstream Apron: Riprap Apron	Excavators	Diesel	Average	1.00	10.0	300	0.38
Downstream Apron: Riprap Apron	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37
Downstream Apron: Riprap Apron	Dumpers/Tenders	Diesel	Average	2.00	10.0	16.0	0.38
Downstream Apron: Riprap Bedding	Excavators	Diesel	Average	1.00	10.0	300	0.38
Downstream Apron: Riprap Bedding	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	286	0.37

Downstream Apron: Riprap Bedding	Dumpers/Tenders	Diesel	Average	2.00	10.0	16.0	0.38
Furnish and Install Electrical / Controls and Instrumentation	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Furnish and Install Electrical / Controls and Instrumentation	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Furnish and Install Electrical / Controls and Instrumentation	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Furnish and Install Aeration System	Forklifts	Diesel	Average	1.00	10.0	142	0.20
Furnish and Install Aeration System	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Furnish and Install Aeration System	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Part 1 Furnish and Install Erosion Control Measures	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Part 1 Furnish and Install Erosion Control Measures	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Part 2 Furnish and Install Erosion Control Measures	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Part 2 Furnish and Install Erosion Control Measures	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Part 3 Furnish and Install Erosion Control Measures	Skid Steer Loaders	Diesel	Average	1.00	10.0	107	0.37
Part 3 Furnish and Install Erosion Control Measures	Excavators	Diesel	Average	1.00	10.0	74.0	0.38
Embankment Mitigation	Rubber Tired Dozers	Diesel	Average	4.00	10.0	367	0.40

Embankment Mitigation	Excavators	Diesel	Average	2.00	10.0	36.0	0.38
Embankment Mitigation	Graders	Diesel	Average	2.00	10.0	148	0.41
Embankment Mitigation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	10.0	84.0	0.37
Embankment Mitigation	Dumpers/Tenders	Diesel	Average	4.00	10.0	16.0	0.38
Embankment Mitigation	Plate Compactors	Diesel	Average	3.00	10.0	8.00	0.43

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Part 1 Site Demolition (Excludes Spillway)	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Part 1 Site Demolition (Excludes Spillway)	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Part 2 Site Demolition (Excludes Spillway)	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Part 2 Site Demolition (Excludes Spillway)	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Spillway Demolition: Existing Spillway Demo	Concrete/Industrial Saws	Diesel	Tier 4 Final	4.00	10.0	33.0	0.73
Spillway Demolition: Existing Spillway Demo	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Spillway Demolition: Existing Spillway Demo	Crushing/Proc. Equipment	Gasoline	Average	2.00	10.0	12.0	0.85
Spillway Demolition: Existing Spillway Demo	Excavators	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38

Spillway Demolition: Existing Spillway Demo	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	376	0.38
Spillway Demolition: Existing Spillway Demo	Welders	Diesel	Tier 4 Final	1.00	10.0	46.0	0.45
Spillway Demolition: Existing Spillway Demo	Air Compressors	Diesel	Tier 4 Final	3.00	10.0	37.0	0.48
Spillway Demolition: Crush Concrete Demo	Crushing/Proc. Equipment	Gasoline	Average	1.00	10.0	12.0	0.85
Spillway Demolition: Crush Concrete Demo	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Spillway Demolition: Crush Concrete Demo	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Spillway Demolition: Crush Concrete Demo	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Spillway Demolition: Bridge Pier and Facing Demo	Concrete/Industrial Saws	Diesel	Tier 4 Final	4.00	10.0	33.0	0.73
Spillway Demolition: Bridge Pier and Facing Demo	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Spillway Demolition: Bridge Pier and Facing Demo	Crushing/Proc. Equipment	Gasoline	Average	2.00	10.0	12.0	0.85
Spillway Demolition: Bridge Pier and Facing Demo	Excavators	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38
Spillway Demolition: Bridge Pier and Facing Demo	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	376	0.38
Spillway Demolition: Bridge Pier and Facing Demo	Welders	Diesel	Tier 4 Final	1.00	10.0	46.0	0.45

Spillway Demolition: Bridge Pier and Facing Demo	Air Compressors	Diesel	Tier 4 Final	3.00	10.0	37.0	0.48
Temporary Flood Control Berm	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Temporary Flood Control Berm	Off-Highway Trucks	Diesel	Tier 4 Final	4.00	10.0	464	0.38
Temporary Flood Control Berm	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	474	0.40
Temporary Flood Control Berm	Rollers	Diesel	Tier 4 Final	1.00	10.0	117	0.38
Mobilization	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Mobilization	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Mobilization	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Mobilization	Graders	Diesel	Tier 4 Final	1.00	10.0	180	0.41
Mobilization	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Mobilization	Skid Steer Loaders	Diesel	Tier 4 Final	2.00	10.0	107	0.37
Mobilization	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Demobilization	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Demobilization	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Demobilization	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Demobilization	Graders	Diesel	Tier 4 Final	1.00	10.0	180	0.41
Demobilization	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Demobilization	Skid Steer Loaders	Diesel	Tier 4 Final	2.00	10.0	107	0.37
Demobilization	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Cleanup	Scrapers	Diesel	Tier 4 Final	2.00	10.0	515	0.48
Cleanup	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	354	0.40
Cleanup	Graders	Diesel	Tier 4 Final	1.00	10.0	290	0.41
Cleanup	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	313	0.37

Allowance for Piping Install	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Allowance for Piping Install	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	241	0.37
Allowance for Piping Install	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Bypass Pumping Diversion Beam	Generator Sets	Diesel	Average	1.00	24.0	14.0	0.74
Inclined Inlet Structure: Steel Pipe and Appurtenances	Rollers	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38
Inclined Inlet Structure: Steel Pipe and Appurtenances	Excavators	Diesel	Tier 4 Final	2.00	20.0	36.0	0.38
Inclined Inlet Structure: Steel Pipe and Appurtenances	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	84.0	0.37
Inclined Inlet Structure: Steel Pipe and Appurtenances	Welders	Diesel	Tier 4 Final	1.00	10.0	46.0	0.45
Inclined Inlet Structure: Steel Pipe and Appurtenances	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Inclined Inlet Structure: Reinforced Concrete	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Inclined Inlet Structure: Reinforced Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Inclined Inlet Structure: Reinforced Concrete	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Inclined Inlet Structure: Reinforced Concrete	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40

Inclined Inlet Structure: Reinforced Concrete	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Inclined Inlet Structure: Reinforced Concrete	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Inclined Inlet Structure: Drilled Foundation Anchors	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Inclined Inlet Structure: Drilled Foundation Anchors	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Inclined Inlet Structure: Drilled Foundation Anchors	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Inclined Inlet Structure: Excavation	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Inclined Inlet Structure: Excavation	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Inclined Inlet Structure: Stainless Steel Platform	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Inclined Inlet Structure: Stainless Steel Platform	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Inclined Inlet Structure: Stainless Steel Platform	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Inclined Inlet Structure: Pneumatic Actuation Control System	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Inclined Inlet Structure: Pneumatic Actuation Control System	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20

Inclined Inlet Structure: Pneumatic Actuation Control System	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Rough Terrain Forklifts	Diesel	Tier 4 Final	1.00	10.0	96.0	0.40
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Aerial Lifts	Diesel	Tier 4 Final	2.00	10.0	46.0	0.31
Cofferdam Installation and Removal: Dewatering	Generator Sets	Diesel	Average	2.00	24.0	14.0	0.74
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Rough Terrain Forklifts	Diesel	Tier 4 Final	1.00	10.0	96.0	0.40
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Aerial Lifts	Diesel	Tier 4 Final	2.00	10.0	46.0	0.31
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Graders	Diesel	Tier 4 Final	1.00	10.0	290	0.41
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Scrapers	Diesel	Tier 4 Final	3.00	10.0	515	0.48

Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	265	0.40
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	464	0.38
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	474	0.40
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Rollers	Diesel	Tier 4 Final	1.00	10.0	405	0.38
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Graders	Diesel	Tier 4 Final	1.00	10.0	238	0.41
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	241	0.37
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Rollers	Diesel	Tier 4 Final	1.00	10.0	112	0.38
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38

Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	5.00	170	0.40
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	241	0.37
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	106	0.37
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Dam Control Building: Pt 1 CMU Control Building	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Dam Control Building: Pt 1 CMU Control Building	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Dam Control Building: Pt 1 CMU Control Building	Excavators	Diesel	Tier 4 Final	1.00	5.00	74.0	0.38
Dam Control Building: Pt 2 CMU Control Building	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Dam Control Building: Pt 2 CMU Control Building	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Dam Control Building: Pt 2 CMU Control Building	Excavators	Diesel	Tier 4 Final	1.00	5.00	74.0	0.38
Dam Control Building: Reinforced Concrete Foundation	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20

Dam Control Building: Reinforced Concrete Foundation	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Dam Control Building: Reinforced Concrete Foundation	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Dam Control Building: Reinforced Concrete Foundation	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Dam Control Building: Reinforced Concrete Foundation	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Dam Control Building: Reinforced Concrete Foundation	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Dam Control Building: Reinforced Concrete Foundation	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Dam Control Building: Reinforced Concrete Foundation	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Dam Control Building: Metal Frame Roofing	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Dam Control Building: Metal Frame Roofing	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Dam Control Building: Ancillary Features	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Dam Control Building: Ancillary Features	Cranes	Diesel	Tier 4 Final	1.00	5.00	367	0.29
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38

Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	170	0.40
Downstream Outlet Works Piping and Vault: Structure Bkfl	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Downstream Outlet Works Piping and Vault: Structure Bkfl	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	241	0.37
Downstream Outlet Works Piping and Vault: Structure Bkfl	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Downstream Outlet Works Piping and Vault: Structure Bkfl	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Cranes	Diesel	Tier 4 Final	1.00	5.00	367	0.29
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37

Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Downstream Outlet Works Piping and Vault: Piping and Valves	Rollers	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Piping and Valves	Excavators	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Piping and Valves	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	84.0	0.37
Downstream Outlet Works Piping and Vault: Piping and Valves	Welders	Diesel	Tier 4 Final	1.00	10.0	46.0	0.45
Downstream Outlet Works Piping and Vault: Steel Casing	Rollers	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38

Downstream Outlet Works Piping and Vault: Steel Casing	Excavators	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Downstream Outlet Works Piping and Vault: Steel Casing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	84.0	0.37
Downstream Outlet Works Piping and Vault: Steel Casing	Welders	Diesel	Tier 4 Final	1.00	10.0	46.0	0.45
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Cranes	Diesel	Tier 4 Final	1.00	5.00	367	0.29
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Excavators	Diesel	Tier 4 Final	1.00	8.00	300	0.38
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	241	0.37
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Plate Compactors	Diesel	Average	1.00	5.00	8.00	0.43
Downstream Outlet Works Piping and Vault: Dewatering	Generator Sets	Diesel	Average	1.00	24.0	14.0	0.74

Downstream Outlet Works Piping and Vault: ARVs and Valves	Excavators	Diesel	Tier 4 Final	1.00	5.00	300	0.38
Downstream Outlet Works Piping and Vault: ARVs and Valves	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	241	0.37
Downstream Outlet Works Piping and Vault: ARVs and Valves	Plate Compactors	Diesel	Average	1.00	5.00	8.00	0.43
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Cranes	Diesel	Tier 4 Final	1.00	5.00	367	0.29
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Forklifts	Diesel	Tier 4 Final	1.00	5.00	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	8.00	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Pumps	Diesel	Average	1.00	5.00	11.0	0.74
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Cranes	Diesel	Average	1.00	10.0	367	0.29
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Graders	Diesel	Tier 4 Final	1.00	10.0	290	0.41
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Scrapers	Diesel	Tier 4 Final	3.00	10.0	515	0.48
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	265	0.40
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Bore/Drill Rigs	Diesel	Average	1.00	10.0	385	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	385	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Excavators	Diesel	Tier 4 Final	1.00	10.0	201	0.38
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Air Compressors	Diesel	Tier 4 Final	1.00	10.0	37.0	0.48
Spillway Site Excavations	Excavators	Diesel	Tier 4 Final	1.00	10.0	485	0.38
Spillway Site Excavations	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Spillway Site Excavations	Off-Highway Trucks	Diesel	Tier 4 Final	4.00	10.0	464	0.38
Spillway Site Excavations	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	474	0.40
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Average	1.00	10.0	385	0.50
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	385	0.50
Rock Slope Stabilization	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Rock Slope Stabilization	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Rock Slope Stabilization	Excavators	Diesel	Tier 4 Final	1.00	10.0	201	0.38
Rock Slope Stabilization	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Rock Slope Stabilization	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Rock Slope Stabilization	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Rock Slope Stabilization	Air Compressors	Diesel	Tier 4 Final	1.00	10.0	37.0	0.48
RCC Weir Support Block	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50

RCC Weir Support Block	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
RCC Weir Support Block	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
RCC Weir Support Block	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
RCC Weir Support Block	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
RCC Weir Support Block	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	3.00	10.0	84.0	0.37
RCC Weir Support Block	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
RCC Weir Support Block	Rollers	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
RCC Weir Support Block	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	367	0.40
RCC Weir Support Block	Off-Highway Trucks	Diesel	Tier 4 Final	5.00	10.0	376	0.38
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74

Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	3.00	10.0	84.0	0.37
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Rollers	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	367	0.40
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Off-Highway Trucks	Diesel	Tier 4 Final	5.00	10.0	376	0.38
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40

Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Cement and Mortar Mixers	Diesel	Average	2.00	5.00	10.0	0.56
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	173	0.50

Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Tractors/Loaders/Back	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Excavators	Diesel	Tier 4 Final	2.00	10.0	425	0.38
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Off-Highway Trucks	Diesel	Tier 4 Final	3.00	10.0	464	0.38
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	354	0.40
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Air Compressors	Diesel	Tier 4 Final	1.00	10.0	37.0	0.48
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Excavators	Diesel	Tier 4 Final	1.00	10.0	201	0.38
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Cement and Mortar Mixers	Diesel	Average	4.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Excavators	Diesel	Tier 4 Final	2.00	10.0	425	0.38
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Off-Highway Trucks	Diesel	Tier 4 Final	3.00	10.0	464	0.38
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	354	0.40

Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Air Compressors	Diesel	Tier 4 Final	1.00	10.0	37.0	0.48
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30

Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56

Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	83.0	0.50
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Excavators	Diesel	Tier 4 Final	1.00	10.0	201	0.38
Wall Transitions: Left Secant Pile Walls	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Wall Transitions: Left Secant Pile Walls	Cranes	Diesel	Tier 4 Final	1.00	5.00	367	0.29
Wall Transitions: Left Secant Pile Walls	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Wall Transitions: Left Secant Pile Walls	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Wall Transitions: Left Secant Pile Walls	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Transitions: Left Secant Pile Walls	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Transitions: Left Secant Pile Walls	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Transitions: Left Secant Pile Walls	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Transitions: Left Secant Pile Walls	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Transitions: Right Secant Pile Wall	Excavators	Diesel	Tier 4 Final	2.00	10.0	425	0.38

Wall Transitions: Right Secant Pile Wall	Cranes	Diesel	Tier 4 Final	1.00	5.00	367	0.29
Wall Transitions: Right Secant Pile Wall	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Wall Transitions: Right Secant Pile Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Transitions: Right Secant Pile Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Transitions: Right Secant Pile Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Transitions: Right Secant Pile Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Transitions: Right Secant Pile Wall	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Right Closure Wall: Work Platform Construction	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Right Closure Wall: Work Platform Construction	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	10.0	464	0.38
Right Closure Wall: Work Platform Construction	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	354	0.40
Right Closure Wall: Work Platform Construction	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Right Closure Wall: Secant Pile Wall	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Right Closure Wall: Secant Pile Wall	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Right Closure Wall: Secant Pile Wall	Excavators	Diesel	Tier 4 Final	1.00	10.0	425	0.38
Right Closure Wall: Secant Pile Wall	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Right Closure Wall: Secant Pile Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37

Right Closure Wall: Secant Pile Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Right Closure Wall: Secant Pile Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Right Closure Wall: Secant Pile Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Right Closure Wall: Secant Pile Wall	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Right Closure Wall: Backfill Concrete	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Right Closure Wall: Backfill Concrete	Pumps	Diesel	Average	1.00	5.00	11.0	0.74
Right Closure Wall: Backfill Concrete	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Right Closure Wall: Backfill Concrete	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Right Closure Wall: Backfill Concrete	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Right Closure Wall: Backfill Concrete	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Wall Type 2 - Left: Leveling Concrete	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 2 - Left: Leveling Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: Leveling Concrete	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Left: Leveling Concrete	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 2 - Left: Leveling Concrete	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Left: 1 Inch Concrete Wall	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 2 - Left: 1 Inch Concrete Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Wall Type 2 - Left: 1 Inch Concrete Wall	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Left: 1 Inch Concrete Wall	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Left: 1 Inch Concrete Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Left: 1 Inch Concrete Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Left: 1 Inch Concrete Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Left: 1 Inch Concrete Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Left: 1 Inch Concrete Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: Concrete Footing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30

Wall Type 2 - Left: Concrete Footing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Left: Concrete Footing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Left: Concrete Footing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Left: Concrete Footing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Left: Concrete Footing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Left: Concrete Footing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Left: Concrete Footing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Left: Concrete Footing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: Backfill	Graders	Diesel	Tier 4 Final	1.00	10.0	215	0.41
Wall Type 2 - Left: Backfill	Excavators	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38
Wall Type 2 - Left: Backfill	Rollers	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Average	4.00	10.0	376	0.38
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	376	0.38
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	376	0.38
Wall Type 2 - Left: Reinforced Concrete Wall	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 2 - Left: Reinforced Concrete Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Wall Type 2 - Left: Reinforced Concrete Wall	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Left: Reinforced Concrete Wall	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Left: Reinforced Concrete Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Left: Reinforced Concrete Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Left: Reinforced Concrete Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Left: Reinforced Concrete Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Left: Reinforced Concrete Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Graders	Diesel	Tier 4 Final	1.00	10.0	215	0.41
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Excavators	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38

Wall Type 2 - Left: Footing Rock Anchors and Backfill	Rollers	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Off-Highway Trucks	Diesel	Tier 4 Final	6.00	10.0	376	0.38
Wall Type 2 - Wall Right: Leveling Concrete	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: Leveling Concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: Leveling Concrete	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: Leveling Concrete	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: Leveling Concrete	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: Leveling Concrete	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: Leveling Concrete	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: Leveling Concrete	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: Leveling Concrete	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: 1 Inch Wall	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: 1 Inch Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Wall Type 2 - Wall Right: 1 Inch Wall	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: 1 Inch Wall	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: 1 Inch Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: 1 Inch Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: 1 Inch Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: 1 Inch Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: 1 Inch Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: 2.5 Inch Wall	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 2 - Wall Right: 2.5 Inch Wall	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: 2.5 Inch Wall	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: 2.5 Inch Wall	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: 2.5 Inch Wall	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: 2.5 Inch Wall	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: 2.5 Inch Wall	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: 2.5 Inch Wall	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: 2.5 Inch Wall	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: Concrete Footing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30

Wall Type 2 - Wall Right: Concrete Footing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 2 - Wall Right: Concrete Footing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 2 - Wall Right: Concrete Footing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 2 - Wall Right: Concrete Footing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 2 - Wall Right: Concrete Footing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 2 - Wall Right: Concrete Footing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 2 - Wall Right: Concrete Footing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 2 - Wall Right: Concrete Footing	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Wall Type 2 - Wall Right: Backfill	Graders	Diesel	Tier 4 Final	1.00	10.0	215	0.41
Wall Type 2 - Wall Right: Backfill	Excavators	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38
Wall Type 2 - Wall Right: Backfill	Rollers	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38
Wall Type 2 - Wall Right: Backfill	Off-Highway Trucks	Diesel	Tier 4 Final	6.00	10.0	376	0.38
Wall Type 3 - Left: Roller Compacted Concrete	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50

Wall Type 3 - Left: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Left: Roller Compacted Concrete	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 3 - Left: Roller Compacted Concrete	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Wall Type 3 - Left: Roller Compacted Concrete	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Wall Type 3 - Left: Roller Compacted Concrete	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	3.00	10.0	84.0	0.37
Wall Type 3 - Left: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Left: Roller Compacted Concrete	Rollers	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Wall Type 3 - Left: Roller Compacted Concrete	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	367	0.40
Wall Type 3 - Left: Roller Compacted Concrete	Off-Highway Trucks	Diesel	Tier 4 Final	5.00	10.0	376	0.38
Wall Type 3 - Left: CVC Facing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 3 - Left: CVC Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 3 - Left: CVC Facing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 3 - Left: CVC Facing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 3 - Left: CVC Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74

Wall Type 3 - Left: CVC Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 3 - Left: CVC Facing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 3 - Left: CVC Facing	Skid Steer Loaders	Diesel	Tier 4 Final	5.00	5.00	71.0	0.37
Wall Type 3 - Left: CVC Facing	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 3 - Right: Roller Compacted Concrete	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Wall Type 3 - Right: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Right: Roller Compacted Concrete	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Wall Type 3 - Right: Roller Compacted Concrete	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Wall Type 3 - Right: Roller Compacted Concrete	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74
Wall Type 3 - Right: Roller Compacted Concrete	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	3.00	10.0	84.0	0.37
Wall Type 3 - Right: Roller Compacted Concrete	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Wall Type 3 - Right: Roller Compacted Concrete	Rollers	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Wall Type 3 - Right: Roller Compacted Concrete	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	367	0.40

Wall Type 3 - Right: Roller Compacted Concrete	Off-Highway Trucks	Diesel	Tier 4 Final	5.00	10.0	376	0.38
Wall Type 3 - Right: CVC Facing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Wall Type 3 - Right: CVC Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Wall Type 3 - Right: CVC Facing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Wall Type 3 - Right: CVC Facing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Wall Type 3 - Right: CVC Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Wall Type 3 - Right: CVC Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Wall Type 3 - Right: CVC Facing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Wall Type 3 - Right: CVC Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Wall Type 3 - Right: CVC Facing	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Wall Type 3 - Right: Backfill	Graders	Diesel	Tier 4 Final	1.00	10.0	215	0.41
Wall Type 3 - Right: Backfill	Excavators	Diesel	Tier 4 Final	1.00	10.0	36.0	0.38
Wall Type 3 - Right: Backfill	Rollers	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38
Wall Type 3 - Right: Backfill	Off-Highway Trucks	Diesel	Tier 4 Final	6.00	10.0	376	0.38
Stilling Basin: RCC	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Stilling Basin: RCC	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Stilling Basin: RCC	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Stilling Basin: RCC	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Stilling Basin: RCC	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74

Stilling Basin: RCC	Tractors/Loaders/Back	Diesel	Tier 4 Final	3.00	10.0	84.0	0.37
Stilling Basin: RCC	Pumps	Diesel	Average	3.00	10.0	11.0	0.74
Stilling Basin: RCC	Rollers	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Stilling Basin: RCC	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	367	0.40
Stilling Basin: RCC	Off-Highway Trucks	Diesel	Tier 4 Final	5.00	10.0	376	0.38
Stilling Basin: Upstream/Downstream CVC Facing	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Stilling Basin: Upstream/Downstream CVC Facing	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Upstream/Downstream CVC Facing	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Stilling Basin: Upstream/Downstream CVC Facing	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Stilling Basin: Upstream/Downstream CVC Facing	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Upstream/Downstream CVC Facing	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Stilling Basin: Upstream/Downstream CVC Facing	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Stilling Basin: Upstream/Downstream CVC Facing	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Stilling Basin: Upstream/Downstream CVC Facing	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Stilling Basin: Basin Steps	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Stilling Basin: Basin Steps	Pumps	Diesel	Average	1.00	10.0	11.0	0.74

Stilling Basin: Basin Steps	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Stilling Basin: Basin Steps	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Stilling Basin: Basin Steps	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Basin Steps	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Stilling Basin: Basin Steps	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Stilling Basin: Basin Steps	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Stilling Basin: Basin Steps	Cement and Mortar Mixers	Diesel	Average	2.00	10.0	10.0	0.56
Stilling Basin: Chute Blocks	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Stilling Basin: Chute Blocks	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Chute Blocks	Cranes	Diesel	Tier 4 Final	2.00	8.00	367	0.29
Stilling Basin: Chute Blocks	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Stilling Basin: Chute Blocks	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Chute Blocks	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	2.00	173	0.50
Stilling Basin: Chute Blocks	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	2.00	286	0.37
Stilling Basin: Chute Blocks	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	2.00	107	0.37
Stilling Basin: Chute Blocks	Cement and Mortar Mixers	Diesel	Average	2.00	2.00	10.0	0.56
Stilling Basin: Dentated Sill	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30

Stilling Basin: Dentated Sill	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Stilling Basin: Dentated Sill	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Stilling Basin: Dentated Sill	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Stilling Basin: Dentated Sill	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Stilling Basin: Dentated Sill	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	2.00	173	0.50
Stilling Basin: Dentated Sill	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	2.00	286	0.37
Stilling Basin: Dentated Sill	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	2.00	107	0.37
Stilling Basin: Dentated Sill	Cement and Mortar Mixers	Diesel	Average	2.00	2.00	10.0	0.56
Spillway Slab Construction: RCC Foundation Support Block	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	173	0.50
Spillway Slab Construction: RCC Foundation Support Block	Pumps	Diesel	Average	6.00	10.0	11.0	0.74
Spillway Slab Construction: RCC Foundation Support Block	Plate Compactors	Diesel	Average	1.00	10.0	8.00	0.43
Spillway Slab Construction: RCC Foundation Support Block	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Spillway Slab Construction: RCC Foundation Support Block	Generator Sets	Diesel	Average	4.00	10.0	14.0	0.74

Spillway Slab Construction: RCC Foundation Support Block	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	3.00	10.0	84.0	0.37
Spillway Slab Construction: RCC Foundation Support Block	Rollers	Diesel	Tier 4 Final	3.00	10.0	36.0	0.38
Spillway Slab Construction: RCC Foundation Support Block	Rubber Tired Dozers	Diesel	Tier 4 Final	3.00	10.0	367	0.40
Spillway Slab Construction: RCC Foundation Support Block	Off-Highway Trucks	Diesel	Tier 4 Final	5.00	10.0	376	0.38
Spillway Slab Construction: Spillway Chute Slab	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Spillway Slab Construction: Spillway Chute Slab	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Spillway Slab Construction: Spillway Chute Slab	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Spillway Slab Construction: Spillway Chute Slab	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Spillway Slab Construction: Spillway Chute Slab	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Spillway Slab Construction: Spillway Chute Slab	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Spillway Slab Construction: Spillway Chute Slab	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37

Spillway Slab Construction: Spillway Chute Slab	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Spillway Slab Construction: Spillway Chute Slab	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Spillway Slab Construction: Stilling Basin Slab	Surfacing Equipment	Diesel	Tier 4 Final	2.00	10.0	399	0.30
Spillway Slab Construction: Stilling Basin Slab	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Spillway Slab Construction: Stilling Basin Slab	Cranes	Diesel	Tier 4 Final	2.00	10.0	367	0.29
Spillway Slab Construction: Stilling Basin Slab	Rough Terrain Forklifts	Diesel	Tier 4 Final	2.00	10.0	96.0	0.40
Spillway Slab Construction: Stilling Basin Slab	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Spillway Slab Construction: Stilling Basin Slab	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	5.00	173	0.50
Spillway Slab Construction: Stilling Basin Slab	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	5.00	286	0.37
Spillway Slab Construction: Stilling Basin Slab	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.00	107	0.37
Spillway Slab Construction: Stilling Basin Slab	Cement and Mortar Mixers	Diesel	Average	3.00	10.0	10.0	0.56
Spillway Slab Construction: Zone B	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Spillway Slab Construction: Zone B	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37

Spillway Slab Construction: Zone B	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Spillway Slab Construction: Zone C	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Spillway Slab Construction: Zone C	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Spillway Slab Construction: Zone C	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Spillway Drains and Cleanouts: Drain Gravel	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Spillway Drains and Cleanouts: Drain Gravel	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	170	0.40
Spillway Drains and Cleanouts: Drain Gravel	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	376	0.38

Spillway Drains and Cleanouts: Filter Sand	Tractors/Loaders/Back	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Spillway Drains and Cleanouts: Filter Sand	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	10.0	170	0.40
Spillway Drains and Cleanouts: Filter Sand	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	10.0	376	0.38
Surface Ditch from Landfill: Excavation	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Surface Ditch from Landfill: Excavation	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Surface Ditch from Landfill: Drop Structures	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Surface Ditch from Landfill: Drop Structures	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Surface Ditch from Landfill: Ditch Lining	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Surface Ditch from Landfill: Ditch Lining	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Surface Ditch from Landfill: Ditch Lining	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Surface Ditch from Landfill: Ditch Lining	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	241	0.37
Surface Ditch from Landfill: Ditch Lining	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Downstream Apron: Concrete Apron	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Downstream Apron: Concrete Apron	Generator Sets	Diesel	Average	1.00	10.0	14.0	0.74
Downstream Apron: Concrete Apron	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Downstream Apron: Concrete Apron	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37

Downstream Apron: Concrete Apron	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Downstream Apron: Concrete Apron	Cement and Mortar Mixers	Diesel	Average	1.00	10.0	10.0	0.56
Downstream Apron: Concrete Apron	Cranes	Diesel	Tier 4 Final	1.00	10.0	367	0.29
Downstream Apron: Concrete Apron	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Downstream Apron: Concrete Apron	Bore/Drill Rigs	Diesel	Tier 4 Final	1.00	10.0	385	0.50
Downstream Apron: Zone C	Bore/Drill Rigs	Diesel	Tier 4 Final	2.00	10.0	385	0.50
Downstream Apron: Zone C	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Downstream Apron: Zone C	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Downstream Apron: Riprap Apron	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Downstream Apron: Riprap Apron	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Downstream Apron: Riprap Apron	Dumpers/Tenders	Diesel	Average	2.00	10.0	16.0	0.38
Downstream Apron: Riprap Bedding	Excavators	Diesel	Tier 4 Final	1.00	10.0	300	0.38
Downstream Apron: Riprap Bedding	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	10.0	286	0.37
Downstream Apron: Riprap Bedding	Dumpers/Tenders	Diesel	Average	2.00	10.0	16.0	0.38
Furnish and Install Electrical / Controls and Instrumentation	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Furnish and Install Electrical / Controls and Instrumentation	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37

Furnish and Install Electrical / Controls and Instrumentation	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Furnish and Install Aeration System	Forklifts	Diesel	Tier 4 Final	1.00	10.0	142	0.20
Furnish and Install Aeration System	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Furnish and Install Aeration System	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Part 1 Furnish and Install Erosion Control Measures	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Part 1 Furnish and Install Erosion Control Measures	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Part 2 Furnish and Install Erosion Control Measures	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Part 2 Furnish and Install Erosion Control Measures	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Part 3 Furnish and Install Erosion Control Measures	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	10.0	107	0.37
Part 3 Furnish and Install Erosion Control Measures	Excavators	Diesel	Tier 4 Final	1.00	10.0	74.0	0.38
Embankment Mitigation	Rubber Tired Dozers	Diesel	Tier 4 Final	4.00	10.0	367	0.40
Embankment Mitigation	Excavators	Diesel	Tier 4 Final	2.00	10.0	36.0	0.38
Embankment Mitigation	Graders	Diesel	Tier 4 Final	2.00	10.0	148	0.41
Embankment Mitigation	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	2.00	10.0	84.0	0.37
Embankment Mitigation	Dumpers/Tenders	Diesel	Average	4.00	10.0	16.0	0.38

Embankment Mitigation	Plate Compactors	Diesel	Average	3.00	10.0	8.00	0.43

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Part 1 Site Demolition (Excludes Spillway)	—	—	—	—
Part 1 Site Demolition (Excludes Spillway)	Worker	5.00	18.5	LDA,LDT1,LDT2
Part 1 Site Demolition (Excludes Spillway)	Vendor	—	10.2	HHDT,MHDT
Part 1 Site Demolition (Excludes Spillway)	Hauling	0.00	20.0	HHDT
Part 1 Site Demolition (Excludes Spillway)	Onsite truck	—	—	HHDT
Part 2 Site Demolition (Excludes Spillway)	—	—	—	—
Part 2 Site Demolition (Excludes Spillway)	Worker	5.00	18.5	LDA,LDT1,LDT2
Part 2 Site Demolition (Excludes Spillway)	Vendor	—	10.2	HHDT,MHDT
Part 2 Site Demolition (Excludes Spillway)	Hauling	0.00	20.0	HHDT
Part 2 Site Demolition (Excludes Spillway)	Onsite truck	—	—	HHDT
Spillway Demolition: Existing Spillway Demo	—	—	—	—
Spillway Demolition: Existing Spillway Demo	Worker	35.0	18.5	LDA,LDT1,LDT2
Spillway Demolition: Existing Spillway Demo	Vendor	—	10.2	HHDT,MHDT

Spillway Demolition: Existing Spillway Demo	Hauling	24.0	12.1	HHDT
Spillway Demolition: Existing Spillway Demo	Onsite truck	—	—	HHDT
Spillway Demolition: Crush Concrete Demo	—	—	—	—
Spillway Demolition: Crush Concrete Demo	Worker	12.5	18.5	LDA,LDT1,LDT2
Spillway Demolition: Crush Concrete Demo	Vendor	—	10.2	HHDT,MHDT
Spillway Demolition: Crush Concrete Demo	Hauling	0.00	20.0	HHDT
Spillway Demolition: Crush Concrete Demo	Onsite truck	—	—	HHDT
Spillway Demolition: Bridge Pier and Facing Demo	—	—	—	—
Spillway Demolition: Bridge Pier and Facing Demo	Worker	35.0	18.5	LDA,LDT1,LDT2
Spillway Demolition: Bridge Pier and Facing Demo	Vendor	—	10.2	HHDT,MHDT
Spillway Demolition: Bridge Pier and Facing Demo	Hauling	0.00	20.0	HHDT
Spillway Demolition: Bridge Pier and Facing Demo	Onsite truck	—	—	HHDT
Temporary Flood Control Berm	—	—	—	—
Temporary Flood Control Berm	Worker	17.5	18.5	LDA,LDT1,LDT2
Temporary Flood Control Berm	Vendor	—	10.2	HHDT,MHDT
Temporary Flood Control Berm	Hauling	0.00	20.0	HHDT
Temporary Flood Control Berm	Onsite truck	—	—	HHDT
Mobilization	—	—	—	—
Mobilization	Worker	22.5	18.5	LDA,LDT1,LDT2
Mobilization	Vendor	—	10.2	HHDT,MHDT
Mobilization	Hauling	14.0	12.1	HHDT

Mobilization	Onsite truck	—	—	HHDT
Demobilization	—	—	—	—
Demobilization	Worker	22.5	18.5	LDA,LDT1,LDT2
Demobilization	Vendor	—	10.2	HHDT,MHDT
Demobilization	Hauling	12.0	12.1	HHDT
Demobilization	Onsite truck	—	—	HHDT
Cleanup	—	—	—	—
Cleanup	Worker	17.5	18.5	LDA,LDT1,LDT2
Cleanup	Vendor	—	10.2	HHDT,MHDT
Cleanup	Hauling	4.00	12.1	HHDT
Cleanup	Onsite truck	—	—	HHDT
Allowance for Piping Install	—	—	—	—
Allowance for Piping Install	Worker	7.50	18.5	LDA,LDT1,LDT2
Allowance for Piping Install	Vendor	—	10.2	HHDT,MHDT
Allowance for Piping Install	Hauling	0.00	20.0	HHDT
Allowance for Piping Install	Onsite truck	—	—	HHDT
Bypass Pumping Diversion Beam	—	—	—	—
Bypass Pumping Diversion Beam	Worker	2.50	18.5	LDA,LDT1,LDT2
Bypass Pumping Diversion Beam	Vendor	—	10.2	HHDT,MHDT
Bypass Pumping Diversion Beam	Hauling	128	20.0	HHDT
Bypass Pumping Diversion Beam	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Steel Pipe and Appurtenances	—	—	—	—
Inclined Inlet Structure: Steel Pipe and Appurtenances	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Steel Pipe and Appurtenances	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Steel Pipe and Appurtenances	Hauling	0.00	20.0	HHDT

Inclined Inlet Structure: Steel Pipe and Appurtenances	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Reinforced Concrete	—	—	—	—
Inclined Inlet Structure: Reinforced Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Reinforced Concrete	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Reinforced Concrete	Hauling	83.0	12.1	HHDT
Inclined Inlet Structure: Reinforced Concrete	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Drilled Foundation Anchors	—	—	—	—
Inclined Inlet Structure: Drilled Foundation Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Drilled Foundation Anchors	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Drilled Foundation Anchors	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Drilled Foundation Anchors	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Excavation	—	—	—	—
Inclined Inlet Structure: Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Excavation	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Excavation	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Excavation	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Stainless Steel Platform	—	—	—	—
Inclined Inlet Structure: Stainless Steel Platform	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Stainless Steel Platform	Vendor	2.78	10.2	HHDT,MHDT

Inclined Inlet Structure: Stainless Steel Platform	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Stainless Steel Platform	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Pneumatic Actuation Control System	—	—	—	—
Inclined Inlet Structure: Pneumatic Actuation Control System	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Pneumatic Actuation Control System	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Pneumatic Actuation Control System	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Pneumatic Actuation Control System	Onsite truck	—	—	HHDT
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	—	—	—	—
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Worker	7.11	18.5	LDA,LDT1,LDT2
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Vendor	2.78	10.2	HHDT,MHDT
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Hauling	0.00	20.0	HHDT
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Onsite truck	—	—	HHDT
Cofferdam Installation and Removal: Dewatering	—	—	—	—
Cofferdam Installation and Removal: Dewatering	Worker	7.11	18.5	LDA,LDT1,LDT2
Cofferdam Installation and Removal: Dewatering	Vendor	2.78	10.2	HHDT,MHDT
Cofferdam Installation and Removal: Dewatering	Hauling	0.00	20.0	HHDT
Cofferdam Installation and Removal: Dewatering	Onsite truck	—	—	HHDT

Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	—	—	—	—
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Worker	7.11	18.5	LDA,LDT1,LDT2
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Vendor	2.78	10.2	HHDT,MHDT
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Hauling	0.00	20.0	HHDT
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Hauling	0.00	20.0	HHDT

Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	—	—	—	—

Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Onsite truck	—	—	HHDT
Dam Control Building: Pt 1 CMU Control Building	—	—	—	—
Dam Control Building: Pt 1 CMU Control Building	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Pt 1 CMU Control Building	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Pt 1 CMU Control Building	Hauling	7.84	20.0	HHDT
Dam Control Building: Pt 1 CMU Control Building	Onsite truck	—	—	HHDT

Dam Control Building: Pt 2 CMU Control Building	—	—	—	—
Dam Control Building: Pt 2 CMU Control Building	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Pt 2 CMU Control Building	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Pt 2 CMU Control Building	Hauling	0.00	20.0	HHDT
Dam Control Building: Pt 2 CMU Control Building	Onsite truck	—	—	HHDT
Dam Control Building: Reinforced Concrete Foundation	—	—	—	—
Dam Control Building: Reinforced Concrete Foundation	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Reinforced Concrete Foundation	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Reinforced Concrete Foundation	Hauling	0.00	20.0	HHDT
Dam Control Building: Reinforced Concrete Foundation	Onsite truck	—	—	HHDT
Dam Control Building: Metal Frame Roofing	—	—	—	—
Dam Control Building: Metal Frame Roofing	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Metal Frame Roofing	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Metal Frame Roofing	Hauling	0.00	20.0	HHDT
Dam Control Building: Metal Frame Roofing	Onsite truck	—	—	HHDT
Dam Control Building: Ancillary Features	—	—	—	—
Dam Control Building: Ancillary Features	Worker	7.11	18.5	LDA,LDT1,LDT2

Dam Control Building: Ancillary Features	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Ancillary Features	Hauling	9.00	12.1	HHDT
Dam Control Building: Ancillary Features	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	—	—	—	—
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Structure Bkfl	—	—	—	—
Downstream Outlet Works Piping and Vault: Structure Bkfl	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Structure Bkfl	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Structure Bkfl	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Structure Bkfl	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	—	—	—	—
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Worker	7.11	18.5	LDA,LDT1,LDT2

Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Piping and Valves	—	—	—	—
Downstream Outlet Works Piping and Vault: Piping and Valves	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Piping and Valves	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Piping and Valves	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Piping and Valves	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Steel Casing	—	—	—	—
Downstream Outlet Works Piping and Vault: Steel Casing	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Steel Casing	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Steel Casing	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Steel Casing	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Ladders and Platforms	—	—	—	—
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Vendor	2.78	10.2	HHDT,MHDT

Downstream Outlet Works Piping and Vault: Ladders and Platforms	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	—	—	—	—
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Dewatering	—	—	—	—
Downstream Outlet Works Piping and Vault: Dewatering	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Dewatering	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Dewatering	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Dewatering	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: ARVs and Valves	—	—	—	—
Downstream Outlet Works Piping and Vault: ARVs and Valves	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: ARVs and Valves	Vendor	2.78	10.2	HHDT,MHDT

Downstream Outlet Works Piping and Vault: ARVs and Valves	Hauling	88.0	12.1	HHDT
Downstream Outlet Works Piping and Vault: ARVs and Valves	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	—	—	—	—

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Hauling	17.0	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Hauling	0.00	20.0	HHDT

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Onsite truck	—	—	HHDT
Spillway Site Excavations	—	—	—	—
Spillway Site Excavations	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Site Excavations	Vendor	2.78	10.2	HHDT,MHDT
Spillway Site Excavations	Hauling	18.0	12.1	HHDT
Spillway Site Excavations	Onsite truck	—	—	HHDT
Rock Slope Stabilization	—	—	—	—
Rock Slope Stabilization	Worker	7.11	18.5	LDA,LDT1,LDT2
Rock Slope Stabilization	Vendor	2.78	10.2	HHDT,MHDT
Rock Slope Stabilization	Hauling	0.00	20.0	HHDT
Rock Slope Stabilization	Onsite truck	—	—	HHDT
RCC Weir Support Block	—	—	—	—
RCC Weir Support Block	Worker	7.11	18.5	LDA,LDT1,LDT2
RCC Weir Support Block	Vendor	2.78	10.2	HHDT,MHDT
RCC Weir Support Block	Hauling	0.00	20.0	HHDT
RCC Weir Support Block	Onsite truck	—	—	HHDT

Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	—	—	—	—
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Worker	7.11	18.5	LDA,LDT1,LDT2
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Vendor	2.78	10.2	HHDT,MHDT
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Hauling	0.00	20.0	HHDT
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Onsite truck	—	—	HHDT
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	—	—	—	—
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Worker	7.11	18.5	LDA,LDT1,LDT2
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Vendor	2.78	10.2	HHDT,MHDT
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Hauling	0.00	20.0	HHDT
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Onsite truck	—	—	HHDT
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	—	—	—	—
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2

Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Vendor	2.78	10.2	HHDT,MHDT
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Hauling	0.00	20.0	HHDT
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	—	—	—	—

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Hauling	0.00	20.0	HHDT

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Vendor	2.78	10.2	HHDT,MHDT

Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Onsite truck	—	—	HHDT
Wall Transitions: Left Secant Pile Walls	—	—	—	—

Wall Transitions: Left Secant Pile Walls	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Transitions: Left Secant Pile Walls	Vendor	2.78	10.2	HHDT,MHDT
Wall Transitions: Left Secant Pile Walls	Hauling	0.00	20.0	HHDT
Wall Transitions: Left Secant Pile Walls	Onsite truck	—	—	HHDT
Wall Transitions: Right Secant Pile Wall	—	—	—	—
Wall Transitions: Right Secant Pile Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Transitions: Right Secant Pile Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Transitions: Right Secant Pile Wall	Hauling	0.00	20.0	HHDT
Wall Transitions: Right Secant Pile Wall	Onsite truck	—	—	HHDT
Right Closure Wall: Work Platform Construction	—	—	—	—
Right Closure Wall: Work Platform Construction	Worker	7.11	18.5	LDA,LDT1,LDT2
Right Closure Wall: Work Platform Construction	Vendor	2.78	10.2	HHDT,MHDT
Right Closure Wall: Work Platform Construction	Hauling	0.00	20.0	HHDT
Right Closure Wall: Work Platform Construction	Onsite truck	—	—	HHDT
Right Closure Wall: Secant Pile Wall	—	—	—	—
Right Closure Wall: Secant Pile Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Right Closure Wall: Secant Pile Wall	Vendor	2.78	10.2	HHDT,MHDT
Right Closure Wall: Secant Pile Wall	Hauling	0.00	20.0	HHDT
Right Closure Wall: Secant Pile Wall	Onsite truck	—	—	HHDT
Right Closure Wall: Backfill Concrete	—	—	—	—

Right Closure Wall: Backfill Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Right Closure Wall: Backfill Concrete	Vendor	2.78	10.2	HHDT,MHDT
Right Closure Wall: Backfill Concrete	Hauling	0.00	20.0	HHDT
Right Closure Wall: Backfill Concrete	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Leveling Concrete	—	—	—	—
Wall Type 2 - Left: Leveling Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Leveling Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Leveling Concrete	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Leveling Concrete	Onsite truck	—	—	HHDT
Wall Type 2 - Left: 1 Inch Concrete Wall	—	—	—	—
Wall Type 2 - Left: 1 Inch Concrete Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: 1 Inch Concrete Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: 1 Inch Concrete Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: 1 Inch Concrete Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Left: 2.5 Inch Concrete Wall	—	—	—	—
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Concrete Footing	—	—	—	—
Wall Type 2 - Left: Concrete Footing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Concrete Footing	Vendor	2.78	10.2	HHDT,MHDT

Wall Type 2 - Left: Concrete Footing	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Concrete Footing	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Backfill	—	—	—	—
Wall Type 2 - Left: Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Backfill	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Backfill	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Reinforced Concrete Wall	—	—	—	—
Wall Type 2 - Left: Reinforced Concrete Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Reinforced Concrete Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Reinforced Concrete Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Reinforced Concrete Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Footing Rock Anchors and Backfill	—	—	—	—
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: Leveling Concrete	—	—	—	—
Wall Type 2 - Wall Right: Leveling Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: Leveling Concrete	Vendor	2.78	10.2	HHDT,MHDT

Wall Type 2 - Wall Right: Leveling Concrete	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: Leveling Concrete	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: 1 Inch Wall	—	—	—	—
Wall Type 2 - Wall Right: 1 Inch Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: 1 Inch Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: 1 Inch Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: 1 Inch Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: 2.5 Inch Wall	—	—	—	—
Wall Type 2 - Wall Right: 2.5 Inch Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: 2.5 Inch Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: 2.5 Inch Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: 2.5 Inch Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: Concrete Footing	—	—	—	—
Wall Type 2 - Wall Right: Concrete Footing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: Concrete Footing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: Concrete Footing	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: Concrete Footing	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: Backfill	—	—	—	—
Wall Type 2 - Wall Right: Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: Backfill	Hauling	31.0	12.1	HHDT

Wall Type 2 - Wall Right: Backfill	Onsite truck	—	—	HHDT
Wall Type 3 - Left: Roller Compacted Concrete	—	—	—	—
Wall Type 3 - Left: Roller Compacted Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Left: Roller Compacted Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Left: Roller Compacted Concrete	Hauling	0.00	20.0	HHDT
Wall Type 3 - Left: Roller Compacted Concrete	Onsite truck	—	—	HHDT
Wall Type 3 - Left: CVC Facing	—	—	—	—
Wall Type 3 - Left: CVC Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Left: CVC Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Left: CVC Facing	Hauling	0.00	20.0	HHDT
Wall Type 3 - Left: CVC Facing	Onsite truck	—	—	HHDT
Wall Type 3 - Right: Roller Compacted Concrete	—	—	—	—
Wall Type 3 - Right: Roller Compacted Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Right: Roller Compacted Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Right: Roller Compacted Concrete	Hauling	0.00	20.0	HHDT
Wall Type 3 - Right: Roller Compacted Concrete	Onsite truck	—	—	HHDT
Wall Type 3 - Right: CVC Facing	—	—	—	—
Wall Type 3 - Right: CVC Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Right: CVC Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Right: CVC Facing	Hauling	0.00	20.0	HHDT
Wall Type 3 - Right: CVC Facing	Onsite truck	—	—	HHDT
Wall Type 3 - Right: Backfill	—	—	—	—

Wall Type 3 - Right: Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Right: Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Right: Backfill	Hauling	0.00	20.0	HHDT
Wall Type 3 - Right: Backfill	Onsite truck	—	—	HHDT
Stilling Basin: RCC	—	—	—	—
Stilling Basin: RCC	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: RCC	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: RCC	Hauling	0.00	20.0	HHDT
Stilling Basin: RCC	Onsite truck	—	—	HHDT
Stilling Basin: Upstream/Downstream CVC Facing	—	—	—	—
Stilling Basin: Upstream/Downstream CVC Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Upstream/Downstream CVC Facing	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Upstream/Downstream CVC Facing	Hauling	0.00	20.0	HHDT
Stilling Basin: Upstream/Downstream CVC Facing	Onsite truck	—	—	HHDT
Stilling Basin: Basin Steps	—	—	—	—
Stilling Basin: Basin Steps	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Basin Steps	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Basin Steps	Hauling	0.00	20.0	HHDT
Stilling Basin: Basin Steps	Onsite truck	—	—	HHDT
Stilling Basin: Chute Blocks	—	—	—	—
Stilling Basin: Chute Blocks	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Chute Blocks	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Chute Blocks	Hauling	0.00	20.0	HHDT
Stilling Basin: Chute Blocks	Onsite truck	—	—	HHDT
Stilling Basin: Dentated Sill	—	—	—	—

Stilling Basin: Dentated Sill	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Dentated Sill	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Dentated Sill	Hauling	0.00	20.0	HHDT
Stilling Basin: Dentated Sill	Onsite truck	—	—	HHDT
Spillway Slab Construction: RCC Foundation Support Block	—	—	—	—
Spillway Slab Construction: RCC Foundation Support Block	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: RCC Foundation Support Block	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: RCC Foundation Support Block	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: RCC Foundation Support Block	Onsite truck	—	—	HHDT
Spillway Slab Construction: Spillway Chute Slab	—	—	—	—
Spillway Slab Construction: Spillway Chute Slab	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Spillway Chute Slab	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Spillway Chute Slab	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Spillway Chute Slab	Onsite truck	—	—	HHDT
Spillway Slab Construction: Stilling Basin Slab	—	—	—	—
Spillway Slab Construction: Stilling Basin Slab	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Stilling Basin Slab	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Stilling Basin Slab	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Stilling Basin Slab	Onsite truck	—	—	HHDT

Spillway Slab Construction: Zone B	—	—	—	—
Spillway Slab Construction: Zone B	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Zone B	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Zone B	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Zone B	Onsite truck	—	—	HHDT
Spillway Slab Construction: Zone C	—	—	—	—
Spillway Slab Construction: Zone C	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Zone C	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Zone C	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Zone C	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	—	—	—	—
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	—	—	—	—
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	—	—	—	—

Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Drain Gravel	—	—	—	—
Spillway Drains and Cleanouts: Drain Gravel	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Drain Gravel	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Drain Gravel	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Drain Gravel	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Filter Sand	—	—	—	—
Spillway Drains and Cleanouts: Filter Sand	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Filter Sand	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Filter Sand	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Filter Sand	Onsite truck	—	—	HHDT
Surface Ditch from Landfill: Excavation	—	—	—	—
Surface Ditch from Landfill: Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Surface Ditch from Landfill: Excavation	Vendor	2.78	10.2	HHDT,MHDT

Surface Ditch from Landfill: Excavation	Hauling	0.00	20.0	HHDT
Surface Ditch from Landfill: Excavation	Onsite truck	—	—	HHDT
Surface Ditch from Landfill: Drop Structures	—	—	—	—
Surface Ditch from Landfill: Drop Structures	Worker	7.11	18.5	LDA,LDT1,LDT2
Surface Ditch from Landfill: Drop Structures	Vendor	2.78	10.2	HHDT,MHDT
Surface Ditch from Landfill: Drop Structures	Hauling	0.00	20.0	HHDT
Surface Ditch from Landfill: Drop Structures	Onsite truck	—	—	HHDT
Surface Ditch from Landfill: Ditch Lining	—	—	—	—
Surface Ditch from Landfill: Ditch Lining	Worker	7.11	18.5	LDA,LDT1,LDT2
Surface Ditch from Landfill: Ditch Lining	Vendor	2.78	10.2	HHDT,MHDT
Surface Ditch from Landfill: Ditch Lining	Hauling	0.00	20.0	HHDT
Surface Ditch from Landfill: Ditch Lining	Onsite truck	—	—	HHDT
Downstream Apron: Concrete Apron	—	—	—	—
Downstream Apron: Concrete Apron	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Concrete Apron	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Concrete Apron	Hauling	0.00	20.0	HHDT
Downstream Apron: Concrete Apron	Onsite truck	—	—	HHDT
Downstream Apron: Zone C	—	—	—	—
Downstream Apron: Zone C	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Zone C	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Zone C	Hauling	0.00	20.0	HHDT

Downstream Apron: Zone C	Onsite truck	—	—	HHDT
Downstream Apron: Riprap Apron	—	—	—	—
Downstream Apron: Riprap Apron	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Riprap Apron	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Riprap Apron	Hauling	59.0	12.1	HHDT
Downstream Apron: Riprap Apron	Onsite truck	—	—	HHDT
Downstream Apron: Riprap Bedding	—	—	—	—
Downstream Apron: Riprap Bedding	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Riprap Bedding	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Riprap Bedding	Hauling	76.7	20.0	HHDT
Downstream Apron: Riprap Bedding	Onsite truck	—	—	HHDT
Furnish and Install Electrical / Controls and Instrumentation	—	—	—	—
Furnish and Install Electrical / Controls and Instrumentation	Worker	7.11	18.5	LDA,LDT1,LDT2
Furnish and Install Electrical / Controls and Instrumentation	Vendor	2.78	10.2	HHDT,MHDT
Furnish and Install Electrical / Controls and Instrumentation	Hauling	34.0	12.1	HHDT
Furnish and Install Electrical / Controls and Instrumentation	Onsite truck	—	—	HHDT
Furnish and Install Aeration System	—	—	—	—
Furnish and Install Aeration System	Worker	7.11	18.5	LDA,LDT1,LDT2
Furnish and Install Aeration System	Vendor	2.78	10.2	HHDT,MHDT
Furnish and Install Aeration System	Hauling	0.00	20.0	HHDT
Furnish and Install Aeration System	Onsite truck	—	—	HHDT
Part 1 Furnish and Install Erosion Control Measures	—	—	—	—
Part 1 Furnish and Install Erosion Control Measures	Worker	7.11	18.5	LDA,LDT1,LDT2

Part 1 Furnish and Install Erosion Control Measures	Vendor	2.78	10.2	HHDT,MHDT
Part 1 Furnish and Install Erosion Control Measures	Hauling	0.00	20.0	HHDT
Part 1 Furnish and Install Erosion Control Measures	Onsite truck	—	—	HHDT
Part 2 Furnish and Install Erosion Control Measures	—	—	—	—
Part 2 Furnish and Install Erosion Control Measures	Worker	7.11	18.5	LDA,LDT1,LDT2
Part 2 Furnish and Install Erosion Control Measures	Vendor	2.78	10.2	HHDT,MHDT
Part 2 Furnish and Install Erosion Control Measures	Hauling	0.00	20.0	HHDT
Part 2 Furnish and Install Erosion Control Measures	Onsite truck	—	—	HHDT
Part 3 Furnish and Install Erosion Control Measures	—	—	—	—
Part 3 Furnish and Install Erosion Control Measures	Worker	7.11	18.5	LDA,LDT1,LDT2
Part 3 Furnish and Install Erosion Control Measures	Vendor	2.78	10.2	HHDT,MHDT
Part 3 Furnish and Install Erosion Control Measures	Hauling	0.00	20.0	HHDT
Part 3 Furnish and Install Erosion Control Measures	Onsite truck	—	—	HHDT
Embankment Mitigation	—	—	—	—
Embankment Mitigation	Worker	42.5	18.5	LDA,LDT1,LDT2
Embankment Mitigation	Vendor	—	10.2	HHDT,MHDT
Embankment Mitigation	Hauling	42.9	20.0	HHDT
Embankment Mitigation	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Part 1 Site Demolition (Excludes Spillway)	—	—	—	—
Part 1 Site Demolition (Excludes Spillway)	Worker	5.00	18.5	LDA,LDT1,LDT2
Part 1 Site Demolition (Excludes Spillway)	Vendor	—	10.2	HHDT,MHDT
Part 1 Site Demolition (Excludes Spillway)	Hauling	0.00	20.0	HHDT
Part 1 Site Demolition (Excludes Spillway)	Onsite truck	—	—	HHDT
Part 2 Site Demolition (Excludes Spillway)	—	—	—	—
Part 2 Site Demolition (Excludes Spillway)	Worker	5.00	18.5	LDA,LDT1,LDT2
Part 2 Site Demolition (Excludes Spillway)	Vendor	—	10.2	HHDT,MHDT
Part 2 Site Demolition (Excludes Spillway)	Hauling	0.00	20.0	HHDT
Part 2 Site Demolition (Excludes Spillway)	Onsite truck	—	—	HHDT
Spillway Demolition: Existing Spillway Demo	—	—	—	—
Spillway Demolition: Existing Spillway Demo	Worker	35.0	18.5	LDA,LDT1,LDT2
Spillway Demolition: Existing Spillway Demo	Vendor	—	10.2	HHDT,MHDT
Spillway Demolition: Existing Spillway Demo	Hauling	24.0	12.1	HHDT
Spillway Demolition: Existing Spillway Demo	Onsite truck	—	—	HHDT
Spillway Demolition: Crush Concrete Demo	—	—	—	—
Spillway Demolition: Crush Concrete Demo	Worker	12.5	18.5	LDA,LDT1,LDT2

Spillway Demolition: Crush Concrete Demo	Vendor	—	10.2	HHDT,MHDT
Spillway Demolition: Crush Concrete Demo	Hauling	0.00	20.0	HHDT
Spillway Demolition: Crush Concrete Demo	Onsite truck	—	—	HHDT
Spillway Demolition: Bridge Pier and Facing Demo	—	—	—	—
Spillway Demolition: Bridge Pier and Facing Demo	Worker	35.0	18.5	LDA,LDT1,LDT2
Spillway Demolition: Bridge Pier and Facing Demo	Vendor	—	10.2	HHDT,MHDT
Spillway Demolition: Bridge Pier and Facing Demo	Hauling	0.00	20.0	HHDT
Spillway Demolition: Bridge Pier and Facing Demo	Onsite truck	—	—	HHDT
Temporary Flood Control Berm	—	—	—	—
Temporary Flood Control Berm	Worker	17.5	18.5	LDA,LDT1,LDT2
Temporary Flood Control Berm	Vendor	—	10.2	HHDT,MHDT
Temporary Flood Control Berm	Hauling	0.00	20.0	HHDT
Temporary Flood Control Berm	Onsite truck	—	—	HHDT
Mobilization	—	—	—	—
Mobilization	Worker	22.5	18.5	LDA,LDT1,LDT2
Mobilization	Vendor	—	10.2	HHDT,MHDT
Mobilization	Hauling	14.0	12.1	HHDT
Mobilization	Onsite truck	—	—	HHDT
Demobilization	—	—	—	—
Demobilization	Worker	22.5	18.5	LDA,LDT1,LDT2
Demobilization	Vendor	—	10.2	HHDT,MHDT
Demobilization	Hauling	12.0	12.1	HHDT
Demobilization	Onsite truck	—	—	HHDT

Cleanup	—	—	—	—
Cleanup	Worker	17.5	18.5	LDA,LDT1,LDT2
Cleanup	Vendor	—	10.2	HHDT,MHDT
Cleanup	Hauling	4.00	12.1	HHDT
Cleanup	Onsite truck	—	—	HHDT
Allowance for Piping Install	—	—	—	—
Allowance for Piping Install	Worker	7.50	18.5	LDA,LDT1,LDT2
Allowance for Piping Install	Vendor	—	10.2	HHDT,MHDT
Allowance for Piping Install	Hauling	0.00	20.0	HHDT
Allowance for Piping Install	Onsite truck	—	—	HHDT
Bypass Pumping Diversion Beam	—	—	—	—
Bypass Pumping Diversion Beam	Worker	2.50	18.5	LDA,LDT1,LDT2
Bypass Pumping Diversion Beam	Vendor	—	10.2	HHDT,MHDT
Bypass Pumping Diversion Beam	Hauling	128	20.0	HHDT
Bypass Pumping Diversion Beam	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Steel Pipe and Appurtenances	—	—	—	—
Inclined Inlet Structure: Steel Pipe and Appurtenances	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Steel Pipe and Appurtenances	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Steel Pipe and Appurtenances	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Steel Pipe and Appurtenances	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Reinforced Concrete	—	—	—	—
Inclined Inlet Structure: Reinforced Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Reinforced Concrete	Vendor	2.78	10.2	HHDT,MHDT

Inclined Inlet Structure: Reinforced Concrete	Hauling	83.0	12.1	HHDT
Inclined Inlet Structure: Reinforced Concrete	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Drilled Foundation Anchors	—	—	—	—
Inclined Inlet Structure: Drilled Foundation Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Drilled Foundation Anchors	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Drilled Foundation Anchors	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Drilled Foundation Anchors	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Excavation	—	—	—	—
Inclined Inlet Structure: Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Excavation	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Excavation	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Excavation	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Stainless Steel Platform	—	—	—	—
Inclined Inlet Structure: Stainless Steel Platform	Worker	7.11	18.5	LDA,LDT1,LDT2
Inclined Inlet Structure: Stainless Steel Platform	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Stainless Steel Platform	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Stainless Steel Platform	Onsite truck	—	—	HHDT
Inclined Inlet Structure: Pneumatic Actuation Control System	—	—	—	—
Inclined Inlet Structure: Pneumatic Actuation Control System	Worker	7.11	18.5	LDA,LDT1,LDT2

Inclined Inlet Structure: Pneumatic Actuation Control System	Vendor	2.78	10.2	HHDT,MHDT
Inclined Inlet Structure: Pneumatic Actuation Control System	Hauling	0.00	20.0	HHDT
Inclined Inlet Structure: Pneumatic Actuation Control System	Onsite truck	—	—	HHDT
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	—	—	—	—
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Worker	7.11	18.5	LDA,LDT1,LDT2
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Vendor	2.78	10.2	HHDT,MHDT
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Hauling	0.00	20.0	HHDT
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	Onsite truck	—	—	HHDT
Cofferdam Installation and Removal: Dewatering	—	—	—	—
Cofferdam Installation and Removal: Dewatering	Worker	7.11	18.5	LDA,LDT1,LDT2
Cofferdam Installation and Removal: Dewatering	Vendor	2.78	10.2	HHDT,MHDT
Cofferdam Installation and Removal: Dewatering	Hauling	0.00	20.0	HHDT
Cofferdam Installation and Removal: Dewatering	Onsite truck	—	—	HHDT
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	—	—	—	—
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Worker	7.11	18.5	LDA,LDT1,LDT2
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Vendor	2.78	10.2	HHDT,MHDT
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Hauling	0.00	20.0	HHDT

Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Worker	7.11	18.5	LDA,LDT1,LDT2

Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Hauling	0.00	20.0	HHDT

Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	Onsite truck	—	—	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	—	—	—	—
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Vendor	2.78	10.2	HHDT,MHDT
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Hauling	0.00	20.0	HHDT
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	Onsite truck	—	—	HHDT
Dam Control Building: Pt 1 CMU Control Building	—	—	—	—
Dam Control Building: Pt 1 CMU Control Building	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Pt 1 CMU Control Building	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Pt 1 CMU Control Building	Hauling	7.84	20.0	HHDT
Dam Control Building: Pt 1 CMU Control Building	Onsite truck	—	—	HHDT
Dam Control Building: Pt 2 CMU Control Building	—	—	—	—
Dam Control Building: Pt 2 CMU Control Building	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Pt 2 CMU Control Building	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Pt 2 CMU Control Building	Hauling	0.00	20.0	HHDT

Dam Control Building: Pt 2 CMU Control Building	Onsite truck	—	—	HHDT
Dam Control Building: Reinforced Concrete Foundation	—	—	—	—
Dam Control Building: Reinforced Concrete Foundation	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Reinforced Concrete Foundation	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Reinforced Concrete Foundation	Hauling	0.00	20.0	HHDT
Dam Control Building: Reinforced Concrete Foundation	Onsite truck	—	—	HHDT
Dam Control Building: Metal Frame Roofing	—	—	—	—
Dam Control Building: Metal Frame Roofing	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Metal Frame Roofing	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Metal Frame Roofing	Hauling	0.00	20.0	HHDT
Dam Control Building: Metal Frame Roofing	Onsite truck	—	—	HHDT
Dam Control Building: Ancillary Features	—	—	—	—
Dam Control Building: Ancillary Features	Worker	7.11	18.5	LDA,LDT1,LDT2
Dam Control Building: Ancillary Features	Vendor	2.78	10.2	HHDT,MHDT
Dam Control Building: Ancillary Features	Hauling	9.00	12.1	HHDT
Dam Control Building: Ancillary Features	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	—	—	—	—

Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Structure Bkfl	—	—	—	—
Downstream Outlet Works Piping and Vault: Structure Bkfl	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Structure Bkfl	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Structure Bkfl	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Structure Bkfl	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	—	—	—	—
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	Onsite truck	—	—	HHDT

Downstream Outlet Works Piping and Vault: Piping and Valves	—	—	—	—
Downstream Outlet Works Piping and Vault: Piping and Valves	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Piping and Valves	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Piping and Valves	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Piping and Valves	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Steel Casing	—	—	—	—
Downstream Outlet Works Piping and Vault: Steel Casing	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Steel Casing	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Steel Casing	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Steel Casing	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Ladders and Platforms	—	—	—	—
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Ladders and Platforms	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	—	—	—	—

Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: Dewatering	—	—	—	—
Downstream Outlet Works Piping and Vault: Dewatering	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: Dewatering	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: Dewatering	Hauling	0.00	20.0	HHDT
Downstream Outlet Works Piping and Vault: Dewatering	Onsite truck	—	—	HHDT
Downstream Outlet Works Piping and Vault: ARVs and Valves	—	—	—	—
Downstream Outlet Works Piping and Vault: ARVs and Valves	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Outlet Works Piping and Vault: ARVs and Valves	Vendor	2.78	10.2	HHDT,MHDT
Downstream Outlet Works Piping and Vault: ARVs and Valves	Hauling	88.0	12.1	HHDT
Downstream Outlet Works Piping and Vault: ARVs and Valves	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	—	—	—	—

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	Onsite truck	—	—	HHDT

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Hauling	17.0	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	Onsite truck	—	—	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	—	—	—	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Worker	7.11	18.5	LDA,LDT1,LDT2

Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Vendor	2.78	10.2	HHDT,MHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Hauling	0.00	20.0	HHDT
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	Onsite truck	—	—	HHDT
Spillway Site Excavations	—	—	—	—
Spillway Site Excavations	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Site Excavations	Vendor	2.78	10.2	HHDT,MHDT
Spillway Site Excavations	Hauling	18.0	12.1	HHDT
Spillway Site Excavations	Onsite truck	—	—	HHDT
Rock Slope Stabilization	—	—	—	—
Rock Slope Stabilization	Worker	7.11	18.5	LDA,LDT1,LDT2
Rock Slope Stabilization	Vendor	2.78	10.2	HHDT,MHDT
Rock Slope Stabilization	Hauling	0.00	20.0	HHDT
Rock Slope Stabilization	Onsite truck	—	—	HHDT
RCC Weir Support Block	—	—	—	—
RCC Weir Support Block	Worker	7.11	18.5	LDA,LDT1,LDT2
RCC Weir Support Block	Vendor	2.78	10.2	HHDT,MHDT
RCC Weir Support Block	Hauling	0.00	20.0	HHDT
RCC Weir Support Block	Onsite truck	—	—	HHDT
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	—	—	—	—
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Worker	7.11	18.5	LDA,LDT1,LDT2
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Vendor	2.78	10.2	HHDT,MHDT

Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Hauling	0.00	20.0	HHDT
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	Onsite truck	—	—	HHDT
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	—	—	—	—
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Worker	7.11	18.5	LDA,LDT1,LDT2
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Vendor	2.78	10.2	HHDT,MHDT
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Hauling	0.00	20.0	HHDT
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	Onsite truck	—	—	HHDT
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	—	—	—	—
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Vendor	2.78	10.2	HHDT,MHDT
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Hauling	0.00	20.0	HHDT
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	—	—	—	—

Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	—	—	—	—

Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	—	—	—	—
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	Onsite truck	—	—	HHDT

Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Worker	7.11	18.5	LDA,LDT1,LDT2

Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	Onsite truck	—	—	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	—	—	—	—
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Hauling	0.00	20.0	HHDT
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	Onsite truck	—	—	HHDT
Wall Transitions: Left Secant Pile Walls	—	—	—	—
Wall Transitions: Left Secant Pile Walls	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Transitions: Left Secant Pile Walls	Vendor	2.78	10.2	HHDT,MHDT
Wall Transitions: Left Secant Pile Walls	Hauling	0.00	20.0	HHDT
Wall Transitions: Left Secant Pile Walls	Onsite truck	—	—	HHDT
Wall Transitions: Right Secant Pile Wall	—	—	—	—

Wall Transitions: Right Secant Pile Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Transitions: Right Secant Pile Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Transitions: Right Secant Pile Wall	Hauling	0.00	20.0	HHDT
Wall Transitions: Right Secant Pile Wall	Onsite truck	—	—	HHDT
Right Closure Wall: Work Platform Construction	—	—	—	—
Right Closure Wall: Work Platform Construction	Worker	7.11	18.5	LDA,LDT1,LDT2
Right Closure Wall: Work Platform Construction	Vendor	2.78	10.2	HHDT,MHDT
Right Closure Wall: Work Platform Construction	Hauling	0.00	20.0	HHDT
Right Closure Wall: Work Platform Construction	Onsite truck	—	—	HHDT
Right Closure Wall: Secant Pile Wall	—	—	—	—
Right Closure Wall: Secant Pile Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Right Closure Wall: Secant Pile Wall	Vendor	2.78	10.2	HHDT,MHDT
Right Closure Wall: Secant Pile Wall	Hauling	0.00	20.0	HHDT
Right Closure Wall: Secant Pile Wall	Onsite truck	—	—	HHDT
Right Closure Wall: Backfill Concrete	—	—	—	—
Right Closure Wall: Backfill Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Right Closure Wall: Backfill Concrete	Vendor	2.78	10.2	HHDT,MHDT
Right Closure Wall: Backfill Concrete	Hauling	0.00	20.0	HHDT
Right Closure Wall: Backfill Concrete	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Leveling Concrete	—	—	—	—
Wall Type 2 - Left: Leveling Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Leveling Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Leveling Concrete	Hauling	0.00	20.0	HHDT

Wall Type 2 - Left: Leveling Concrete	Onsite truck	—	—	HHDT
Wall Type 2 - Left: 1 Inch Concrete Wall	—	—	—	—
Wall Type 2 - Left: 1 Inch Concrete Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: 1 Inch Concrete Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: 1 Inch Concrete Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: 1 Inch Concrete Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Left: 2.5 Inch Concrete Wall	—	—	—	—
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: 2.5 Inch Concrete Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Concrete Footing	—	—	—	—
Wall Type 2 - Left: Concrete Footing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Concrete Footing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Concrete Footing	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Concrete Footing	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Backfill	—	—	—	—
Wall Type 2 - Left: Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Backfill	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Backfill	Onsite truck	—	—	HHDT

Wall Type 2 - Left: Reinforced Concrete Wall	—	—	—	—
Wall Type 2 - Left: Reinforced Concrete Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Reinforced Concrete Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Reinforced Concrete Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Reinforced Concrete Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Left: Footing Rock Anchors and Backfill	—	—	—	—
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Hauling	0.00	20.0	HHDT
Wall Type 2 - Left: Footing Rock Anchors and Backfill	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: Leveling Concrete	—	—	—	—
Wall Type 2 - Wall Right: Leveling Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: Leveling Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: Leveling Concrete	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: Leveling Concrete	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: 1 Inch Wall	—	—	—	—
Wall Type 2 - Wall Right: 1 Inch Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: 1 Inch Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: 1 Inch Wall	Hauling	0.00	20.0	HHDT

Wall Type 2 - Wall Right: 1 Inch Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: 2.5 Inch Wall	—	—	—	—
Wall Type 2 - Wall Right: 2.5 Inch Wall	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: 2.5 Inch Wall	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: 2.5 Inch Wall	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: 2.5 Inch Wall	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: Concrete Footing	—	—	—	—
Wall Type 2 - Wall Right: Concrete Footing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: Concrete Footing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: Concrete Footing	Hauling	0.00	20.0	HHDT
Wall Type 2 - Wall Right: Concrete Footing	Onsite truck	—	—	HHDT
Wall Type 2 - Wall Right: Backfill	—	—	—	—
Wall Type 2 - Wall Right: Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 2 - Wall Right: Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 2 - Wall Right: Backfill	Hauling	31.0	12.1	HHDT
Wall Type 2 - Wall Right: Backfill	Onsite truck	—	—	HHDT
Wall Type 3 - Left: Roller Compacted Concrete	—	—	—	—
Wall Type 3 - Left: Roller Compacted Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Left: Roller Compacted Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Left: Roller Compacted Concrete	Hauling	0.00	20.0	HHDT

Wall Type 3 - Left: Roller Compacted Concrete	Onsite truck	—	—	HHDT
Wall Type 3 - Left: CVC Facing	—	—	—	—
Wall Type 3 - Left: CVC Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Left: CVC Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Left: CVC Facing	Hauling	0.00	20.0	HHDT
Wall Type 3 - Left: CVC Facing	Onsite truck	—	—	HHDT
Wall Type 3 - Right: Roller Compacted Concrete	—	—	—	—
Wall Type 3 - Right: Roller Compacted Concrete	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Right: Roller Compacted Concrete	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Right: Roller Compacted Concrete	Hauling	0.00	20.0	HHDT
Wall Type 3 - Right: Roller Compacted Concrete	Onsite truck	—	—	HHDT
Wall Type 3 - Right: CVC Facing	—	—	—	—
Wall Type 3 - Right: CVC Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Right: CVC Facing	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Right: CVC Facing	Hauling	0.00	20.0	HHDT
Wall Type 3 - Right: CVC Facing	Onsite truck	—	—	HHDT
Wall Type 3 - Right: Backfill	—	—	—	—
Wall Type 3 - Right: Backfill	Worker	7.11	18.5	LDA,LDT1,LDT2
Wall Type 3 - Right: Backfill	Vendor	2.78	10.2	HHDT,MHDT
Wall Type 3 - Right: Backfill	Hauling	0.00	20.0	HHDT
Wall Type 3 - Right: Backfill	Onsite truck	—	—	HHDT
Stilling Basin: RCC	—	—	—	—
Stilling Basin: RCC	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: RCC	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: RCC	Hauling	0.00	20.0	HHDT

Stilling Basin: RCC	Onsite truck	—	—	HHDT
Stilling Basin: Upstream/Downstream CVC Facing	—	—	—	—
Stilling Basin: Upstream/Downstream CVC Facing	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Upstream/Downstream CVC Facing	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Upstream/Downstream CVC Facing	Hauling	0.00	20.0	HHDT
Stilling Basin: Upstream/Downstream CVC Facing	Onsite truck	—	—	HHDT
Stilling Basin: Basin Steps	—	—	—	—
Stilling Basin: Basin Steps	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Basin Steps	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Basin Steps	Hauling	0.00	20.0	HHDT
Stilling Basin: Basin Steps	Onsite truck	—	—	HHDT
Stilling Basin: Chute Blocks	—	—	—	—
Stilling Basin: Chute Blocks	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Chute Blocks	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Chute Blocks	Hauling	0.00	20.0	HHDT
Stilling Basin: Chute Blocks	Onsite truck	—	—	HHDT
Stilling Basin: Dentated Sill	—	—	—	—
Stilling Basin: Dentated Sill	Worker	7.11	18.5	LDA,LDT1,LDT2
Stilling Basin: Dentated Sill	Vendor	2.78	10.2	HHDT,MHDT
Stilling Basin: Dentated Sill	Hauling	0.00	20.0	HHDT
Stilling Basin: Dentated Sill	Onsite truck	—	—	HHDT
Spillway Slab Construction: RCC Foundation Support Block	—	—	—	—
Spillway Slab Construction: RCC Foundation Support Block	Worker	7.11	18.5	LDA,LDT1,LDT2

Spillway Slab Construction: RCC Foundation Support Block	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: RCC Foundation Support Block	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: RCC Foundation Support Block	Onsite truck	—	—	HHDT
Spillway Slab Construction: Spillway Chute Slab	—	—	—	—
Spillway Slab Construction: Spillway Chute Slab	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Spillway Chute Slab	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Spillway Chute Slab	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Spillway Chute Slab	Onsite truck	—	—	HHDT
Spillway Slab Construction: Stilling Basin Slab	—	—	—	—
Spillway Slab Construction: Stilling Basin Slab	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Stilling Basin Slab	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Stilling Basin Slab	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Stilling Basin Slab	Onsite truck	—	—	HHDT
Spillway Slab Construction: Zone B	—	—	—	—
Spillway Slab Construction: Zone B	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Slab Construction: Zone B	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Zone B	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Zone B	Onsite truck	—	—	HHDT
Spillway Slab Construction: Zone C	—	—	—	—
Spillway Slab Construction: Zone C	Worker	7.11	18.5	LDA,LDT1,LDT2

Spillway Slab Construction: Zone C	Vendor	2.78	10.2	HHDT,MHDT
Spillway Slab Construction: Zone C	Hauling	0.00	20.0	HHDT
Spillway Slab Construction: Zone C	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	—	—	—	—
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	—	—	—	—
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	—	—	—	—
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	Onsite truck	—	—	HHDT

Spillway Drains and Cleanouts: Drain Gravel	—	—	—	—
Spillway Drains and Cleanouts: Drain Gravel	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Drain Gravel	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Drain Gravel	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Drain Gravel	Onsite truck	—	—	HHDT
Spillway Drains and Cleanouts: Filter Sand	—	—	—	—
Spillway Drains and Cleanouts: Filter Sand	Worker	7.11	18.5	LDA,LDT1,LDT2
Spillway Drains and Cleanouts: Filter Sand	Vendor	2.78	10.2	HHDT,MHDT
Spillway Drains and Cleanouts: Filter Sand	Hauling	0.00	20.0	HHDT
Spillway Drains and Cleanouts: Filter Sand	Onsite truck	—	—	HHDT
Surface Ditch from Landfill: Excavation	—	—	—	—
Surface Ditch from Landfill: Excavation	Worker	7.11	18.5	LDA,LDT1,LDT2
Surface Ditch from Landfill: Excavation	Vendor	2.78	10.2	HHDT,MHDT
Surface Ditch from Landfill: Excavation	Hauling	0.00	20.0	HHDT
Surface Ditch from Landfill: Excavation	Onsite truck	—	—	HHDT
Surface Ditch from Landfill: Drop Structures	—	—	—	—
Surface Ditch from Landfill: Drop Structures	Worker	7.11	18.5	LDA,LDT1,LDT2

Surface Ditch from Landfill: Drop Structures	Vendor	2.78	10.2	HHDT,MHDT
Surface Ditch from Landfill: Drop Structures	Hauling	0.00	20.0	HHDT
Surface Ditch from Landfill: Drop Structures	Onsite truck	—	—	HHDT
Surface Ditch from Landfill: Ditch Lining	—	—	—	—
Surface Ditch from Landfill: Ditch Lining	Worker	7.11	18.5	LDA,LDT1,LDT2
Surface Ditch from Landfill: Ditch Lining	Vendor	2.78	10.2	HHDT,MHDT
Surface Ditch from Landfill: Ditch Lining	Hauling	0.00	20.0	HHDT
Surface Ditch from Landfill: Ditch Lining	Onsite truck	—	—	HHDT
Downstream Apron: Concrete Apron	—	—	—	—
Downstream Apron: Concrete Apron	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Concrete Apron	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Concrete Apron	Hauling	0.00	20.0	HHDT
Downstream Apron: Concrete Apron	Onsite truck	—	—	HHDT
Downstream Apron: Zone C	—	—	—	—
Downstream Apron: Zone C	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Zone C	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Zone C	Hauling	0.00	20.0	HHDT
Downstream Apron: Zone C	Onsite truck	—	—	HHDT
Downstream Apron: Riprap Apron	—	—	—	—
Downstream Apron: Riprap Apron	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Riprap Apron	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Riprap Apron	Hauling	59.0	12.1	HHDT
Downstream Apron: Riprap Apron	Onsite truck	—	—	HHDT

Downstream Apron: Riprap Bedding	—	—	—	—
Downstream Apron: Riprap Bedding	Worker	7.11	18.5	LDA,LDT1,LDT2
Downstream Apron: Riprap Bedding	Vendor	2.78	10.2	HHDT,MHDT
Downstream Apron: Riprap Bedding	Hauling	76.7	20.0	HHDT
Downstream Apron: Riprap Bedding	Onsite truck	—	—	HHDT
Furnish and Install Electrical / Controls and Instrumentation	—	—	—	—
Furnish and Install Electrical / Controls and Instrumentation	Worker	7.11	18.5	LDA,LDT1,LDT2
Furnish and Install Electrical / Controls and Instrumentation	Vendor	2.78	10.2	HHDT,MHDT
Furnish and Install Electrical / Controls and Instrumentation	Hauling	34.0	12.1	HHDT
Furnish and Install Electrical / Controls and Instrumentation	Onsite truck	—	—	HHDT
Furnish and Install Aeration System	—	—	—	—
Furnish and Install Aeration System	Worker	7.11	18.5	LDA,LDT1,LDT2
Furnish and Install Aeration System	Vendor	2.78	10.2	HHDT,MHDT
Furnish and Install Aeration System	Hauling	0.00	20.0	HHDT
Furnish and Install Aeration System	Onsite truck	—	—	HHDT
Part 1 Furnish and Install Erosion Control Measures	—	—	—	—
Part 1 Furnish and Install Erosion Control Measures	Worker	7.11	18.5	LDA,LDT1,LDT2
Part 1 Furnish and Install Erosion Control Measures	Vendor	2.78	10.2	HHDT,MHDT
Part 1 Furnish and Install Erosion Control Measures	Hauling	0.00	20.0	HHDT
Part 1 Furnish and Install Erosion Control Measures	Onsite truck	—	—	HHDT
Part 2 Furnish and Install Erosion Control Measures	—	—	—	—

Part 2 Furnish and Install Erosion Control Measures	Worker	7.11	18.5	LDA,LDT1,LDT2
Part 2 Furnish and Install Erosion Control Measures	Vendor	2.78	10.2	HHDT,MHDT
Part 2 Furnish and Install Erosion Control Measures	Hauling	0.00	20.0	HHDT
Part 2 Furnish and Install Erosion Control Measures	Onsite truck	—	—	HHDT
Part 3 Furnish and Install Erosion Control Measures	—	—	—	—
Part 3 Furnish and Install Erosion Control Measures	Worker	7.11	18.5	LDA,LDT1,LDT2
Part 3 Furnish and Install Erosion Control Measures	Vendor	2.78	10.2	HHDT,MHDT
Part 3 Furnish and Install Erosion Control Measures	Hauling	0.00	20.0	HHDT
Part 3 Furnish and Install Erosion Control Measures	Onsite truck	—	—	HHDT
Embankment Mitigation	—	—	—	—
Embankment Mitigation	Worker	42.5	18.5	LDA,LDT1,LDT2
Embankment Mitigation	Vendor	—	10.2	HHDT,MHDT
Embankment Mitigation	Hauling	42.9	20.0	HHDT
Embankment Mitigation	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
Part 1 Site Demolition (Excludes Spillway)	0.00	0.00	0.00	1,248	—
Part 2 Site Demolition (Excludes Spillway)	0.00	0.00	0.00	1,248	—
Spillway Demolition: Existing Spillway Demo	0.00	0.00	0.00	7,020	—
Spillway Demolition: Crush Concrete Demo	0.00	0.00	0.00	15,600	—
Spillway Demolition: Bridge Pier and Facing Demo	0.00	0.00	0.00	7,020	—
Mobilization	—	1,350	13.8	0.00	—
Demobilization	—	3,000	13.8	0.00	—
Cleanup	—	1,800	110	0.00	—
Bypass Pumping Diversion Beam	80,000	—	0.00	0.00	—
Inclined Inlet Structure: Reinforced Concrete	—	88,800	13.8	0.00	—
Dam Control Building: Pt 1 CMU Control Building	—	4,200	0.00	0.00	—
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	—	3,000	110	0.00	—
Spillway Site Excavations	—	9,000	69.4	0.00	—
Wall Type 2 - Left: Reinforced Concrete Wall	—	140,400	0.00	0.00	—
Stilling Basin: Basin Steps	—	4,200	0.00	0.00	—
Stilling Basin: Chute Blocks	—	2,400	0.00	0.00	—

Downstream Apron: Riprap Apron	—	13,500	0.00	0.00	—
Downstream Apron: Riprap Bedding	—	13,500	0.00	0.00	—
Furnish and Install Electrical / Controls and Instrumentation	—	25,200	0.00	0.00	—
Embankment Mitigation	120,000	—	1,313	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
User Defined Linear	0.00	100%
General Light Industry	0.00	0%
Road Construction	0.09	100%
Bridge/Overpass Construction	0.06	100%
User Defined Linear	0.40	100%
General Light Industry	0.00	0%
User Defined Linear	0.00	100%
User Defined Linear	2.97	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	349	0.03	< 0.005
2025	0.00	349	0.03	< 0.005

2026	0.00	346	0.03	< 0.005
2027	0.00	346	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	10.3	annual days of extreme heat
Extreme Precipitation	4.25	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	55.3	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A

Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	64.9
AQ-PM	64.8
AQ-DPM	18.4
Drinking Water	57.2
Lead Risk Housing	9.33
Pesticides	0.00
Toxic Releases	73.0
Traffic	95.2
Effect Indicators	—
CleanUp Sites	17.1
Groundwater	14.3
Haz Waste Facilities/Generators	73.8
Impaired Water Bodies	23.9
Solid Waste	66.9
Sensitive Population	—
Asthma	7.91
Cardio-vascular	22.6
Low Birth Weights	12.6
Socioeconomic Factor Indicators	—
Education	27.2
Housing	54.6
Linguistic	20.6
Poverty	12.4
Unemployment	60.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	89.23392788
Employed	85.57679969
Median HI	92.4547671
Education	—
Bachelor's or higher	91.91582189
High school enrollment	17.87501604
Preschool enrollment	73.37354036
Transportation	—
Auto Access	98.98626973
Active commuting	3.349159502
Social	—
2-parent households	87.84806878
Voting	49.06967792
Neighborhood	—
Alcohol availability	97.0101373
Park access	61.56807391
Retail density	14.48736045
Supermarket access	53.29141537
Tree canopy	67.12434236
Housing	—
Homeownership	68.57436161
Housing habitability	76.78686
Low-inc homeowner severe housing cost burden	54.20248941
Low-inc renter severe housing cost burden	56.30694213
Uncrowded housing	79.21211344
Health Outcomes	—

Insured adults	84.28076479
Arthritis	89.2
Asthma ER Admissions	91.0
High Blood Pressure	76.3
Cancer (excluding skin)	49.7
Asthma	88.8
Coronary Heart Disease	92.9
Chronic Obstructive Pulmonary Disease	93.7
Diagnosed Diabetes	89.8
Life Expectancy at Birth	67.1
Cognitively Disabled	93.6
Physically Disabled	85.5
Heart Attack ER Admissions	65.4
Mental Health Not Good	89.0
Chronic Kidney Disease	90.3
Obesity	92.8
Pedestrian Injuries	72.8
Physical Health Not Good	93.2
Stroke	93.8
Health Risk Behaviors	—
Binge Drinking	26.9
Current Smoker	89.7
No Leisure Time for Physical Activity	86.6
Climate Change Exposures	—
Wildfire Risk	99.0
SLR Inundation Area	0.0
Children	51.6
Elderly	92.1

English Speaking	93.7
Foreign-born	54.4
Outdoor Workers	73.1
Climate Change Adaptive Capacity	—
Impervious Surface Cover	73.7
Traffic Density	95.1
Traffic Access	23.0
Other Indices	—
Hardship	6.1
Other Decision Support	—
2016 Voting	77.6

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	23.0
Healthy Places Index Score for Project Location (b)	89.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Data provided by applicant. Linear construction represented within vertical construction.
Construction: Off-Road Equipment	Equipment data provided by applicant.
Construction: Dust From Material Movement	Data provided by applicant - export quantities consolidated into a refined number of phases.
Construction: Trips and VMT	Monthly haul trip Data Provided by applicant; monthly haul trips accounted for in a consolidated number of phases.

Biological Technical Report

Santiago Creek Dam Improvement Project, Orange County, California

Prepared for

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618
Contact: Fiona Sanchez
Director of Water Resources

Prepared by

Psomas
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707
T: 714.751.7373
Contact: Amber Heredia
Associate Principal, Resource Management

April 17, 2025

TABLE OF CONTENTS

Section **Page**

Executive Summary **ES-1**

1.0 Introduction **1**

1.1 Project Location 1

1.2 Project Background 2

1.3 Purpose And Need 4

1.4 Project Objectives 4

1.5 Project Description 5

1.6 Additional Geotechnical Investigations 7

1.7 Construction Activities 8

1.8 Operation and Maintenance 9

1.8.1 Additional Inundation During Operation 11

1.9 Regulatory Setting 11

1.9.1 Federal 11
1.9.2 State 14
1.9.3 Regional 18

2.0 Methods **20**

2.1 Literature Review 20

2.2 Vegetation Mapping and General Surveys 21

2.3 Focused Surveys 21

2.3.1 Special Status Plant Species 21
2.3.2 Quino Checkerspot Butterfly 23
2.3.3 Crotch's Bumble Bee 25
2.3.4 Western Spadefoot 26
2.3.5 Arroyo Toad 27
2.3.6 Southwestern Pond Turtle 29
2.3.7 Coastal California Gnatcatcher 32
2.3.8 Least Bell's Vireo/Southwestern Willow Flycatcher 33
2.3.9 Western Yellow-billed Cuckoo 36
2.3.10 Jurisdictional Delineation 37

3.0 Existing Biological Resources **39**

3.1 Physical Environmental Setting 39

3.1.1 Regional Environment 39
3.1.2 Climate 39

3.1.3 Local Environment *40*

3.2 Vegetation Types and Other Areas 40

3.2.1 Sagebrush Scrub (2.3.6) *42*
3.2.2 Disturbed Sagebrush Scrub (2.3.6) *43*
3.2.3 Sagebrush – Coyote Brush Scrub (2.3.12) *43*
3.2.4 Southern Cactus Scrub (2.4) *43*
3.2.5 Disturbed Southern Cactus Scrub (2.4) *43*
3.2.6 Disturbed Floodplain Sage Scrub (2.6) *44*
3.2.7 Toyon – Sumac Chaparral (3.12) *44*
3.2.8 Annual Grassland (4.1) *44*
3.2.9 Ruderal (4.6) *45*
3.2.10 Riparian Herb (7.1) *45*
3.2.11 Southern Willow Scrub (7.2) *45*
3.2.12 Mulefat Scrub (7.3) *46*
3.2.13 Disturbed Mulefat Scrub (7.3) *46*
3.2.14 Southern Sycamore Riparian Woodland (7.4) *46*
3.2.15 Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest (7.4/7.5) *46*
3.2.16 Southern Black Willow Forest (7.7) *47*
3.2.17 Disturbed Southern Black Willow Forest (7.7) *47*
3.2.18 Southern Black Willow Forest/Riparian Herb (7.7/7.1) *47*
3.2.19 Coast Live Oak Woodland (8.1) *47*
3.2.20 Western Sycamore (8.x) *48*
3.2.21 Cliff (10.0) *48*
3.2.22 Open Water (12.1) *48*
3.2.23 Fluctuating Shoreline (12.2) *48*
3.2.24 Vegetated Fluctuating Shoreline (12.2) *48*
3.2.25 Perennial Stream (13.1) *49*
3.2.26 Ornamental (15.5) *49*
3.2.27 Developed (15.6) *49*
3.2.28 Disturbed (16.1) *49*

3.3 Wildlife Populations and Movement Patterns 50

3.3.1 Fish *50*
3.3.2 Amphibians *50*
3.3.3 Reptiles *50*
3.3.4 Birds *51*
3.3.5 Mammals *51*
3.3.6 Wildlife Movement *52*

3.4 Special Status Biological Resources 54

3.4.1 Definitions *55*

3.5 Special Status Vegetation Types 57

3.6 Jurisdictional Resources 58

3.7 Special Status Plants 59

3.7.1 Braunton's Milkvetch 74
3.7.2 Intermediate Mariposa Lily 74
3.7.3 Many-stemmed Dudleya 75
3.7.4 Mud Nama 75
3.7.5 Coulter's Matilija Poppy 77

3.8 Special Status Wildlife 77

3.8.1 Monarch Butterfly 89
3.8.2 Crotch's Bumble Bee 89
3.8.3 White Sturgeon 90
3.8.4 Santa Ana Speckled Dace 90
3.8.5 Western Spadefoot 91
3.8.6 Southwestern Pond Turtle 91
3.8.7 Orange-throated Whiptail 92
3.8.8 Coastal Whiptail 92
3.8.9 Two-striped Garter Snake 93
3.8.10 White-tailed Kite 93
3.8.11 Bald Eagle 93
3.8.12 American Peregrine Falcon 94
3.8.13 Least Bell's Vireo 94
3.8.14 Coastal Cactus Wren 95
3.8.15 Coastal California Gnatcatcher 95
3.8.16 Southern California Rufous-Crowned Sparrow 96
3.8.17 Grasshopper Sparrow 96
3.8.18 Yellow-breasted Chat 97
3.8.19 Yellow Warbler 97
3.8.20 Mountain Lion 97

4.0 Project Impacts 98

4.1 Significance Criteria 101

4.2 Direct Impacts 103

4.2.1 Vegetation Types and Other Areas 103
4.2.2 Jurisdictional Resources 109
4.2.3 Wildlife 111
4.2.4 Wildlife Movement 112
4.2.5 Special Status Biological Resource Impacts 113

4.2.6 Indirect Impacts 124

5.0 Mitigation Measures 129

5.1 Mitigation Measure #1: Coastal Sage Scrub and Coastal California Gnatcatcher 129

5.2 Mitigation Measure #2: Riparian Vegetation and Jurisdictional Permitting 129

5.3 Mitigation Measure #3: Tree Survey/Replacement....130
5.4 Mitigation Measure #4: Special Status Plant Species....131
5.5 Mitigation Measure #5: Crotch's Bumble Bee....132
5.6 Mitigation Measure #6: Least Bell's Vireo....134
5.7 Mitigation Measure #7: Bald Eagle....135
5.8 Mitigation Measure #8: Pre-Construction Bat Surveys....135

6.0 Consistency With the NCCP/HCP....137
6.1 Consistency With Non-Reserve Open Space Policies....137
6.2 Consistency With Coastal Sage Scrub Take Authorization....137
6.3 Covered Species....138
6.4 Conditionally Covered Species....139
6.5 Covered Habitats....141
6.6 Migratory Bird Treaty Act....141

7.0 Level of Significance After Mitigation....142

8.0 References....143

TABLES

Table		Page
ES-1	Vegetation Acreage Impacts of the Project	2
ES-2	Summary of Project Impacts on Jurisdictional Resources	4
1	IRWD/Lake Operational Modes	10
2	Reference Populations Monitored in the Project Region	22
3	Summary of Quino Checkerspot Butterfly Surveys	24
4	Summary of Crotch's Bumble Bee Surveys	26
5	Summary of Survey Conditions for Western Spadefoot Surveys	27
6	Summary of Survey Data and Conditions for Arroyo Toad Surveys	28
7	Summary of Survey Conditions for Southwestern Pond Turtle Visual Surveys	30
8	Summary of Survey Data and Conditions for Southwestern Pond Turtle Trapping	31
9	Summary of Survey Data and Conditions for Coastal California Gnatcatcher Surveys	32
10	Summary of Survey Data and Conditions for Least Bell's Vireo Surveys	35
11	Summary of Survey Data and Conditions for Western Yellow-Billed Cuckoo Surveys	37
12	Vegetation Types and Other Areas in the BSA	41
13	Summary of Jurisdictional Resources in the Survey Area	58
14	Special Status Plant Species Reported from the Project Region	60
15	Mud Nama Population Information	76
16	Special Status Wildlife Species Reported from the Project Vicinity	79
17	Vegetation Acreage Impacts of the Project	104
18	Summary of Project Impacts on Jurisdictional Resources	111
19	Mud Nama Population Information	115

EXHIBITS

Exhibit		Follows Page
1	Regional Location and Local Vicinity	1
2	Existing Dam Features	1
3	U.S. Geological Survey 7.5-minute Digital Quadrangle	1
4	Orange County Central/Coastal NCCP/HCP	2
5	Soil Types	42
6	Biological Resources	42
7	Jurisdictional Resources – USACE Waters of the United States	58
8	Jurisdictional Resources – RWQCB Waters of the State	58
9	Jurisdictional Resources – CDFW Jurisdictional Waters	58
10	Special Status Species Locations	74
11	Project Impacts	98
12	Project Impacts – USACE Waters of the United States	109
13	Project Impacts – RWQCB Waters of the State	110
14	Project Impacts – CDFW Jurisdictional Waters	110
15	Project Impacts Special Status Species	113

APPENDICES

A	Geotechnical Investigations Memorandum
B	USFWS Official Species List
C	Representative Photographs
D	Plant and Wildlife Compendia
E	Special Status Plant Surveys
F	Quino Checkerspot Butterfly Survey
G	Crotch's Bumble Bee Survey
H	Arroyo Toad Surveys
I	Southwestern Pond Turtle Survey
J	Coastal California Gnatcatcher Surveys
K	Least Bell's Vireo/Southwestern Willow Flycatcher Surveys
L	Western Yellow-billed Cuckoo Survey
M	Jurisdictional Delineation
N	Project Impacts by Landowner

EXECUTIVE SUMMARY

This report provides baseline data regarding the type and extent of biological resources for the Santiago Creek Dam Improvement Project proposed by the Irvine Ranch Water District (IRWD). The primary objective of the Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities, as well as to modify the dam embankment to permit operation of the facilities for a long-term water resource benefit. The Project would also raise the spillway two feet, which would result in a small increase in maximum inundation area of the reservoir. In implementing the Project, the Districts would: (1) create new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements; (2) satisfy IRWD's operational requirements in the present and future; (3) extend the useful life of the facilities; (4) improve water supply reliability; and (5) minimize impacts to local environmental resources and surrounding property owners.

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). IRWD is a participant in the NCCP/HCP. Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP shall be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

The following vegetation types occur in the Biological Study Area (BSA): sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas. The Project would impact coastal sage scrub, chaparral, grassland, riparian, woodland (including a limited amount of sycamore woodland), cliff, lakes, reservoirs, or basins (i.e., dewatering Irvine Lake during construction), disturbed, and developed (Table ES-1). Compensatory mitigation is included to mitigate the loss of coastal sage scrub[1], riparian, and woodland, including replacement of western sycamore (*Platanus racemosa*) and coast live oaks (*Quercus agrifolia*) that would be removed by the Project.

[1] IRWD is a participant in the NCCP/HCP and can use their take credits to compensate for the loss of coastal sage scrub.

TABLE ES-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	115.81	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	20.11	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.63	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		*175.10*	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	30.35	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		*30.35*	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	92.38	0.25	25.72	0.00	25.97	3.07
Subtotal Grassland		*107.97*	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		*212.65*	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

TABLE ES-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	31.09	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		*31.45*	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.63	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.63*	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.13	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		*383.55*	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	20.77	0.03	1.21	0.00	1.24	0.47
Developed	15.6	20.98	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		*41.75*	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	25.42	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		*25.42*	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**1,016.85**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N.

[b] Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

Jurisdictional resources occur throughout the BSA; a summary of jurisdictional resources that would be impacted by the Project is shown in Table ES-2. A total of 203.570 acres of Waters of the U.S. under the regulatory authority of the U.S. Army Corps of Engineers (USACE) would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary); an additional 0.673 acre of WOTUS (0.673 acre wetland) with the additional inundation area. A total of 203.641 acres of waters of the State under the regulatory authority of the Regional Water Quality Control Board (RWQCB) would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary); an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area. A total of 233.774 acres of waters under the regulatory authority of CDFW would be impacted to construct the Project (3.924 acres permanent; 229.850 acres temporary); an additional 8.980 acres of waters under the authority of CDFW with the additional inundation area. Regulatory permitting would be required prior to impacting jurisdictional resources and compensatory mitigation will be required to mitigate for the loss of these resources.

TABLE ES-2
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES

	Amount of Jurisdictional Water Resource (acres)				
Jurisdiction	**Existing**	**Permanent**	**Temporary**	**Total Permanent/ Temporary Impact**	**Additional Inundation Area[a]**
USACE WOTUS	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 326.770	Non-wetland: 1.798	Non-wetland: 137.857	Non-wetland: 139.655	Non-wetland: 0.000
	Total: 428.476	Total: 1.798	Total: 201.772	Total: 203.570	Total: 0.673
RWCQB Waters of the State	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 333.499	Non-wetland: 1.861	Non-wetland: 137.865	Non-wetland: 139.726	Non-wetland: 0.038
	Total: 435.20	Total: 1.861	Total: 201.780	Total: 203.641	Total: 0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

Focused surveys for special status plants were conducted downstream of the dam in spring/summer 2020 and upstream of the dam in spring/summer 2022. Three special status plant species, intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*), and Coulter's matilija poppy (*Romneya coulteri*), were observed downstream of the dam during the 2020 focused surveys. Four special status

plant species, Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily, mud nama (*Nama stenocarpa*), and Coulter's matilija poppy, were observed upstream of the dam during the 2022 focused surveys. The Braunton's milk-vetch, intermediate mariposa lily, the larger population of many-stemmed dudleya (810 individuals), mud nama, and Coulter's matilija poppy are all located outside the impact area for the Project. One small population of many-stemmed dudleya (10 individuals) would be impacted by the Project; this impact was determined to be less than significant since the larger population is avoided. The majority of the mud nama would be impacted by the Project's borrow areas; this impact was determined to be significant. Compensatory mitigation is included to mitigate for the loss of mud nama. Additional inundation resulting from raising the spillway is expected to be less than significant on two individual intermediate mariposa lilies.

Focused surveys for several special status wildlife were conducted in the Biological Study Area in spring/summer 2020, spring/summer 2022, summer 2024, and spring 2025. Quino checkerspot (*Euphydryas editha quino*), western spadefoot (*Spea hammondii*), arroyo toad (*Anaxyrus californicus*), southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]), southwestern willow flycatcher (*Empidonax traillii extimus*), and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) were determined to be absent based on the results of focused surveys. Several special status species were observed or would be expected to occur. Those that would require additional surveys or mitigation are summarized below.

Suitable habitat is present for Crotch's bumble bee (*Bombus crotchii*) throughout the BSA; one individual was observed during focused surveys conducted in summer 2024. This species is proposed for State listing. Mitigation measures require pre-construction focused surveys for Crotch's bumble bee, avoidance of active nest burrows during construction, and consultation with California Department of Fish and Wildlife (CDFW) to obtain an Incidental Take Permit for this species.

Suitable habitat for coastal California gnatcatcher (*Polioptila californica californica*) is located throughout the BSA; one breeding territory was observed downstream of Santiago Creek Dam near the Project's impact area downstream of the dam. Suitable habitat for least Bell's vireo (*Vireo bellii pusillus*) is located along Santiago Creek, primarily at the upstream end of Irvine Lake; a total of 29 least Bell's vireo locations were observed during the 2022 focused surveys upstream of the dam. Marginally suitable habitat is located downstream of the dam along Santiago Creek; no least Bell's vireo were observed during focused surveys conducted downstream of the dam in 2020 but least Bell's vireo was incidentally observed downstream of the dam in summer 2024. The Project's staging area would be adjacent to the upstream end of Irvine Lake; noise from construction could impact breeding least Bell's vireos at the upstream end of Irvine Lake. Mitigation has been included to mitigate for the loss of coastal sage scrub and riparian habitat primarily through restoration of temporarily impacted habitat following construction, and the restoration of coastal sage scrub and riparian habitat at either an on-site or off-site mitigation site. Use of NCCP/HCP take credits would supplement the restoration and enhancement efforts as necessary. Additionally, standard NCCP/HCP construction minimization measures include pre-construction surveys, biological monitoring, and noise minimization measures to avoid and minimize impacts on these species.

A breeding pair of bald eagle (*Haliaeetus leucocephalus*), State Endangered and California Fully Protected, was incidentally observed nesting in a canyon adjacent to the BSA during focused surveys conducted around Irvine Lake in 2022. The 2022 nesting location was over 1,200 feet (approximately 0.22 mile) from the proposed borrow site/staging area, which is the closest Project activity, and approximately 1.25 miles from Santiago Creek Dam, where construction would be concentrated. Therefore, the nest would not be expected to be directly or indirectly impacted by the construction activities or noise. However, during construction, the lake would be dewatered; the temporary loss of the lake as foraging habitat may cause the bald eagles to leave Irvine Lake for the duration of construction. Avoidance and minimization measures include monitoring the bald eagles during construction if they continue to occupy the area.

Mountain lions (*Puma concolor*) are known to occur throughout the vicinity of the BSA and mountain lion sign (i.e., tracks) were incidentally observed downstream of Santiago Creek Dam during focused surveys. The mountain lion is proposed for State listing due to fragmentation of habitat that isolates populations. The Project would not create a new barrier to movement since it would occur at the existing dam. The speed limit and wildlife crossing signage would be posted along construction access roads.

Several special status bat species have potential to roost in the rocky outcroppings along Santiago Creek, in crevices of structures (e.g., dam structure, spillway, outlet tower, or dam keeper's house), or in large oak (*Quercus agrifolia*) or sycamore (*Platanus racemosa*) trees in the BSA. A pre-construction roosting bat survey (including both day and evening efforts) would be conducted prior to the initiation of construction to ensure that no active day-roosts would be impacted. If roosting bats are observed, the bats will be excluded from the areas prior to the roosts being impacted.

Best management practices to minimize impacts would be implemented to prevent the spread of invasive exotic plant species; treat invasive species during and following construction; ensure that night lighting during construction does not spillover into sensitive habitat areas; includes biological monitoring during vegetation clearing activities to ensure sensitive habitat areas are protected; and conducting a worker environmental awareness program training for all construction staff.

1.0 INTRODUCTION

This Biological Technical Report has been prepared to support California Environmental Quality Act (CEQA) documentation for the Santiago Creek Dam Improvement Project (hereinafter referred to as "the Project") proposed by Irvine Ranch Water District (IRWD). It will also support regulatory permitting with the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and California Department of Wildlife (CDFW). This information has been reported in accordance with accepted scientific and technical standards that are consistent with the requirements of the U.S. Fish and Wildlife Service (USFWS) and the CDFW.

1.1 PROJECT LOCATION

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the embankment dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, a portion of the Irvine Lake pipeline, and dam access road (Exhibit 2).

The Project is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle map (Exhibit 3). It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. The Project is within the Santa Ana Watershed (Hydrologic Unit Code 18070203). Irvine Lake (named Santiago Creek Reservoir by the USGS) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project site in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project site. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level (msl).

Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Orange County Waste and Recycling (OCWR) Landfill Facility (i.e., Santiago Canyon Landfill) is located adjacent to the west of Irvine Lake. Residential development is located east of SR-241.

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Improvement Project

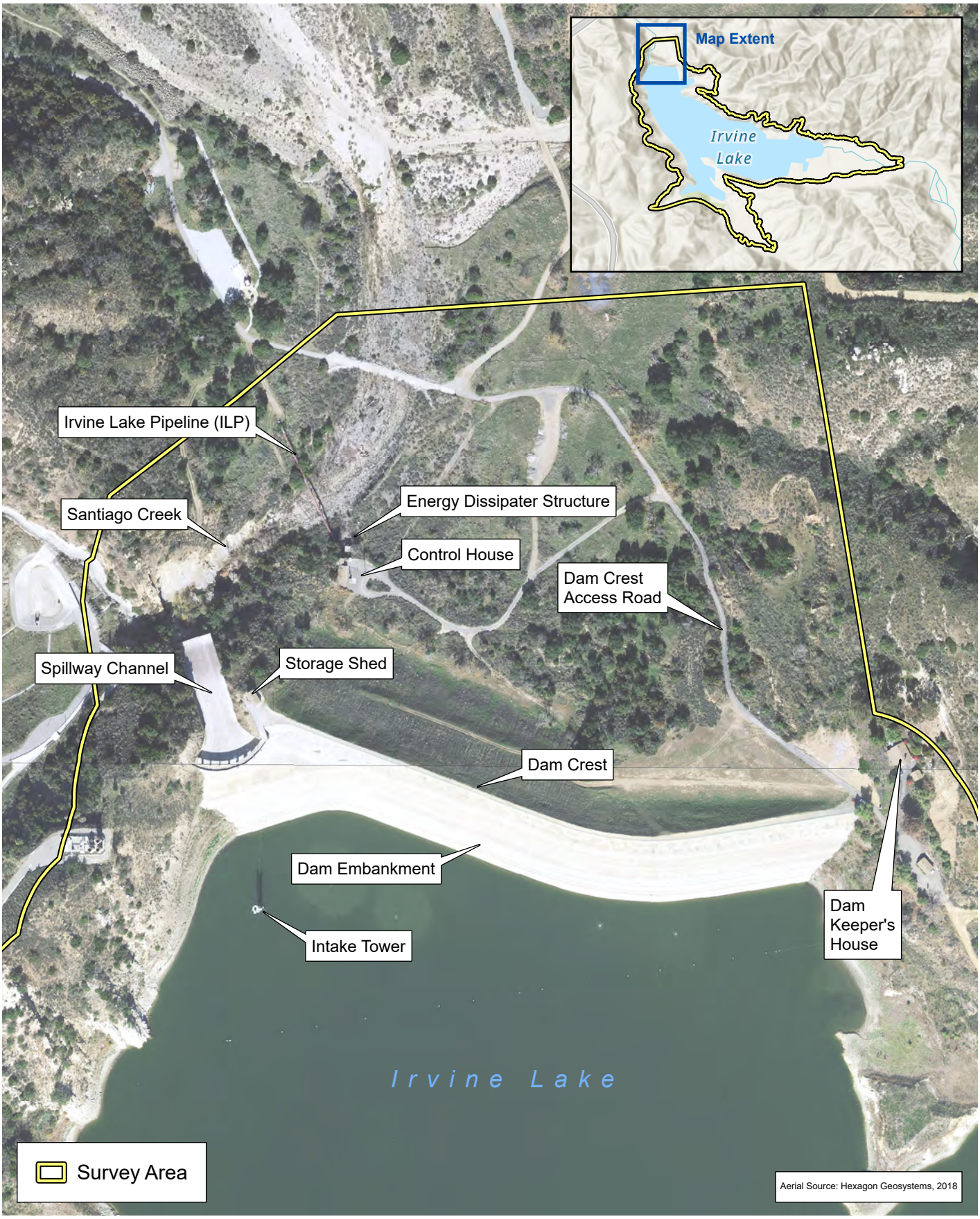
N
W
E
S

0 2,000 4,000 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_LV_RL.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_LV_RL



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Existing_Dam_Features

Existing Dam Features

Exhibit 2

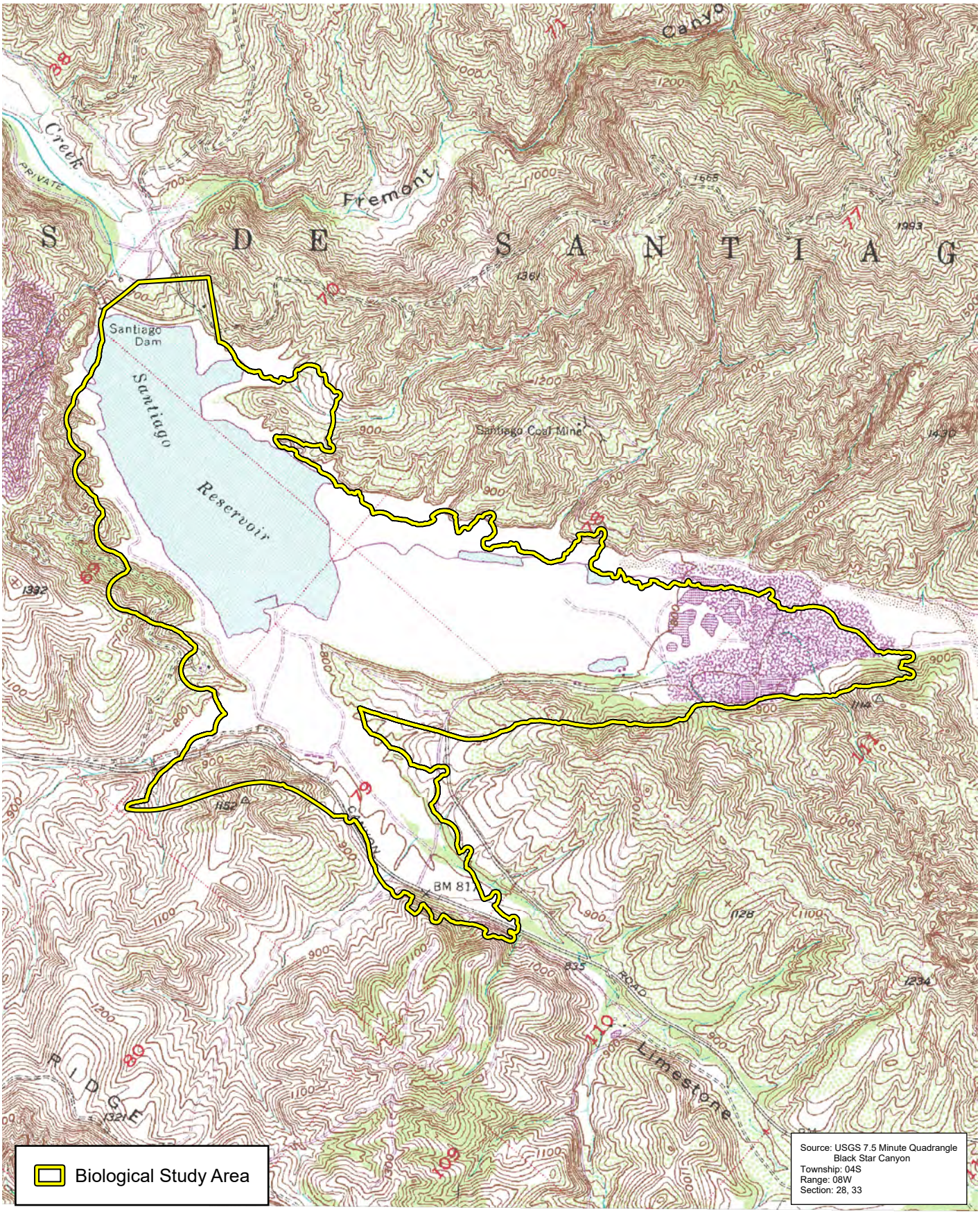
Santiago Creek Dam Improvement Project

N W E S

0 150 300 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_ExistingDamFeatures.pdf



U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 3

Santiago Creek Dam Improvement Project

N
W E
S

0 1,000 2,000
Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_USGS

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake (Exhibit 4). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[2] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement (IA). Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP shall be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

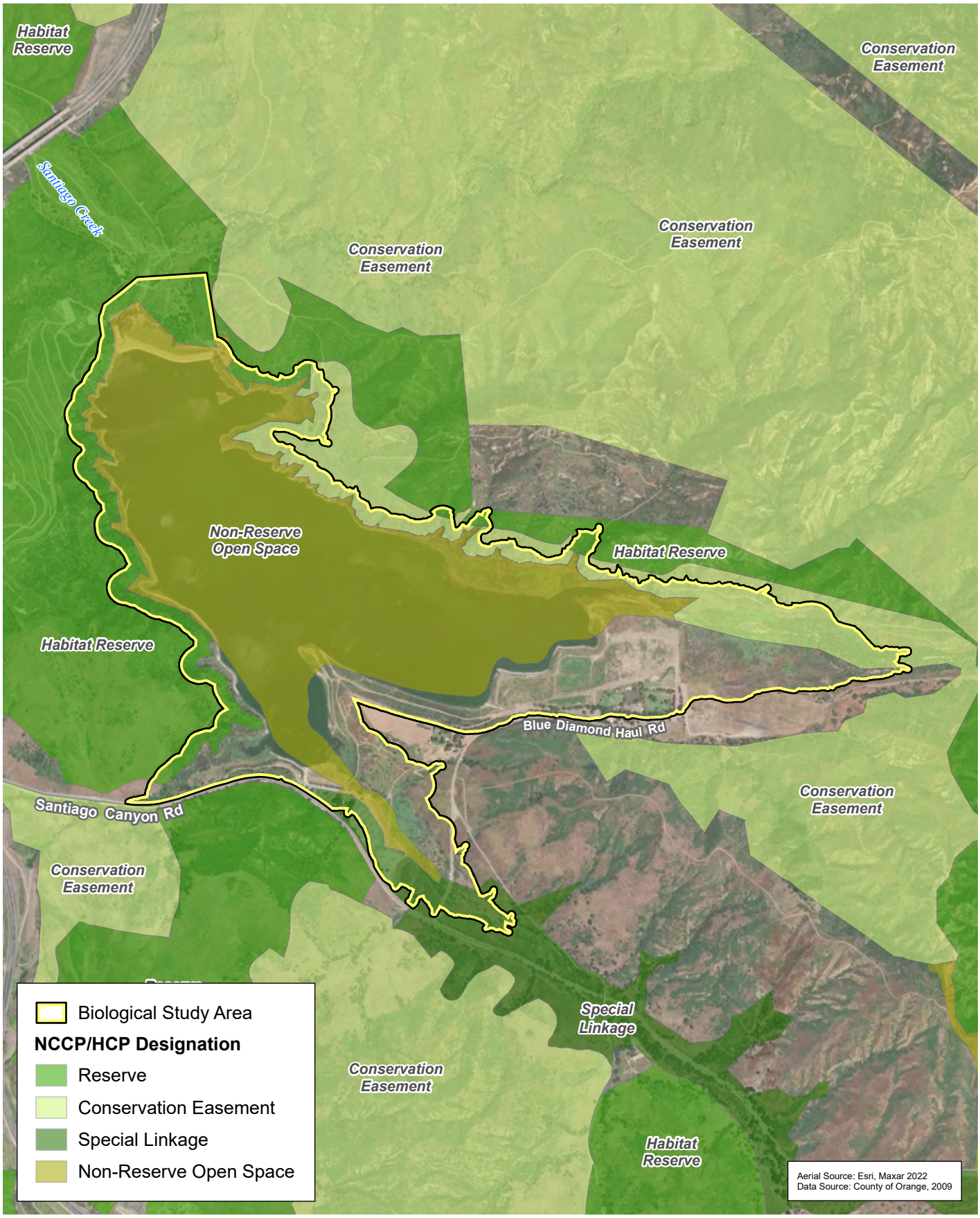
1.2 PROJECT BACKGROUND

IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serve as a critical water supply reservoir for IRWD's service area. The Santiago Creek Dam impounds water for Irvine Lake from Santiago Creek, local storm water runoff, and raw water from Metropolitan Water District of Southern California (MWD). It serves as a domestic and non-potable water supply for various cities in Orange County.

Irvine Lake is a reservoir of untreated water located east of Irvine Regional Park. The lake's capacity is currently approximately 24,000 acre-feet (AF) but can hold an additional 2,700 AF when flash boards are installed on the spillway, temporarily raising the maximum water elevation an additional 4 feet to 795.9 feet. IRWD uses water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation uses, and 2) as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. IRWD can provide water from Irvine Lake to Serrano Water District (SWD) through the Howiler Treatment Plan, which is owned and operated by IRWD, to serve SWD customers in the City of Villa Park and portions of the City of Orange. Per the terms of the Water Service Reliability Agreement executed between IRWD and SWD on December 12, 2024, IRWD can backstop and/or augment use of groundwater to enhance SWD's water supply reliability using water sourced from Irvine Lake. In the future, IRWD will construct an interconnection between SWD's and IRWD's potable system, which will allow IRWD to serve water from the Howiler Treatment Plant to IRWD customers. The construction and operation of the interconnection will be subject to separate environmental review.

Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000. Santiago Creek Dam is located in Orange County, California and impounds water for Irvine Lake from Santiago Creek, a tributary to the Santa Ana River. Santiago Creek Dam is approximately 136 feet high and 1,425 feet long. It is roughly 760 feet wide at the base and contains approximately 800,000 cubic yards of materials. IRWD has appropriative rights to the flows of Santiago Creek including a right to

[2] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_NCCP

Orange County Central/Coastal NCCP/HCP

Exhibit 4

Santiago Creek Dam Improvement Project

N W E S

0 1,000 2,000 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_NCCP.pdf

diversion by storage in Irvine Lake for municipal, domestic, and agricultural uses. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level varies throughout the lake; however, it is estimated that the accumulated sediment currently occupies approximately 2,150 AF of the lake.

The sources of water for the Lake are flows from Santiago Creek, local runoff captured during rainfall events and untreated (imported) water purchased from MWD. The imported water is conveyed to the Lake through MWD's Santiago Lateral Pipeline (SLP). When water is drawn from the Lake from the existing outlet tower, water is conveyed via the Irvine Lake Pipeline (ILP) to downstream customers.

The outlet works for the dam consists of a tower, an outlet conduit, and a downstream control house. The outlet works are the normal means of releasing water impounded by the dam. The tower sits above the outlet pipe, or tunnel, and is used to transport water out of the reservoir. The outlet conduit conveys water from the reservoir through, under, or around a dam in a controlled manner. The downstream control house contains, or houses, electrical or other equipment. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where the pipeline splits in a bifurcation valve vault to permit water to flow into a 36-inch main pipe and a 30-inch diverter pipe. The main pipe supplies water to IRWD and the Howiler Water Treatment Plant. The diverter pipe can release water from the lake into the streambed immediately downstream of the control house for dam safety purposes.

The existing dam spillway[3] is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, broad-crested weir control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years).

Irvine Lake is held at varying levels depending on the time of year. In the wet winter months, water can be stored up to the 791.9-foot elevational contour.[4] The height of the existing spillway with the flashboards installed is at the 795.9-foot elevation contour; this is the current maximum capacity of the reservoir and is only permitted in the summer months. Historically, the inflow into the reservoir during storm events is high enough to cause the water to flow over the spillway crest, located at the 791.9-foot elevation, approximately once every four to five years (1937 to 2019). From October 2002 to September 2020, the reservoir has been filled to the spillway crest four times and water has been high enough to flow over the spillway twice. The water levels in the lake during this period (2002 to 2020) fluctuated between the approximately 736-foot elevation contour and the 795-foot elevation contour. Between 2002 and 2020, the longest consecutive period of time that water was stored in the upper two feet of the reservoir (793.9 to 795.9 feet) was approximately 35 days.

[3] A spillway is a structure on a dam that allows water to flow around the dam to safely release excess water from a reservoir.

[4] NAVD88 Datum is used throughout this document.

1.3 PURPOSE AND NEED

In 2012, and in collaboration with DSOD, IRWD initiated seismic evaluations of the existing outlet tower that resulted in a determination that the free-standing structure was seismically unstable. In 2017, at the request of DSOD, IRWD initiated a multi-phase spillway condition assessment. The assessment found that the spillway is nearing the end of its useful life and its design, while acceptable at the time of construction, does not meet current design standards (URS 2015). IRWD has also conducted an assessment of seismic performance of the dam embankment and has determined that modifications to the Santiago Creek Dam embankment are necessary.

In view of the findings of the seismic evaluation for the existing outlet tower and dam embankment, as well as the comprehensive assessment of the existing spillway, IRWD has elected to develop designs for an inclined outlet structure that will be placed near the left abutment of the existing dam, to modify the embankment, and to replace the existing spillway with a side-channel spillway on the left abutment. The spillway crest will also be raised by six feet, which is two feet higher than the top of the flashboards when installed, to regain operational storage capacity that was lost over the years due to sedimentation. The existing outlet tower would be demolished, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir. The dam embankment would be modified to include a filter drain system.

1.4 PROJECT OBJECTIVES

The primary objective of the proposed Project is to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities to modify the dam embankment to permit operation of the facilities to provide a long-term water resource benefit. In implementing the proposed Project, IRWD would also obtain the following benefits:

- Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements established by DSOD, which is the governing state agency associated with this Project;
- Satisfy IRWD's operational requirements in the present and future;
- Extend the useful life of the facilities;
- Improve regional water supply reliability; and
- Minimize impacts to local environmental resources and surrounding property owners.

1.5 PROJECT DESCRIPTION

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Environmental Impact Report (EIR). The Project Description represents a conservative analysis to accommodate the range of uncertainty regarding the final design. Therefore, the quantities and measurements used throughout the analysis are estimates based on the best available information.

- The existing outlet tower would be demolished; with the portion of the tower located below the sediment to be filled with concrete and capped with a concrete plug or completely removed. A new inclined outlet structure would be constructed on the left abutment, including an approximately 54-inch steel pipe inclined along the slope that would act as the conveyance pipe for water into and out of the reservoir. The concrete-encased steel pipe would be situated in firm bedrock and anchored to the slope by drilled foundation anchors. A series of steel riser pipes would extend vertically from the inclined 54-inch steel pipe and would act as intakes for reservoir water into the 54-inch pipe. Each riser would include an intake fish screen that would inhibit debris, silt, and aquatic life from entering the pipe.
- The inlet/outlet works would be configured to incorporate the new structure, including new valves and fittings. Water from the lake would enter into the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow either to the ILP or the emergency outlet pipeline. Water that enters the ILP would reach IRWD's distribution system. Water that enters the emergency outlet pipeline would be released to the creek at the end of the new spillway.
- The ILP would be increased from 36 inches to 54 inches to match the pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line to improve the system's hydraulics. The relocation and upsizing improvements would also protect the ILP from future flood events, thereby enhancing the overall reliability of delivering water from Irvine Lake to customers.
- The existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment. The alignment for the new spillway was selected as a result of several constraints including the footprint of the dam embankment, the location of the sloped outlet structure, and the steeply sloped hillside along the left abutment.
- To ensure the spillway structure is constructed on sound foundational material, many areas under the spillway structure would include the placement of roller compacted concrete. In addition, the floor of the spillway would be anchored into bedrock materials that would include drilling, grouting, post-tensioning and securing the anchors into the spillway slab.
- The end of the new spillway would include a stilling basin before discharging to a concrete and riprap apron. At the end of the stilling basin, a scour protection cutoff is included for additional mitigation of head cutting that may occur during significant discharges.

- The dam embankment improvements include removing the upper portion of the dam on the downstream side of the embankment, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material composed of pervious material.
- A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new shotcrete tie-back wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.
- A new dam control building would be constructed to house the valve system at the end of the existing dam crest. The preliminary layout shows a fire-hardened building with the approximate dimensions of 60 feet by 20 feet with a height of 18 feet.
- The dam crest would be widened from 10 feet to between approximately 35 and 45 feet, the dam crest elevation would be raised approximately one foot, which would improve access and safety for dam maintenance. The paved dam crest would include protective railings on both sides of the road and replacement piezometers to monitor the performance of the embankment dam. These embankment improvements would require excavations along the toe of the dam to key in the earthwork improvements to the face of the dam.
- The dam crest would be raised approximately one foot on the upstream side of the dam crest. This would raise the effective dam crest from an elevation of 811.9 feet up to approximately 812.9 feet for DSOD freeboard requirements during a probable maximum flood event.
- The Project would raise the spillway six feet to 797.9 feet, which is two feet higher than the existing maximum water storage elevation of 795.5 feet. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water.
- A new emergency access walkway (five feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent closed OCWR landfill facility during a spillway event. The walkway would connect to the new access road (described above).
- A new steel bridge structure would be included for vehicles across the new spillway.
- Existing structures would be demolished, including the existing vertical outlet tower and portions of 60-inch outlet conduit, significant portions (or possibly all) of the existing spillway chute and walls, spillway bridge and piers, portions of the upstream dam embankment concrete facing, storage building on the dam crest, outlet works control building and valve vault, outlet works energy dissipator vault, portions of the ILP, catwalk and stairs assembly across Santiago Creek, the dam keeper's house, boat shop (unless re-purposed for IRWD use), and piezometers/monitoring wells. Site demolition activities are anticipated to occur in 2027/2028, and spillway demolition is expected to occur in 2028. The potential removal of the boat shop building would occur at the end of the construction period in 2030. When feasible, demolished materials would be recycled or reused.

- The existing Southern California Edison (SCE) overhead power lines and power poles in the vicinity would be relocated outside the construction limits. This relocation would be completed by SCE. There would be an approximately 15-foot-wide right-of-way (ROW) easement for long-term maintenance.
- Before beginning construction of the dam improvements, the lake would be dewatered, and an access road would be graded along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.
- IRWD would maximize withdrawals from Irvine Lake in the time leading up to construction initiation to minimize the amount required to be dewatered. The dewatering process would combine several methods including dewatering using the valves and outlet tower to allow water to flow downstream, implementing a temporary pumping system, and installing a subgrade dewatering system (e.g., dewatering wells). The temporary pumping system would include diesel-driven pumps and temporary above ground piping that would convey the water from the lake to a discharge point along Santiago Creek near the existing Arizona crossing (a type of culvert crossing). Dewatering would be used throughout the year as needed to manage the water level during and after storm events and to maintain a dry work environment. IRWD would coordinate downstream releases with impacted agencies and entities.
- Once the lake is dewatered and before the first dry season, the contractor would construct a temporary diversion berm and access ramp. The temporary diversion would provide a physical barrier to protect the work area from seasonal storms and would provide an elevated access road to allow construction equipment to access the downstream side of the dam.
- During construction, concrete crushing would occur in one of the staging areas. Concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may also occur at various stages of the Project as concrete is removed from the existing spillway or dam. When feasible, demolished and removed materials would be recycled or reused.

1.6 ADDITIONAL GEOTECHNICAL INVESTIGATIONS

Although the Districts previously completed geotechnical investigation to support Project design and the development of detailed construction documents (2021–2024), additional geotechnical investigations were conducted in early 2025 to support the final design. These investigations included the performance of exploratory test pits, soil borings, packer testing, and non-intrusive geologic investigations and observations. The additional geotechnical investigations remained within the proposed limits of disturbance defined by the Project and will be mitigated as part of the overall Project. The Biological Resources Memorandums analyzing the Santiago Creek Dam Geotechnical Investigations are included in Appendix A.

1.7 CONSTRUCTION ACTIVITIES

Construction Access and Staging

The primary construction access would lead into the lake from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area, as well as the required concrete batch plant and construction trailers, would be located in the large, flat plateau area (known as "the Flats") at the upstream end of the reservoir. The primary construction access/haul road would connect the staging area to the existing dam within the lakebed after the lake is dewatered. An earthen ramp would be constructed up the right abutment of the existing dam to allow construction vehicles to access the downstream side of the dam. To facilitate construction of the downstream features, a secondary staging area would be located on the downstream toe of the dam near the existing outlet structure building. It is anticipated that the secondary staging area would be utilized by the contractor to mobilize the roller compacted concrete batch plant. The secondary staging area may also be used to stage formwork, rebar, raw materials, and other related materials and equipment required to successfully construct the dam improvements. Material from the embankment would be removed, staged, and repurposed within the Project site.

Temporary Construction Water

Water would be utilized for various construction activities. The available water source in the Project vicinity is a 12-inch potable water line running along East Santiago Canyon Road south of Irvine Lake. IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road to the staging area. The temporary construction water line would be routed above-ground through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work areas. Construction activities may also use untreated water from the ILP as an additional water source.

Borrow Areas

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would include importing approximately 200,000 CY of material and exporting approximately 315,000 CY of material over the four-year construction period.

Construction Schedule

Construction work is anticipated to begin in Fall 2027 and the Project is expected to be completed within approximately four years. The approximately four-year construction window assumes down-time associated with weather restrictions and assumes working double 10-hour shifts (i.e., 20-hour workdays with nighttime work). The construction schedule assumes that a minimum of three dry seasons, which are generally between April to October, would be required to build the dam improvements in a systematic and phased fashion. It also assumes that the embankment improvements would be built concurrently with the spillway improvements. The exact date that construction begins is subject to

change. The construction schedule will be refined as Project design plans are developed and finalized.

During construction, concrete crushing would occur in the staging area at the upstream end of the lake. Concrete crushing would be expected to occur during the day from April through November during the demolition phase of the Project. As mentioned above, concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may occur at various stages of the Project as concrete is removed from the existing spillway or dam.

Various public agencies (e.g., Orange County Fire Authority, Orange County Sheriff's Department, etc.) currently use portions of the proposed staging area for takeoff and landings associated with training and operational activities. During construction of the proposed Project, HeloPods[5] would be designated near the eastern edge of the lake near the Flats area at the upstream end of the reservoir for their continued use.

1.8 OPERATION AND MAINTENANCE

Once operational, all Project components would operate and be monitored through IRWD's Supervisory Control and Data Acquisition (SCADA) system. Reservoir level sensors would continue to monitor water levels in the reservoir. In addition, instrumentation and monitoring systems would continuously monitor the stability of the dam and identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. Any upgrades to instrumentation and monitoring equipment would be determined during final design and may include, but are not limited to, survey monuments, inclinometers, seepage weirs, piezometers, reservoir level sensors, strong motion accelerographs, and a weather station.

Irvine Lake is generally operated in four IRWD operational modes as outlined in Table 1. Each mode has general operating parameters that allow for the safe, cost-effective operation of the lake while maximizing the potential average annual water runoff from natural storm events.

[5] Portable, tactical helicopter dip sources which provide fire crews a water source to refill the helicopters water tanks closer to the location of a wildfire.

TABLE 1
IRWD/LAKE OPERATIONAL MODES

Season	
Winter	During the Winter Mode any available rainfall is captured in the lake and stored for use. This period begins with the first rainfall event in November/December and reduces or eliminates the need to purchase untreated imported water from MWD if runoff equals or is greater than demands.
Spring	During the Spring Mode under the first option, lake storage is evaluated to determine if available runoff captured during the winter will meet demands through October 1. If additional water is needed during a dry year, untreated imported water from MWD is purchased prior to May 1. Under the second option, water is not purchased prior to the summer season.
Summer	During the Summer Mode beginning May 1, under the first option, the lake is drafted down to meet IRWD demands. Under the second option water is purchased on a month-by-month basis to meet demands, which minimizes evaporation losses applied to imported supplies.
Fall	During the Fall Mode beginning October 1, purchased untreated imported water from MWD is used to maintain the Lake at the minimum operational level while maximizing available storage. Once sufficient runoff is received to meet demands or to begin filling the lake, staff transitions to the Winter Mode.
Under some water level and rain event conditions, the spillway may be utilized to pass storm flows around the dam. When the spillway is activated, the emergency outlet valve to Santiago Creek may be opened to release water and lower the water level in the reservoir and orders for untreated imported water are ceased. Source: IRWD 2020.	

Similar to the current reservoir, operation of the proposed Project would not require daily onsite staffing but would require only periodic maintenance. Water levels at Irvine Lake would fluctuate seasonally; water would be stored in winter when water supply exceeds demand, and the reservoir would be drawn down in summer when water demand exceeds supply. However, IRWD would develop a new operating plan for Irvine Lake that would be updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time based upon a wide variety of factors, such as: seasonal storage needs, water quality considerations, and impoundment requirements based on rainfall projections.

During precipitation events, IRWD may maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify an operating strategy that would reduce the potential for utilizing the spillway and for maximizing stormwater capture. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands, and other factors as needed.

Under normal operating conditions, all flow out of the reservoir would be conveyed through inlet/outlet pipeline. In the event of an emergency or for dam safety reasons, IRWD would release water through the cone valve to the creek. IRWD Operations and Maintenance staff

would continue to conduct routine safety and security checks of the site, similar to existing protocols.

1.8.1 Additional Inundation During Operation

The Project includes raising the spillway six feet to 797.9 feet, which is 2 feet higher than the existing maximum water storage elevation with the flashboards installed (759.9 feet). Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water. Under current operations, if Irvine Lake was full and the water was conveyed to the Baker Water Treatment Plant at full production while also feeding the Howiler Water Treatment Plant, the water level in the lake would be lowered by approximately 2 feet in approximately 18 days, assuming no additional inflow into the reservoir and excluding evaporation. IRWD estimates that the upper 2 feet of the reservoir (i.e., 795.9 to 797.9 feet in elevation) could be inundated for an approximate maximum of 30 to 45 days per year but typically would be inundated less often and in some years not at all. As previously discussed, the existing lake capacity is currently approximately 24,000 AF, but it can hold an additional 2,700 AF when the flash boards are installed on the spillway. With proposed improvements, the lake would hold a maximum of 28,000 AF.

Other than raising the spillway, all other operations would remain similar to the existing operations of the dam.

1.9 REGULATORY SETTING

1.9.1 Federal

National Environmental Policy Act

The National Environmental Policy Act (NEPA) establishes a broad national framework for protecting the environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment (42 *United States Code* [USC] 4321-4347). NEPA established the U.S. Environmental Protection Agency (USEPA) with the following roles and functions: (1) to establish and enforce environmental protection standards consistent with national environmental goals; (2) to conduct research on the adverse effects of pollution and on methods and equipment for controlling it; the gathering of information on pollution; and the use of this information in strengthening environmental protection programs and recommending policy changes; (3) to assist, through grants, technical assistance, and other means, in arresting pollution of the environment; and (4) to assist the Council on Environmental Quality in developing and recommending to the President new policies for the protection of the environment.

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects plants and animals that the USFWS has listed as "Endangered" or "Threatened." A federally listed species is protected from unauthorized "take," which is defined in the FESA as acts to "harass, harm, pursue, hunt,

shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 USC Sections 1532[19] and 1538[a]). In this definition, "harm" includes "any act which actually kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife" (50 *Code of Federal Regulations* [CFR], Title 50, Section 17.3). Unless performed for scientific or conservation purposes with the permission of the USFWS, take of listed species is only permissible if the USFWS issues an Incidental Take Permit (ITP). When issuing an ITP, all federal agencies, including the USFWS, must ensure that their activities are "not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species" (16 USC 1536[a]). Enforcement of the FESA is administered by the USFWS.

The FESA also provides for designation of Critical Habitat: specific areas within the geographical range occupied by a species where physical or biological features "essential to the conservation of the species" are found and "which may require special management considerations or protection" (16 USC 1538[5][A]). Critical Habitat may also include areas outside the current geographical area occupied by the species that are nonetheless essential for the conservation of the species.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires consultation with the USFWS and the fish and wildlife agencies of States where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

Sections 404 and 401 of the Clean Water Act of 1972

Section 404 of the Clean Water Act (CWA) (33 USC 1251 et seq.) regulates the discharge of dredged or fill material into waters of the United States (WOTUS), including wetlands. The USACE is the designated regulatory agency responsible for administering the 404 permit program and for making jurisdictional determinations. This permitting authority applies to all waters of the United States where the material has the effect of (1) replacing any portion of WOTUS with dry land or (2) changing the bottom elevation of any portion of WOTUS. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in WOTUS. Dredge and fill activities are typically associated with development projects; water resource-related projects; infrastructure development; and wetland conversion to farming, forestry, or urban development.

The definition of WOTUS has been the subject of shifting regulations. Past federal revisions to regulations addressing the extent of USACE jurisdiction and the definition of WOTUS have been issued by the Obama Administration in 2015 and the Trump Administration in 2020. On January 18, 2023, the United States Environmental Protection Agency (USEPA) published a final Water Rule in the Federal Register that went into effect on March 20, 2023 ("the 2023 Rule") (USACE and USEPA 2023a).

The definition of WOTUS changed again in response to the Supreme Court decision in the case of *Sackett v. USEPA*[6]. On September 8, 2023, the USEPA and the USACE amended the Code of Federal Regulations to conform the definition of WOTUS to the Supreme Court decision (USACE and USEPA 2023b). This conforming rule amends the provisions of the agencies' definition of WOTUS that were invalid under the Supreme Court's interpretation of the CWA under *Sackett*. Based on these changes, tributaries must have at least relatively permanent flow to be considered WOTUS from the federal definition. This would exclude ephemeral drainages from being WOTUS. This represents a substantial change to areas under federal jurisdiction in the arid west. This report provides interpretations of WOTUS under the Amended 2023 Rule.

Under Section 401 of the CWA, an activity requiring a USACE Section 404 permit must obtain a State Water Quality Certification (or waiver thereof) to ensure that the activity will not violate established federal or State water quality standards. The State Water Resources Control Board (SWRCB), in conjunction with the nine California RWQCBs, is responsible for administering the Section 401 water quality certification program. The SWRCB's and RWQCB's jurisdiction also extend to all "waters of the State" when no WOTUS are present, including wetlands and non-wetland waters of the State (isolated and non-isolated). The USEPA is the federal regulatory agency responsible for implementing the CWA.

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711), as amended in 1972, makes it unlawful at any time, by any means or in any manner, unless permitted by regulations, to "pursue; hunt; take; capture; kill; attempt to take, capture, or kill; possess; offer for sale; sell; offer to barter; barter; offer to purchase; purchase; deliver for shipment; ship; export; import; cause to be shipped, exported or imported; deliver for transportation; transport or cause to be transported; carry or cause to be carried; or receive for shipment, transportation, carriage, or export, any migratory bird; any part, nest, or eggs of any such bird; or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. . . ." (16 USC 703).

The MBTA covers the taking of any nests or eggs of migratory birds, except as allowed by permit pursuant to 50 CFR, Part 21. This regulation seeks to protect migratory birds and active nests. The MBTA protects over 800 species, including geese, ducks, shorebirds, raptors, songbirds, and many relatively common species. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (50 CFR 10.13), as updated by the 1983 American Ornithologists' Union (AOU) Checklist and published supplements by the USFWS.

In 1972, the MBTA was amended to include protection for migratory birds of prey (e.g., raptors). Six families of raptors occurring in North America were included in the amendment: Accipitridae (kites, hawks, and eagles); Cathartidae (New World vultures); Falconidae (falcons and caracaras); Pandionidae (ospreys); Strigidae (typical owls); and

[6] Further discussion of this court decision is included in Appendix A of the Jurisdictional Delineation.

Tytonidae (barn owls). The provisions of the 1972 amendment to the MBTA protect all species and subspecies of these families.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668) provides for the protection of the bald eagle (*Haliaeetus leucocephalus*) and the golden eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act and strengthened other enforcement measures. A 1978 amendment authorized the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations.

The Bald and Golden Eagle Protection Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Regulations further define "disturb" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.6).

In addition to immediate impacts, this definition also covers effects that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

A 1994 Memorandum from President William Clinton to the heads of Executive Agencies and Departments established the policy concerning collection and distribution of eagle feathers for Native American religious purposes.

1.9.2 State

California Environmental Quality Act

CEQA (13 *Public Resources Code* Sections 21000 et seq.) is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. The CEQA Guidelines (14 *California Code of Regulations* [CCR] Chapter 3) are the regulations that explain and interpret the law for both public agencies and private development required to administer CEQA.

With regards to plants and animals, CEQA Guidelines Section 15380 independently defines "Endangered" and "Rare" species separately from the definitions of the California Endangered Species Act (CESA). Under CEQA, Endangered species of plants or animals are defined as those whose survival and reproduction in the wild are in immediate jeopardy, while Rare species are defined as those that (1) have such low numbers that they could become Endangered if their environment worsens or (2) are likely to become endangered within the foreseeable future (i.e., "threatened" as used in the FESA). In addition, a Lead

Agency can consider a non-listed species (e.g., species with a California Rare Plant Rank [CRPR], California Species of Special Concern, or species of Local Concern) to be treated as if it were Endangered, Rare, or Threatened for the purposes of CEQA if the species can be shown to meet the criteria in the definition of "Rare" or "Endangered" in the Project region.

The CEQA Guidelines designate certain "trustee agencies" that have jurisdiction by law over natural resources affected by a project which are held in trust for the people of California. CDFW is the trustee responsible for conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations. Trustee agencies are generally required to be notified of CEQA documents relevant to their jurisdiction, whether or not these agencies have actual permitting authority or approval power over aspects of the underlying project. CDFW shall provide the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities and shall make recommendations regarding those resources held in trust for the people of California (*California Fish and Game Code* §1802).

California Endangered Species Act

The State of California implements the CESA, which is enforced by the CDFW. While the provisions of the CESA are similar to the FESA, CDFW maintains a list of California Threatened and Endangered species, independent of the FESA Threatened and Endangered species list. It also lists species that are considered Rare and Candidates for listing, which also receive protection. The California list of Endangered and Threatened species is contained in Title 14, Sections 670.2 (plants) and 670.5 (animals) of the *California Code of Regulations*.

State-listed Threatened and Endangered species are protected under provisions of CESA. Activities that may result in take of individuals (defined in CESA as acts to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") are regulated by CDFW. While habitat degradation or modification is not included in the definition of "take" under CESA, the CDFW has interpreted "take" to include the destruction of nesting, denning, or foraging habitat necessary to maintain a viable breeding population of protected species.

If it is determined that the "take" would not jeopardize the continued existence of the species, an ITP can be issued by CDFW per Section 2081 of the *California Code of Regulations*. If a State-listed species is also federally listed, and the USFWS has issued an ITP that satisfies CDFW's requirements, CDFW may issue a consistency finding in accordance with Section 2080.1 of the *California Fish and Game Code*.

California Fish and Game Code

CDFW administers the *California Fish and Game Code*. Particular sections of the Code are applicable to natural resource management.

Native Plant Protection

Sections 1900–1913 of the *California Fish and Game Code* were developed to preserve, protect, and enhance Endangered and Rare plants in the State of California. The act requires

all State agencies to use their authority to carry out programs to conserve Endangered and Rare native plants. Provisions of the Native Plant Protection Act prohibit the taking of listed plants from the wild and require notification of the CDFW at least ten days in advance of any change in land use that would adversely impact listed plants. This allows the CDFW to salvage listed plant species that would otherwise be destroyed.

Unlawful Take or Destruction of Nests or Eggs

These sections duplicate federal protection under the MBTA. Section 3503 of the *California Fish and Game Code* makes it unlawful to take, possess, or destroy any bird's nest or any bird's eggs. Further, any birds in the orders *Falconiformes* or *Strigiformes* (i.e., birds of prey, such as hawks, eagles, and owls) and their nests and eggs are protected under Section 3503.5 of the *California Fish and Game Code*. Section 3513 of the *California Fish and Game Code* prohibits the take and possession of any migratory nongame bird, as designated in the MBTA.

California Fully Protected Species

The State of California created the "Fully Protected" classification in an effort to identify and provide additional protection to those animals that are rare or that face possible extinction. Lists were created for fish, amphibians and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under the State and/or Federal Endangered Species Acts; however, some have not been formally listed.

Various sections of the *California Fish and Game Code* provide lists of Fully Protected reptile and amphibian (§ 5050), bird (§ 3511), and mammal (§ 4700) species that may not be taken or possessed at any time, except as provided in Sections 2081.7, 2081.9, or 2835. CDFW is unable to authorize the issuance of permits or licenses to take these species, except for necessary scientific research.

Natural Communities Conservation Planning Act

The Natural Community Conservation Planning Act, codified in Sections 2800–2835 of the *California Fish and Game Code* and signed into law in October 1991, authorizes the preparation of Natural Community Conservation Plans (NCCPs). The Act is a State of California effort to protect critical vegetative communities and their dependent wildlife species. The purpose of an NCCP is to sustain and restore those species and their habitat identified by CDFW that are necessary to maintain the continued viability of those biological communities impacted by human changes to the landscape. The NCCP process provides an alternative to protecting species on a "single species basis" as in the federal and State ESAs. Under the Act, CDFW is responsible for creating process planning and conservation guidelines for NCCP programs. Local governments and landowners may then prepare the NCCPs so that they comply with the CESA.

California Fish and Game Code (Sections 1600 through 1616)

California Fish and Game Code Sections 1600 et seq. establish a process to ensure that projects conducted in and around lakes, rivers, or streams do not adversely impact fish and wildlife resources or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided.

California Fish and Game Code Section 1602 requires any person, State, or local governmental agency or public utility to notify CDFW before beginning any activity that will do one or more of the following:

- substantially obstruct or divert the natural flow of a river, stream, or lake;
- substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. CDFW's regulatory authority extends to include riparian habitat (including wetlands) supported by a river, stream, or lake regardless of the presence or absence of hydric soils and saturated soil conditions. Generally, CDFW takes jurisdiction to the top bank of the stream or to the outer limit of the adjacent riparian vegetation (outer drip line), whichever is greater. Notification is generally required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. A Section 1602 Lake or Streambed Alteration Agreement would be required if impacts to identified CDFW jurisdictional areas occur.

California Porter-Cologne Water Quality Control Act

The Porter-Cologne Act broadly defines "waters of the State" as any surface water or groundwater, including saline waters, within the boundaries of the State." In 2020, the Office of Administrative Law (OAL) began implementing the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to waters of the State. Under these new regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS, and all waters that would have been considered WOTUS under any historical definition.

Impacts to WOTUS are authorized by the RWQCBs through a Water Quality Certification per Section 401 of the CWA. Impacts to "waters of the State" that are not considered WOTUS would be authorized by Waste Discharge Requirements (WDRs) issued by the RWQCB, pursuant to California's Porter-Cologne Water Quality Control Act.

Pursuant to the California Porter-Cologne Water Quality Control Act, the SWRCB and the nine RWQCBs may require permits (known as "Waste Discharge Requirements" or WDRs) for the fill or alteration of the waters of the State. The term "waters of the State" is defined as "any

surface water or groundwater, including saline waters, within the boundaries of the state" (*California Water Code,* Section 13050[e]). The SWRCB and RWQCB have interpreted their authority to require WDRs to extend to any proposal to fill or alter waters of the State, even if those same waters are not under USACE jurisdiction. Pursuant to this authority, the State and Regional Boards may require the submission of a "report of waste discharge" under Section 13260, which is treated as an application for WDRs.

The Porter-Cologne Water Quality Control Act charges the SWRCB and the nine RWQCBs statewide with protecting water quality throughout California. Typically, the SWRCB and RWQCB act in concert with the USACE under Section 401 of the CWA in relation to permitting fill of federally jurisdictional waters. SWRCB and the RWQCBs may require permits (i.e., WDRs) for the fill or alteration of the waters of the State.

1.9.3 Regional

Central-Coastal Natural Community Conservation Plan/Habitat Conservation Plan

On August 30, 1991, the State Fish and Game Commission considered a petition in support of listing the coastal California gnatcatcher (*Polioptila californica californica*). The Commission decided not to list the coastal California gnatcatcher as an Endangered species in favor of pursuing preparation of a NCCP program as proposed by Assembly Bill (AB) 2172 (AB 2172/Natural Community Conservation Planning Act). AB 2172 authorized CDFW[7] to enter into agreements with any person for the purpose of preparing and implementing NCCPs and to prepare guidelines for development and implementation of NCCPs. AB 2172 also permits NCCPs to be prepared by local, State, or federal agencies independently or in cooperation with other persons and requires CDFW to be compensated for costs incurred in preparing and implementing NCCPs.

The purpose of the NCCP program is to provide regional or area wide protection and perpetuation of natural wildlife diversity while allowing compatible and appropriate development and growth. AB 2172 was designed in recognition of the fact that individual species protection under the state Endangered Species Act and the federal Endangered Species Act (FESA) is costly and historically ineffective as a mechanism for protection or prevention of extinction of plant and wildlife species, and that a habitat-based, multispecies or ecosystem-driven preservation approach has greater potential for long-term success. The focus of the NCCP program represents a dramatic shift from "individual species" to "habitat".

On March 25, 1993, the U.S. Department of the Interior listed the coastal California gnatcatcher as a "Threatened" species and adopted a special rule in accordance with Section 4(d) of the FESA that authorized landowners and local jurisdictions to voluntarily participate in the State of California NCCP Act of 1992.

The County of Orange, in conjunction with the state and federal resource agencies, local jurisdictions, utility companies (including IRWD), the Transportation Corridor Agencies, and major private landowners, prepared the NCCP/HCP for the Central–Coastal NCCP Subregion

[7] The California Department of Fish and Wildlife (CDFW) was formerly known as the California Department of Fish and Game (CDFG).

(NCCP/HCP approved on April 16, 1996, and Implementation Agreement [IA] executed on July 17, 1996). The plan is intended to ensure the long-term survival of the coastal California gnatcatcher and other special status coastal sage scrub-dependent plant and wildlife species while allowing for reasonable economic growth in accordance with state-sanctioned NCCP program guidelines. The Project occurs within the NCCP Central/Coastal Subregion.

The Habitat Reserve includes core habitat along the frontal slopes of the Lomas de Santiago and provides high densities of NCCP target species, including coastal California gnatcatcher and coastal cactus wren (*Campylorhynchus brunneicapillus couesi*). In addition, the Habitat Reserve provides linkages with other core habitat areas via a long strip of natural habitat between Portola Parkway and the Foothill Transportation Corridor, and other large blocks of core habitat in the vicinity of the frontal slopes of the Lomas de Santiago, including Syphon Reservoir and Rattlesnake Reservoir. The Habitat Reserve supports the largest subpopulation of coastal California gnatcatchers in the Central Subarea of the NCCP Central/Coastal Subregion Reserve System Design for Orange County (County of Orange 1996a).

The County of Orange has been issued a 10(a) permit as part of the approval of the NCCP/HCP which authorizes the "take" of coastal sage scrub and other specified habitats (e.g., oak woodland, cliff and rock, Tecate cypress) and provides regulatory coverage for a number of "Covered Species". Potential direct and indirect impacts are fully mitigated through the County's participation and contribution in the NCCP/HCP Mitigation Program. The participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other special status species designated as Covered Species by the NCCP/HCP. Mitigation measures outlined in the NCCP/HCP Mitigation Program are summarized below:

1. *Creation of a Habitat Reserve System that will include coastal sage scrub and representative habitat of virtually all of the major habitat types currently existing within the Central/Coastal Subregion;*
2. *Creation and funding of an NCCP Non-Profit Corporation to coordinate management of the Reserve System;*
3. *Designation of Special Linkage Areas and Existing Use Areas to enhance biological connectivity within the Reserve System and Central/Coastal Subregion;*
4. *Implementation of the Adaptive Management Program, including specific management plans, defined by the NCCP/HCP, within the Reserve System, including provisions for restoration and enhancement funded both by Participating Landowners and Non-Participating Landowners as provided herein.*

2.0 METHODS

This section summarizes survey methods used to conduct biological surveys for the Project. The Biological Study Area (BSA) discussed in this report generally includes the area around Santiago Creek Dam and Irvine Lake. Initial work (spring/summer 2020) was focused north (downstream) of the dam structure in a Project study area provided by IRWD. The BSA was expanded in fall 2020 to south (upstream) of the dam, including the entirety of Irvine Lake, in order to assess potential effects related to raising the spillway and additional staging/access areas in Oak Park. The BSA was developed by adding a 250-foot buffer around the 797.9-foot elevation contour. Where the buffer did not include the 811.9-foot contour, the BSA was extended 50-feet beyond the 811.9-foot contour.[8] However, the BSA was truncated at the ridgeline adjacent to Irvine Lake and at Santiago Canyon Road because indirect effects (e.g., noise) would not be expected to extend over the ridgeline. This BSA allows for an assessment of indirect impacts of inundation effects and construction activities on surrounding habitat (Exhibit 3).

The focused surveys that Psomas conducted in spring/summer 2020 were limited to the area downstream of the dam, while the focused surveys conducted in spring/summer 2022 were generally conducted upstream of the dam. The survey area for each species varied depending on target habitat and details of each species protocol. Vegetation mapping and the jurisdictional delineation were conducted throughout the BSA. It should be noted that when the term "survey area" is used, it does not refer to the entire BSA.

2.1 LITERATURE REVIEW

Prior to the start of surveys, Psomas conducted a literature search to identify special status plants, wildlife, and habitats reported from the vicinity of the BSA. The literature review was updated prior to the 2022 focused surveys and again as documentation was completed; the most recent citation is given below. The BSA region is generally defined as the Central Subregion of the NCCP/HCP. Psomas reviewed the following sources of information:

- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2025a)
- The California Native Plant Society's (CNPS') Inventory of Rare and Endangered Plants (CNPS 2025)
- CDFW's *Natural Communities List* (CDFW 2025b), *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c), and *Special Animals* List (CDFW 2025d)
- Jepson eFlora (Jepson Flora Project 2024)
- County of Orange *Natural Community Conservation Plan and Habitat Conservation Plan* (County of Orange 1996a) and *Implementation Agreement* (County of Orange 1996b)

[8] The study area extended to the elevation of the dam crest (811.9 feet) because the impact boundary had not yet been developed when the surveys began.

- USFWS Information for Planning and Consultation (IPAC) Database (USFWS 2025, Appendix B)

2.2 VEGETATION MAPPING AND GENERAL SURVEYS

Psomas Senior Biologist Allison Rudalevige performed a general survey and vegetation mapping north (downstream) of the dam on February 25, 2020. Ms. Rudalevige and Psomas Senior Biologist Lindsay Messett performed a general survey and vegetation mapping south (upstream) of the dam on September 16 and 17, 2020. Psomas mapped vegetation in the field on an aerial photograph at a scale of 1-inch equals 175-feet (1″=175′) downstream of the dam and 1-inch equals 275 feet (1″ = 275′) upstream of the dam. Psomas used a boat for navigable access in order to map the vegetation along the northern portion of Irvine Lake. Psomas mapped vegetation along the southern portion of Irvine Lake and upstream into Santiago Creek on foot. Psomas used binoculars to map vegetation that was inaccessible due to steep topography or due to access issues.

Nomenclature of vegetation types generally follows Gray and Bramlet (1992) but is cross-referenced to *A Manual of California Vegetation* (CNPS 2024), which is the most current vegetation classification system used by CDFW for assessing sensitive natural communities (CDFW 2025b). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c) for special status species and the Jepson eFlora (Jepson Flora Project 2024) for all other taxa. Representative photographs of the BSA are included in Appendix C.

Psomas biologists documented all plant and wildlife species detected during the survey in field notes and they are listed in Appendix D. Psomas conducted active searches for reptiles and amphibians that included lifting, overturning, and carefully replacing rocks and debris. Psomas identified birds by visual and auditory recognition. Psomas conducted surveys for mammals during the day and included searching for and identifying diagnostic signs, including scat, footprints, scratch-outs, dust bowls, burrows, and trails. Taxonomy and nomenclature for wildlife follows the *Special Animals List* (CDFW 2025d) for special status species and, for other species, Crother (2017) for amphibians and reptiles, the American Ornithological Society (AOS 2024) for birds, and the Smithsonian National Museum of Natural History (SNMNH 2011) for mammals.

2.3 FOCUSED SURVEYS

2.3.1 Special Status Plant Species

Psomas conducted the botanical surveys consistent with the protocols created by CDFW (2018); therefore, the surveys were floristic in nature. Psomas conducted a literature search prior to both the 2020 and 2022 field surveys to identify special status plant species reported from the vicinity of the BSA. The literature search was updated as technical documentation was updated. Sources reviewed include the USGS's Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2025) and CDFW's CNDDB (CDFW 2025a).

Many annual and perennial herb species' germination capability are dependent on receiving a certain amount of rainfall in the winter and spring. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The region received approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches. Therefore, rainfall was considered within normal ranges and conditions should have been adequate for germination of most plant species.

Additionally, reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive (Table 2). This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable in the BSA. Reference populations were not monitored for species with a CRPR of 3 or 4, large perennials (e.g., Tecate cypress [*Hesperocyparis forbesii*] and chaparral nolina [*Nolina cismontana*]), which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

TABLE 2
REFERENCE POPULATIONS MONITORED IN THE PROJECT REGION

Species	Date Observed	Location	Phenology
Brodiaea filifolia thread-leaved brodiaea	May 15, 2020	San Clemente	in bloom
Calochortus weedii var. *intermedius* intermediate mariposa lily	June 1, 2020 May 12, 2022	Peters Canyon Regional Park Santiago Canyon vicinity	in bloom early bloom
Dudleya multicaulis many-stemmed dudleya	April 12, 2017 April 27, 2022	City of Orange Santiago Canyon vicinity	Vegetative in bloom
Pseudognaphalium leucocephalum white rabbit-tobacco	September 8, 2022	San Juan Capistrano	in bloom

Surveys downstream of the dam were conducted on April 30, May 21, and June 4, 2020, by Psomas Senior Biologist Allison Rudalevige. The total number of person-hours spent surveying was approximately 15.75 hours. The 2020 plant survey area included the portion of the BSA located downstream of the dam. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area.

Surveys upstream of the dam were conducted on March 24, 2022, by Ms. Rudalevige; on April 25, 26, and 28, 2022, by Ms. Rudalevige and Consulting Botanist Sandra Leatherman; on May 23 and 26 by Ms. Rudalevige and Psomas Biologist Erin Ruckman; and on September 13, 2022, by Ms. Rudalevige and Psomas Biologist Sarah Thomas. The total number of person-hours spent surveying was approximately 87.75 hours. The special status plant survey area included all project impact areas upstream, of the dam (i.e., permanent, temporary, and additional inundation areas) plus a 50-foot buffer. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. Inaccessible areas (e.g., steep cliffs), were observed remotely with binoculars.

All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified to the taxonomic level necessary to determine whether they were a special status species. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2024), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c) for special status species and the Jepson eFlora (Jepson Flora Project 2024) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software or with a handheld Garmin Global Positioning System (GPS) unit. Data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species). The results of the special status plant survey efforts are included as Appendix E.

2.3.2 Quino Checkerspot Butterfly

Psomas conducted Quino checkerspot butterfly surveys following guidelines from the USFWS Survey Protocol (USFWS 2014) to maximize detection of adults during the flight season. Per the USFWS protocol, surveys consist of an initial site assessment to determine if the Project site contains areas recommended for Quino checkerspot butterfly surveys. If the Project site is determined to be comprised solely of excluded areas (described below), Quino checkerspot butterfly surveys are not recommended. If a Project site has areas suitable for butterfly surveys (non-excluded areas), then surveys should be conducted in those portions of the Project site. Per USFWS protocol, Psomas completed five weekly focused surveys beginning the third week of February and continuing into March.

All areas within 50-feet of the proposed impact footprint (including additional inundation areas) were included in the site assessment. The site assessment was conducted prior to the first focused butterfly survey to identify which portions of the Project site provide suitable habitat for Quino checkerspot butterfly. The assessment was conducted by Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) on February 15 and 16, 2022.

Per the USFWS protocol, orchards, developed areas, or small in-fill parcels (plots smaller than one acre that are completely surrounded by urban development) largely dominated by non-native vegetation, active/in-use agricultural fields, closed-canopy forests or riparian areas, dense chaparral, and small openings (less than one acre) completely enclosed within dense chaparral, were considered unsuitable and designated as “excluded areas”. Areas outside of excluded areas, regardless of the presence/absence of host plants and nectar sources, were considered potential habitat areas.

All areas that were not excluded were surveyed for Quino checkerspot butterfly, regardless of host plant presence, absence, and/or density. The Quino checkerspot butterfly is generally associated with sage scrub, open chaparral, grasslands, and vernal pools. Within these communities, they are usually observed in open or sparsely vegetated areas (including trails and dirt roads), on hilltops, and on ridgelines.

The survey area contained approximately 308 acres of suitable habitats that could not be excluded per USFWS protocol; two days were required to complete each survey visit. The survey visits were divided into two areas (i.e., upstream of Santiago Creek Dam and downstream of Santiago Creek Dam). Ms. Messett conducted five rounds of focused survey visits in the survey areas during the 2022 flight season. Surveys were conducted once per week (weather permitting) on non-consecutive days during the peak of the flight season on February 18, 19, 25, 27; March 3, 4, 10, 11, 17, and 18, 2022. Table 3 below summarizes the survey conditions during each of the ten surveys.

TABLE 3
SUMMARY OF QUINO CHECKERSPOT BUTTERFLY SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Surveyor	Weather Conditions		
					Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Creek Dam	February 18, 2022	0900/1500	Messett	62/70	0–1/2–5	Clear/Clear
1	Upstream of Santiago Creek Dam	February 19, 2022	0930/1530	Messett	60/70	0–1/4–6	25/20
2	Downstream of Santiago Creek Dam	February 25, 2022	1000/1600	Messett	60/63	2–3/5–7	Clear/Clear
2	Upstream of Santiago Creek Dam	February 27, 2022	1000/1545	Messett	61/70	0–1/5–6	10/10
3	Upstream of Santiago Creek Dam	March 3, 2022	0930/1555	Messett	62/67	1–2/8–10	50/30
3	Downstream of Santiago Creek Dam	March 4, 2022	0915/1530	Messett	63/65	0–1/2–5	50/50
4	Upstream of Santiago Creek Dam	March 10, 2022	0845/1550	Messett	63/71	2–3/4–6	30/Clear
4	Downstream of Santiago Creek Dam	March 11, 2022	0815/1530	Messett	68/74	3–4/6–8	Clear/Clear
5	Upstream of Santiago Creek Dam	March 17, 2022	0930/1600	Messett	65/80	0–1/2–5	25/30
5	Downstream of Santiago Creek Dam	March 18, 2022	0900/1515	Messett	68/74	1–2/4–6	Clear/Clear

Surveys focused on likely breeding areas (host plant patches), feeding areas (nectaring plant patches), and topographical features conducive to detecting the Quino checkerspot butterfly

(ridgelines, hilltops, rock outcrops, dirt roads, and open ground with clay soils). Survey areas were walked at an average rate of 10 to 15 acres per hour. Binoculars were used to identify the majority of butterfly species that could not be seen at close range. General survey forms were filled out for each survey, noting weather conditions, survey date, start and end times, and nectaring sources in bloom.

The results of the Quino checkerspot surveys are included in Appendix F.

2.3.3 Crotch's Bumble Bee

In June 2023, the California Department of Fish and Wildlife (CDFW) issued survey guidelines for Candidate bumble bee species recommending at least three visual surveys conducted two to four weeks apart during the appropriate Colony Active Period (April to August for Crotch's bumble bee) to ensure the highest probability of detecting the species (CDFW 2023). Surveys must be conducted at a rate of three acres per hour within optimal habitat by a qualified Biologist (i.e., one with appropriate permits and experience in the identification of bee species). Psomas Senior Biologist Lindsay Messett (Scientific Collecting Permit [SCP]; 182810004-20009-001[9]) conducted all focused surveys for Crotch's bumble bee. The survey included all suitable foraging and potential nesting habitats for the Crotch's bumble bee in the survey area. Surveys were conducted on June 20 and 21; July 16 and 17; and August 5 and 6, 2024. A summary of weather conditions during each survey is provided in Table 4.

Ms. Messett conducted the surveys by walking meandering transects, slowly across the survey area, through all appropriate habitats, to obtain a 100 percent survey cover. The surveys were paced at approximately three acres per hour in optimal habitats but were more quickly paced in areas lacking available nectar sources. Ms. Messett scanned for bee activity on the ground and spent additional time at any flowering plants to look for foraging bees. Potential nest sites (e.g., forest edges, unmowed areas, and cavities such as mammal burrows) were inspected with binoculars for evidence of bumble bee use. If multiple exiting/entering bumble bees were observed at a cavity, further observation was made until nesting could be confirmed (e.g., multiple individuals entering the cavity).

Surveys were non-lethal (capture, photograph, release) and were conducted in accordance with the CDFW Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023) and authorizations in Ms. Messett's SCP and MOU issued by CDFW. All bumble bees observed were captured using a butterfly net. Bees were carefully transferred to a clear, plastic vial and placed in a cooler with ice to chill. Once the bees were cooled, they were removed from the vial and photographed. Photographs focused on specific identifiable areas of the bees (i.e. the top of the abdomen, side of the thorax and abdomen, and the front and side views of the head). The bees were processed within 15 minutes of capture and were released within 100 feet of the capture site. Bumble bee species were identified by Ms. Messett using *Bumble Bees of North America: An Identification Guide* (Williams *et al.* 2014). Photographs of the bumble bees observed during the surveys were

[9] Lindsay Messett's SCP includes a MOU to allow her to capture and handle Crotch's bumble bee according to the survey guidelines.

also provided to taxonomist Dr. Keng-Lou James Hung, PhD (University of Oklahoma) to confirm species identification.

TABLE 4
SUMMARY OF CROTCH'S BUMBLE BEE SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Acres Surveyed (acres)	Surveyor	Weather Conditions		
						Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Creek Dam	June 20, 2024	9:00 AM/ 3:00 PM	15	Messett	66/80	1–1/1–2	0/0
1	Upstream of Santiago Creek Dam	June 21, 2024	8:10 AM/ 3:55 PM	35	Messett	68/76	0–1/4–5	0/0
2	Downstream of Santiago Creek Dam	July 16, 2024	9:00 AM/ 2:50 PM	15	Messett	68/81	0–1/3–4	10/0
2	Upstream of Santiago Creek Dam	July 17, 2024	8:00 AM/ 3:45 PM	35	Messett	71/80	1–2/1–2	75/30
3	Downstream of Santiago Creek Dam	August 5, 2024	9:00 AM/ 12:50 PM	15	Messett	80/92	1–2/1–2	0/0
3	Upstream of Santiago Creek Dam	August 6, 2024	8:25 AM/ 2:45 PM	35	Messett	71/80	0–1/1–2	0/0

°F: Fahrenheit; mph: miles per hour; %: percent.

The results of the Crotch's bumble bee surveys are included in Appendix G.

2.3.4 Western Spadefoot

There is currently no standardized survey protocol in place for this species. Survey methods were based on the biology of the western spadefoot and survey protocols for other currently listed anurans (i.e., frogs and toads) to maximize the likelihood of detection.

Focused surveys for this species were conducted throughout the BSA in spring 2025. Three surveys have been conducted, with one in February, one in March, and one in April. Each of the surveys was conducted within three days following rain events. These surveys included diurnal and nocturnal components to search for the presence of egg masses, tadpoles, and adults. The diurnal portion of the survey focused on searches for the presence of egg masses and tadpoles. Nocturnal surveys focused on searches for active juveniles and calling adults. Flashlights and headlamps were used at night to search for and visually identify any toads detected. Because spadefoots can be sensitive to sounds and light, the Biologists stopped and remained still for extended periods to listen for calls.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for western spadefoot in the BSA. Mr. Aguayo and Ms. Messett conducted focused surveys for the western spadefoot on February 14; March 13; and April 4, 2025, during favorable weather conditions conducive to good toad activity. The dates and weather conditions during each survey are provided in Table 5.

TABLE 5
SUMMARY OF SURVEY CONDITIONS FOR
WESTERN SPADEFOOT SURVEYS

Survey Number	Date	Time (Start/End)	Biologists	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1 (Day)	February 14, 2025	2:52 PM–6:03 PM	Aguayo Messett	58/54	7/6	70/60
1 (Night)	February 14, 2025	6:37 PM–8:56 PM	Aguayo Messett	53/52	5/3	50/40
2 (Day)	March 13, 2025	3:58 PM–7:12 PM	Aguayo Messett	52/49	13/11	60/70
2 (Night)	March 13, 2025	7:56 PM–9:55 PM	Aguayo Messett	48/47	9/5	70/80
3 (Day)	April 4, 2025	4:09 PM–7:18 PM	Aguayo Messett	67/61	8/4	10/0
3 (Night)	April 4, 2025	7:59 PM–10:34 PM	Aguayo Messett	59/53	3/2	0/0

°F: Fahrenheit; mph: miles per hour; %: percent; nr: not recorded

The focused survey report documenting the results of these surveys is in preparation.

2.3.5 Arroyo Toad

USFWS survey protocol for the arroyo toad requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad (*Anaxyrus californicus*) egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population was documented, recorded with a GPS unit, and mapped on an aerial photograph. The number of individuals were noted on each subsequent visit, and data were collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the survey methodology described above. The 2020 survey area included all suitable habitat downstream of the dam along Santiago Creek, extending 0.62 mile (1 kilometer) downstream of the BSA, which included a tributary from Fremont Canyon. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on April 17 and 24; May 15 and 22; and June 12 and 19, 2020. The 2022 survey area included all suitable habitat along Santiago Creek upstream of the dam. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on March 25; April 1 and 8; May 27; and June 10 and 23, 2022.

Diurnal surveys were conducted from approximately 4:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles; breeding and/or calling adults in potentially suitable breeding locations along the creek; and foraging individuals in the adjacent riparian and upland areas. Mr. Aguayo and Ms. Messett moved in an upstream direction during the surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour). Surveys were not scheduled on nights with a full or nearly full moon because arroyo toad activity is lower on these nights due to higher predation risk. Survey dates, times, and weather data are shown in Table 6. Survey conditions and results were documented in field notes.

TABLE 6
SUMMARY OF SURVEY DATA AND CONDITIONS
FOR ARROYO TOAD SURVEYS

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
2020 Surveys									
1	4/17/2020	Diurnal	Aguayo, Messett	5:00 PM–7:20 PM	6–7	4–5	63	60	70%
		Nocturnal		8:15 PM–10:20 PM	4–5	4–5	59	57	50%
2	4/24/2020	Diurnal	Aguayo, Messett	4:50 PM–7:10 PM	6–7	4–5	93	86	40%
		Nocturnal		8:15 PM–10:15 PM	3–4	3–4	82	79	70%
3	5/15/2020	Diurnal	Aguayo, Messett	5:15 PM–7:40 PM	4–5	0–1	73	68	clear
		Nocturnal		8:30 PM–10:20 PM	0–1	2–3	66	64	clear
4	5/22/2020	Diurnal	Aguayo, Messett	5:25 PM–7:20 PM	4–5	3–4	70	64	clear
		Nocturnal		8:30 PM–10:15 PM	2–3	2–3	61	59	clear
5	612/2020	Diurnal	Aguayo, Messett	5:35 PM–7:40 PM	2–3	4–5	73	64	clear
		Nocturnal		8:40 PM–10:30 PM	3–4	1–2	63	61	clear

TABLE 6
SUMMARY OF SURVEY DATA AND CONDITIONS
FOR ARROYO TOAD SURVEYS

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
6	6/19/2020	Diurnal	Aguayo, Messett	5:40 PM–7:45 PM	3–4	4–5	72	67	clear
		Nocturnal		8:40 PM–10:20 PM	4–5	4–5	63	62	clear
2022 Surveys									
1	3/25/2022	Diurnal	Aguayo, Messett	4:20 PM–6:55 PM	6	4	75	71	30–20%
		Nocturnal		7:42 PM–10:48 PM	4	3	69	58	10%
2	4/1/2022	Diurnal	Aguayo, Messett	3:45 PM–7:07 PM	4	8	69	59	clear
		Nocturnal		8:10 PM–10:49 PM	6	3	57	53	clear
3	4/8/2022	Diurnal	Aguayo, Messett	3:54 PM–7:16 PM	8	4	94	81	20%–clear
		Nocturnal		8:10 PM–10:36 PM	4	3	78	72	clear
4	5/27/2022	Diurnal	Aguayo, Messett	4:40 PM–7:43 PM	6	6	68	61	40%
		Nocturnal		8:39 PM–10:55 PM	5	4	60	57	50%
5	6/10/2022	Diurnal	Aguayo, Messett	4:50 PM–7:52 PM	7	5	80	71	clear
		Nocturnal		8:33 PM–10:42 PM	4	3	68	63	clear
6	6/23/2022	Diurnal	Aguayo, Messett	4:48 PM–7:04 PM	7	5	87	82	clear
		Nocturnal		8:42 PM–10:39 PM	3	1	76	70	clear

°F: degrees Fahrenheit.

The results of the arroyo toad surveys are included in Appendix H.

2.3.6 Southwestern Pond Turtle

2.3.6.1. Visual Survey

There is currently no standardized USFWS protocol in place for the southwestern pond turtle; therefore, surveys generally followed the Visual Survey Protocol for the Southcoast Ecoregion (USGS 2006a). Survey methods were focused on the detection of southwestern pond turtle adults and juveniles through visual observation; the visual surveys did not include dip netting or seining. Any southwestern pond turtles observed would have been documented and recorded using a Global Positioning System (GPS) or iPad to map the location on an aerial photograph.

Psomas Senior Biologist Jonathan Aguayo conducted visual surveys across all potentially suitable habitats for the southwestern pond turtle within the BSA. He walked slowly up the stream channel, either in the water or immediately adjacent to the water, visually searching for pond turtles with and without binoculars, concentrating on pools, surface water, banks, and suitable basking sites within the BSA. He searched aquatic habitat with and without

binoculars for the presence of basking or underwater pond turtles. He observed open pools or possible basking areas from a distance and then approached slowly and quietly to help prevent disturbing basking turtles. He listened for the splash of water, which could indicate possible unseen turtles entering the water. If a splash was heard, he spent additional time observing the area for a turtle to resurface. Visual surveys were performed on August 20 and 30, 2024, during weather conditions favorable for turtle activity (Table 7).

TABLE 7
SUMMARY OF SURVEY CONDITIONS FOR
SOUTHWESTERN POND TURTLE VISUAL SURVEYS

Survey Number	Date	Time (Start/End)	Biologist	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	August 20, 2024	8:00 AM/2:30 PM	Aguayo	72/96	2/6	0/0
2	August 30, 2024	9:20 AM/3:40 PM	Aguayo	67/81	1/5	80/0

°F: Fahrenheit; mph: miles per hour; %: percent.

Turtle Trapping

Trapping surveys follow the methodology outlined in the Western Pond Turtle Trapping Survey Protocol for the Southcoast Ecoregion (USGS 2006b). A five-day/four-night trapping program was conducted in August 2024. Nylon mesh hoop traps and floating basking traps were placed in suitable locations in Irvine Lake, baited with cans of sardines in oil to attract turtles. Traps were set near habitat features likely to be used by pond turtles (possible basking areas, areas with underwater refugia). The hoop traps measured 2.5 feet in diameter by 6 feet long with 1-inch square mesh and featured a one-way funnel entrance. Floating basking traps measured 20 inches wide by 28 inches long and 13 inches deep, with two 13-inch wings. Both hoop and basking traps were equipped with floats and securely fastened to immovable objects to prevent submersion to allow for captured turtles (and other animals) to surface for air.

Traps were left in place for a maximum of 24 hours before being checked by Biologists to retrieve captured turtles and other aquatic species (e.g. fish, frogs, invertebrates). General weather data (i.e., ambient air temperature, sky conditions, wind speed) and water temperature were recorded at the start and end of each trapping session. Two trapping sessions, one on the west side of Irvine Lake and another on the east side of Irvine Lake, were required to adequately cover Irvine Lake. As described above, Santiago Creek was surveyed visually because it was not deep enough for trap placement.

Mr. Aguayo (Scientific Collecting Permit [SCP] ID: S-190310010-20076-001) and Senior Biologist Lindsay Messett (SCP ID: S-182810004-20009-001) were the Principal Investigators for the trapping sessions, with assistance from Psomas Biologists Trevor Bristle, Jack Underwood, Cristina Juran, and Tyler Glaser. Both Mr. Aguayo and Ms. Messett are knowledgeable about the southwestern pond turtle and hold the necessary CDFW

authorization to trap and handle the species. All traps were tagged with Mr. Aguayo's CDFW SCP number, under which the live trapping was conducted.

Trapping sessions were conducted from August 19–23, 2024, on the west side of Irvine Lake and from August 26–30, 2024, on the east side of Irvine Lake. Surveys were conducted during weather conditions favorable for turtle activity (Table 8). A total of 24 hoop traps and 3 basking traps were set in Irvine Lake. Trap locations were selected based on suitable habitat with traps spaced 820 feet (i.e., 250 meters) apart. The number of traps set was proportionate to the overall size of the lake.

TABLE 8
SUMMARY OF SURVEY DATA AND CONDITIONS
FOR SOUTHWESTERN POND TURTLE TRAPPING

Survey Number	Survey Date	Surveying Biologists	Start/End Time	Water Temperature (°F)		Wind (mph)		Temperature (°F)		Cloud Cover (%)
				Start	End	Start	End	Start	End	
West Side of Irvine Lake										
1	8/19/2024	Aguayo, Bristle	9:36 AM/3:33 PM	81.2	84.0	2	6	72	89	0
2	8/20/2024	Messett, Bristle	8:00 AM/10:35 AM	80.5	81.6	1	1	65	87	0
3	8/21/2024	Messett, Bristle	7:00 AM/11:00 AM	79.6	Thermometer broke	1	1	64	86	0
4	8/22/2024	Aguayo, Bristle	7:15 AM/10:25 AM	78.5	80.1	1	1	60	77	0
5	8/23/2024	Aguayo, Messett, Underwood	6:48 AM/10:56 AM	79.7	80.2	4	7	62	75	100
East Side of Irvine Lake										
1	8/26/2024	Aguayo, Bristle, Juran	7:58 AM/9:08 AM	79.2	81.3	1	2	64	88	0
2	8/27/2024	Aguayo, Bristle	7:08 AM/9:08 AM	78.9	79.2	1	2	62	70	0
3	8/28/2024	Aguayo, Bristle	6:52 AM/9:05 AM	78.5	79.0	2	3	61	70	100
4	8/29/2024	Aguayo, Bristle	6:42 AM/8:49 AM	78.8	79.2	1	1	60	65	100
5	8/30/2024	Aguayo, Bristle, Glaser	6:37 AM/9:25 AM	78.8	78.6	2	3	60	68	100

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

The results of the southwestern pond turtle surveys are included as Appendix I.

2.3.7 Coastal California Gnatcatcher

USFWS survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6:00 AM and 12:00 PM, and no more than 100 acres of suitable habitat may be surveyed per visit.

Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) conducted all focused surveys for coastal California gnatcatcher. The 2020 survey area for the gnatcatcher surveys included all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, and disturbed floodplain sagebrush scrub) downstream of the dam and within a 500-foot buffer around the tentative impact footprint. The 2022 survey area for the gnatcatcher surveys includes all suitable habitat upstream of the dam in the BSA. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake). The 2020 surveys were conducted on April 30, May 27, and June 25, 2020. The 2022 surveys were conducted on March 25, April 4, and June 9, 2022.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [°F]), too hot (i.e., above 95°F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. A summary of weather conditions during each survey is provided in Table 9, below. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and "pishing" sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and "pishing" varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions.

TABLE 9
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
COASTAL CALIFORNIA GNATCATCHER SURVEYS

Survey Number	Date	Time (Start/End)	Surveyor	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
2020 Surveys						
1	April 30, 2020	7:15 AM–10:30 AM	Messett	65/70	0–1/0–1	100/50
2	May 27, 2020	8:15 AM–11:40 AM	Messett	65/76	0–1/0–1	10/Clear
3	June 25, 2020	6:50 AM–10:00 AM	Messett	68/77	0–1/0–1	90/40
2022 Surveys						
1	March 25, 2022	0700/1300	Messett	55/83	0–1/1–2	100/Clear
2	April 14, 2022	0730/1200	Messett	55/69	0–1/4–5	Clear/20
3	June 9, 2022	0700/1155	Messett	62/76	1–2/3–4	100/Clear

°F: degrees Fahrenheit; mph: miles per hour; %: percent

The results of the coastal California gnatcatcher surveys are included as Appendix J.

2.3.8 Least Bell's Vireo/Southwestern Willow Flycatcher

USFWS protocol for the least Bell's vireo (*Vireo bellii pusillus*) requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). The USFWS protocol for the southwestern willow flycatcher requires a total of five surveys, with the first survey conducted between May 15 and May 31; the second and third surveys between June 1 and June 24; and the fourth and fifth surveys between June 25 and July 17 (Sogge et al. 2010).

Psomas Senior Biologist Lindsay Messett conducted all 2020 focused surveys for least Bell's vireo downstream of the dam. The 2020 survey area for the least Bell's vireo surveys included all suitable habitat (i.e., southern willow scrub and mule fat scrub) downstream of the dam and within a 500-foot buffer north of the BSA along Santiago Creek. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake). Surveys were conducted on April 30, May 12 and 27, June 9, and 25, and July 6, 17, and 28, 2020.

Psomas Senior Biologist Jonathan Aguayo (USFWS Permit No. TE 96514A-3) conducted all focused surveys for least Bell's vireo and southwestern willow flycatcher upstream of the dam. Because the survey area contained more than 80 acres of suitable habitat, 2 days were required to cover the entire survey area for each of the 8 visits. Mr. Aguayo conducted focused surveys for the least Bell's vireo on April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Focused surveys for southwestern willow flycatcher were conducted on May 25 and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Per guidance issued from the USFWS, focused surveys for least Bell's vireo and southwestern willow flycatcher were not conducted concurrently. During the last five surveys, surveys were conducted for southwestern willow flycatcher first; surveys for least Bell's vireo followed (described below).

As mentioned above, the surveys were conducted sequentially, with surveys for the southwestern willow flycatcher conducted first (i.e., first thing in the morning) and surveys for the least Bell's vireo conducted afterwards. The survey area was split into two mainly linear routes; therefore, southwestern willow flycatchers were surveyed from the starting point to the end, and least Bell's vireos were surveyed on the way back. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird). A complete list of wildlife species observed during the surveys is included in Appendix D.

Ms. Messett and Mr. Aguayo systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from any potentially territorial southwestern willow flycatchers. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos or southwestern willow flycatchers detected were recorded

with a GPS unit (Garmin Vista) or an iPad. Because of the high density of least Bell's vireos in the survey area upstream of the dam, great care was taken in the field to verify that adjacent territories were occupied by distinct males. Although not required during a presence/absence survey, time was also taken to visually observe any individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions and during early morning hours when bird activity is at its peak (Table 10). It should be noted that the timing of a few of the 2020 surveys began later because on these mornings, Ms. Messett was surveying for coastal California gnatcatcher in the adjacent upland habitat. If a least Bell's vireo was singing during the gnatcatcher survey, Ms. Messett likely would have heard it in the adjacent riparian habitat. As mentioned above, the 2022 surveys were conducted sequentially, with surveys for the southwestern willow flycatcher conducted first (i.e., first thing in the morning) and surveys for the least Bell's vireo conducted afterwards. The survey area was split into two mainly linear routes; therefore, southwestern willow flycatchers were surveyed from the starting point to the end, and least Bell's vireos were surveyed on the way back. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird [*Molothrus ater*]).

TABLE 10
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
LEAST BELL'S VIREO SURVEYS

Survey Number	Survey Dates	Surveyors	Time	Air Temperature (°F) (Start/End)		Cloud Cover (Start/End)	Wind (mph) (Start/End)
2020 Surveys							
1	April 30	Messett	10:00 AM – 11:30 AM	71	75	50/Clear	0–1/0–1
2	May 12	Messett	7:30 AM – 11:00 AM	61	69	10/80	0–1/0–1
3	May 27	Messett	6:30 AM – 8:15 AM	65	76	10/Clear	0–1/0–2
4	June 9	Messett	6:50 AM – 10:45 AM	70	91	Clear/Clear	0–1/1–2
5	June 25	Messett	10:00 AM – 11:40 AM	68	77	90/40	0–1/0–1
6	July 6	Messett	6:45 AM – 10:30 AM	68	83	10/Clear	0–1/1–3
7	July 17	Messett	7:00 AM – 10:10 AM	67	74	100/Clear	0–1/0–1
8	July 28	Messett	6:40 AM – 10:25 AM	65	70	Clear/Clear	0–1/1–2
2022 Surveys							
1A	April 13, 2022	V	6:10 AM–11:00 AM	43	61	0/0	2–4
1B	April 14, 2022	V	6:12 AM–11:00 AM	45	63	0/0	1–5
2A	April 24, 2022	V	5:55 AM–11:00 AM	54	79	0/0	3–7
2B	April 25, 2022	V	6:02 AM–11:00 AM	57	83	0/0	2–6
3A	May 12, 2022	V	5:44 AM–11:00 AM	55	73	15/5	3–6
3B	May 13, 2022	V	5:44 AM–11:00 AM	56	79	0/0	3–4
4A	May 25, 2022	F	5:34 AM–8:22 AM	56	68	40/20	1–2
		V	8:22 AM–11:00 AM	68	74	20/10	2–5
4B	May 26, 2022	F	5:31 AM–8:30 AM	55	62	0/0	1–2
		V	8:30 AM–11:00 AM	62	71	0/0	2–4
5A	June 7, 2022	F	5:38 AM–8:37 AM	56	66	60/10	1–2
		V	8:37 AM–11:00 AM	66	75	10/5	2–4
5B	June 8, 2022	F	5:36 AM–8:34 AM	56	66	30/0	1–2
		V	8:34 AM–11:00 AM	66	75	0/0	2–5
6A	June 21, 2022	F	5:40 AM–8:38 AM	62	74	0/0	1–3
		V	8:38 AM–11:00 AM	74	82	10/10	3–6
6B	June 22, 2022	F	5:35 AM–8:37 AM	65	77	60/40	2–4
		V	8:37 AM–10:52 AM	77	83	40/30	4–5
7A	July 1, 2022	F	5:32 AM–8:36 AM	58	68	100/0	1–3
		V	8:36 AM–11:00 AM	68	76	0/0	3–5
7B	July 4, 2022	F	5:50 AM–8:46 AM	53	62	20/0	2–3
		V	8:46 AM–11:00 AM	62	70	0/0	3–4
8A	July 13, 2022	F	5:52 AM–8:44 AM	55	62	15/0	2–3
		V	8:44 AM–11:00 AM	62	74	0/0	3–7
8B	July 14, 2022	F	6:14 AM–8:38 AM	59	66	10/0	3–6
		V	8:38 AM–10:49 AM	66	73	0/0	6–8

°F: degrees Fahrenheit; mph: miles per hour

The results of the least Bell's vireo/southwestern willow flycatcher surveys are included in Appendix K.

2.3.9 Western Yellow-billed Cuckoo

The USFWS survey protocol for western yellow-billed cuckoo requires a minimum of four surveys be conducted in three time periods that span the peak of breeding activity for the western populations of this species: (1) one survey is required from June 15 to June 30 when migrating yellow-billed cuckoos are passing through but breeding birds are also arriving; (2) two surveys are required from July 1 to July 31 when individual cuckoos encountered are mostly breeders but are occasionally migrants, wandering individuals, or young of the year; and (3) one survey is required from August 1 to August 15 when most breeding yellow-billed cuckoos have finished breeding activities and are departing. Each survey needs to be conducted 12 to 15 days apart. Focused surveys were conducted by Lindsay Messett (TE-067064-5).

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats upstream of the dam. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake).

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. Per USFWS survey protocol for the species, Ms. Messett played recorded contact or "kowlp" calls of western yellow-billed cuckoo five times at one-minute intervals at each calling station (or point) established in the survey area. Compact speakers capable of broadcasting recorded bird calls in excess of 70 decibels were used during all surveys. Upon arriving at each calling point, Ms. Messett listened and watched for cuckoos for one minute prior to playing the broadcast contact calls. Calling points were established approximately every 328 feet in riparian habitat that provided potentially suitable or marginally suitable habitat for the western yellow-billed cuckoo. All surveys were conducted under optimal weather conditions (i.e., between 55 degrees Fahrenheit [°F] and 95°F with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak (Table 11). Additionally, per USFWS guidelines, all incidental observations of least Bell's vireo and willow flycatcher (*Empidonax trailli*) were recorded and mapped.

TABLE 11
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
WESTERN YELLOW-BILLED CUCKOO SURVEYS

Survey No.	Survey Date	Surveyor	Time	Air Temperature (°F)		Cloud Cover (%) Start/End	Wind (mph)
				Start	End		
1A	June 23, 2022	Messett	6:00 AM–10:50 AM	67	83	50/30	1–3
1B	June 24, 2022	Messett	6:15 AM–10:45 AM	55	80	0/0	0–6
2A	July 12, 2022	Messett	5:50 AM–11:00 AM	64	73	100/0	2–4
2B	July 13, 2022	Messett	5:45 AM–10:55 AM	63	72	100/0	1–2
3A	July 28, 2022	Messett	6:00 AM–11:05 AM	66	76	100/50	0–1
3B	July 29, 2022	Messett	6:05 AM–10:45 AM	67	78	90/75	4–5
4A	August 11, 2022	Messett	6:00 AM–10:30 AM	63	87	25/0	0–1
4B	August 12, 2022	Messett	5:54 AM–11:00 AM	70	82	25/10	0–4
(°F): Fahrenheit; %: percent; mph: miles per hour							

The results of the western yellow-billed cuckoo surveys are included in Appendix L.

2.3.10 Jurisdictional Delineation

Jurisdictional water resources considered for this report include waters of the United States (WOTUS) under the regulatory authority of the USACE; waters of the State under the regulatory authority of the RWQCB; and the bed, bank, and channel of all lakes, rivers, and/or streams (and associated riparian vegetation), under the regulatory authority of CDFW.

Psomas assessed the presence of WOTUS by determining connectivity or adjacency of on-site features to points of discharge at a Traditional Navigable Waterway. Non-wetland WOTUS are delineated based on the limits of the Ordinary High Water Mark (OHWM), which can be determined by a number of factors, including (1) the presence of a clear, natural line impressed on the bank; (2) shelving; (3) changes in the character of the soil; (3) destruction of terrestrial vegetation; and (4) the presence of litter and debris. The OHWM limits (i.e., active floodplain) occurring in the BSA were further verified using methods contained in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*, *A Delineation Manual* (Lichvar and McColley 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010).

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). This regional supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Both documents prescribe using a three-parameter approach to identify wetlands. The three parameters needed to assign a site as a wetland include evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability or

the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the regional supplement.

Psomas determined the limits of RWQCB jurisdiction in the field following the methods described for USACE jurisdiction, above. RWQCB shares USACE jurisdiction unless isolated conditions are present. If isolated waters are present, RWQCB takes jurisdiction using USACE's definition of the OHWM. In 2019, SWRCB adopted a new wetland definition, which includes areas with (1) continuous or recurrent saturation of the upper substrate of sufficient duration to cause anaerobic conditions and (2) vegetation dominated by hydrophytes or lacking vegetation (SWRCB 2019). This new definition went into effect on May 28, 2020.

CDFW's jurisdiction was determined by measuring the distance between the top of the bank to the top of the bank of the water features on site or, if present, to the outer limit of riparian vegetation located within or immediately adjacent to the feature. CDFW jurisdiction within Irvine Lake extended to the top of the existing dam embankment.

The jurisdictional delineation for the portion of the BSA downstream of the dam was conducted by Psomas on March 24, 2020. The jurisdictional delineation for the portion of the BSA upstream of the dam was conducted on October 14, 20, and 21, 2020. Psomas Senior Regulatory Specialist Allison Rudalevige performed all surveys with assistance from Psomas Senior Biologist Jonathan Aguayo on October 14 and 20 and Psomas Senior Biologist Lindsay Messett on October 21. Areas under USACE, RWQCB, and CDFW authority were delineated using an aerial photograph (scale of 1-inch equals 175 feet [1″ = 175′] downstream of the dam and scale 1″ = 275′ upstream of the dam) overlaid with 5-foot topographic contour data loaded onto Avenza Maps application on an iPad. Large drainage features and waterbodies were delineated as polygons and narrow drainages were delineated as centerlines with corresponding width measurements. Soil test pits were dug in areas that exhibited potential hydrophytic vegetation and wetland hydrology.

The results of the jurisdictional delineation are included as Appendix M.

3.0 EXISTING BIOLOGICAL RESOURCES

3.1 PHYSICAL ENVIRONMENTAL SETTING

3.1.1 Regional Environment

The Project is generally located in the coastal foothills of eastern Orange County. Topographically, this region exhibits low-lying ridgelines and hills with interspersed relatively broad valley and canyon bottoms. Elevations in the BSA range from approximately 657 to 996 feet above msl.

Within the eastern Orange County area, there are numerous designated open space areas. The largest areas in proximity to the BSA include the following: the 1,000-acre NCCP Reserve, Limestone Canyon Regional Park, Whiting Ranch Wilderness Park, Santiago Oaks Regional Park, Irvine Regional Park, and Cleveland National Forest. In addition to designated open space, other non-designated open space areas within the region include other undeveloped land in the foothills of Santiago Canyon.

3.1.2 Climate

Southern California experiences a Mediterranean climate characterized by mild, rainy winters and hot, dry summers. The temperature is moderated by the coastal influence of the Pacific Ocean, which creates mild conditions throughout most of the year. The most distinguishing characteristic of a Mediterranean climate is its seasonal precipitation. In Southern California, precipitation is characterized by brief, intense storms between November and March. It is not unusual for the majority of the annual precipitation to fall during a few storms over a short span of time.

Rainfall patterns in the region are subject to extreme variations from year to year and longer-term wet and dry cycles. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The region received approximately 7.1 inches of precipitation between July 2021 and June 2022 and approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches.

Climate change refers to any significant change in climate, such as the average temperature, precipitation, or wind patterns over a period of time. Significant changes in global climate patterns have been associated with an accumulation of greenhouse gas emissions in the atmosphere. Some greenhouse gases occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities; the majority of global warming is attributed to human activities. In addition to affecting temperature and precipitation patterns, climate change is believed to be contributing to more extreme weather events such as more frequent larger storms and extended periods of drought (USFS 2018, US EPA 2017).

In the Cleveland National Forest, climate change effects are changing fire patterns and disease outbreaks and affecting water supplies (USFS 2018). Fires are a natural part of the landscape, but each year the fire season is coming earlier and ending later. In addition, the fires themselves are burning hotter and have become more damaging and dangerous. Similarly, insects are a natural part of forested landscapes, but now the insects are spreading more rapidly because the winter is not cold enough to reduce their populations. Also, insect-caused disease epidemics are larger and last longer, killing more trees and increasing fire risk. The warmer winters are affecting water supplies because the snow packs are thinner and melt earlier in spring, so the water runs out from the forest earlier in summer. Extended droughts also make trees more vulnerable to both fire and insects (USFS 2018).

Two significant fires have recently burned in the vicinity of the BSA. The Silverado Fire began in October of 2020 and burned approximately 12,466 acres of open space south of the BSA. The 2020 Bond Fire is located north and east of the previous Silverado Fire. The Bond Fire burned approximately 6,686 acres (CalFire 2020). These fires were two of three significant fires that were burning concurrently in Southern California in the fall of 2020 during unusually powerful and long-lasting Santa Ana Wind conditions.

3.1.3 Local Environment

Irvine Lake (named Santiago Creek Reservoir on the USGS, Exhibit 3) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east of the BSA include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the BSA in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the BSA. Elevations in the BSA range from approximately 657 to 996 feet above msl.

Soils mapped in the BSA include Alo variant clay, Anaheim loam, Anaheim clay loam, Balcom-rock outcrop complex, beaches, Bosanko clay, Botella loam, Botella clay loam, Calleguas clay loam, Capistrano sandy loam, Cieneba sandy loam, Cieneba–rock outcrop complex, Corralitos loamy sand, Myford sandy loam, pits, riverwash, rock outcrop–Cieneba complex, Soboba gravelly loamy sand, Soper loam, Soper gravelly loam, Soper cobbly loam, Soper–rock outcrop complex, and Sorrento loam (USDA NRCS 2020) (Exhibit 5).

3.2 VEGETATION TYPES AND OTHER AREAS

The following vegetation types occur in the BSA: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline (Exhibit 6; Table 12). Other

landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

TABLE 12
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Coastal Sage Scrub			
Sagebrush Scrub	2.3.6	No	115.81
Disturbed Sagebrush Scrub	2.3.6	No	20.11
Sagebrush – Coyote Brush Scrub	2.3.12	No	10.59
Southern Cactus Scrub	2.4	Provisional[a]	17.48
Disturbed Southern Cactus Scrub	2.4	Yes	10.63
Disturbed Floodplain Sage Scrub	2.6	Yes	0.48
Subtotal Coastal Sage Scrub			*175.10*
Chaparral			
Toyon – Sumac Chaparral	3.12	No	30.35
Subtotal Chaparral			*30.35*
Grassland			
Annual Grassland	4.1	No	15.59
Ruderal	4.6	No	92.38
Subtotal Grassland			*107.97*
Riparian			
Riparian Herb	7.1	No	13.15
Southern Willow Scrub	7.2	Yes	0.43
Mulefat Scrub	7.3	No	1.50
Disturbed Mulefat Scrub	7.3	No	26.67
Southern Sycamore Riparian Woodland	7.4	Yes	20.48
Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest	7.4/7.5	Yes	5.46
Southern Black Willow Forest	7.7	Yes	83.61
Disturbed Southern Black Willow Forest	7.7	Yes	35.35
Southern Black Willow Forest/Riparian Herb	7.7/7.1	No[b]	26.01
Subtotal Riparian			*212.66*
Woodland			
Coast Live Oak Woodland	8.1	No	31.09
Western Sycamore	8.x	Yes	0.36
Subtotal Woodland			*31.45*
Cliff and Rock			
Cliff	10.0	No	1.63
Subtotal Cliff and Rock			*1.63*

TABLE 12
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Lakes, Reservoirs, and Basins			
Open Water	12.1	No	312.11
Fluctuating Shoreline	12.2	No	26.31
Vegetated Fluctuating Shoreline	12.2	No	45.13
Subtotal Lakes, Reservoirs, and Basins			*383.55*
Watercourses			
Perennial Stream	13.1	No	6.97
Subtotal Watercourses			*6.97*
Developed Areas			
Ornamental	15.5	No	20.77
Developed	15.6	No	20.98
Subtotal Developed Areas			*41.75*
Disturbed Areas			
Disturbed	16.1	No	25.42
Subtotal Disturbed Areas			*25.42*
Total			**1,016.85**

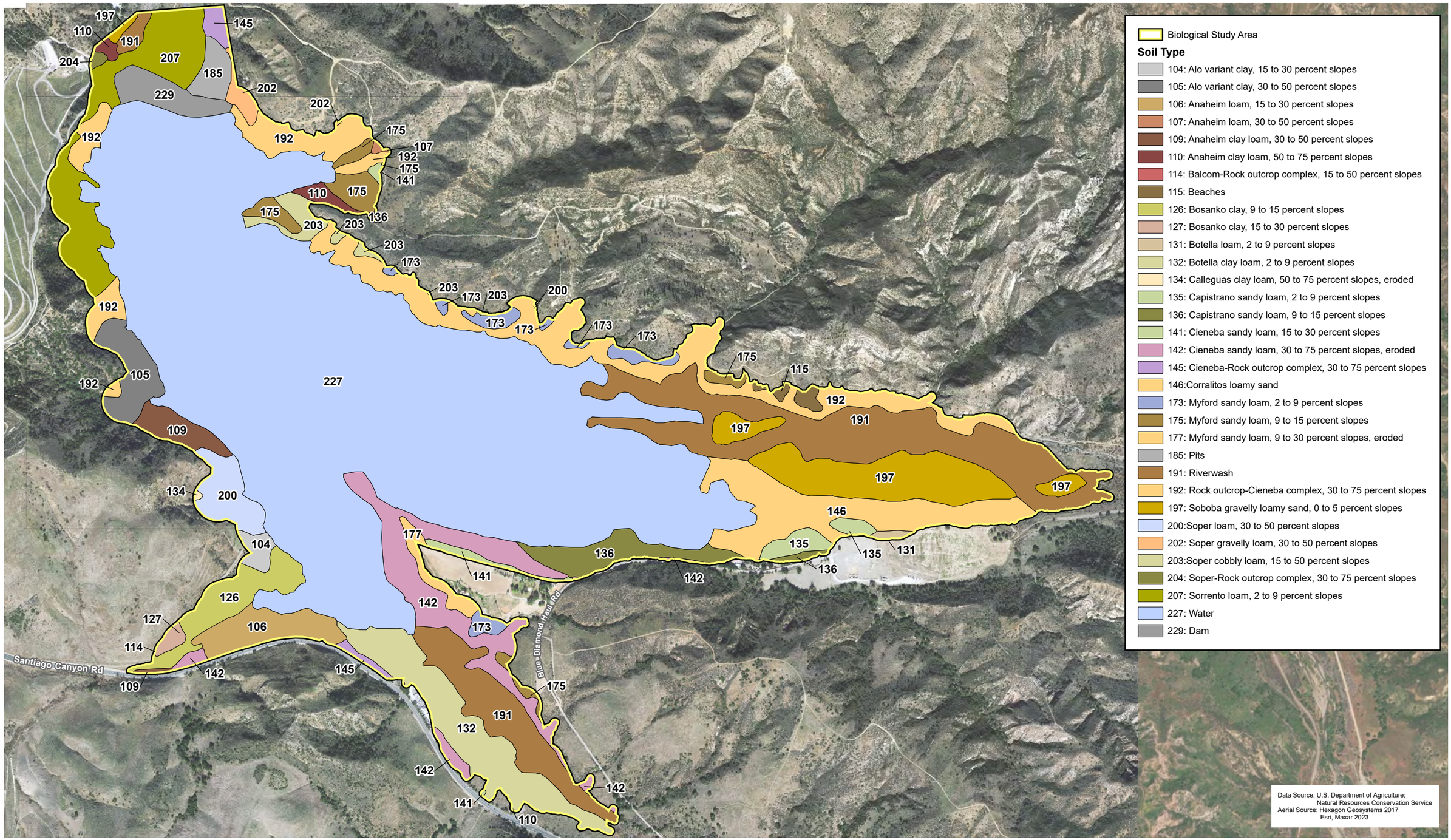
[a] Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2025b).
[b] This blended community would be characterized more as riparian herb than southern black willow forest; therefore, it would not be considered a sensitive community.

BSA: Biological Survey Area

3.2.1 Sagebrush Scrub (2.3.6)

Sagebrush scrub is distributed throughout the BSA on the slopes surrounding Irvine Lake. This vegetation type is dominated by relatively dense California sagebrush (*Artemisia californica*). Other native shrubs are also scattered throughout these areas and include leafy California buckwheat (*Eriogonum fasciculatum var. foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), and toyon (*Heteromeles arbutifolia*). The density of these co-occurring species varies across the BSA. Where present, openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*). Sparse amounts of scaly scale-broom (*Lepidospartum squamatum*) extend into this vegetation where it occurs along Santiago Creek downstream of the dam.

Sagebrush scrub is consistent with the *Artemisia californica* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b). However, sagebrush scrub is protected by the NCCP/HCP.



D:\Projects\3IRW\SantiagoCreek\PROS\GIS\SCD_Project.aprx\ex_Soils

Soil Types

Santiago Creek Dam Improvement Project

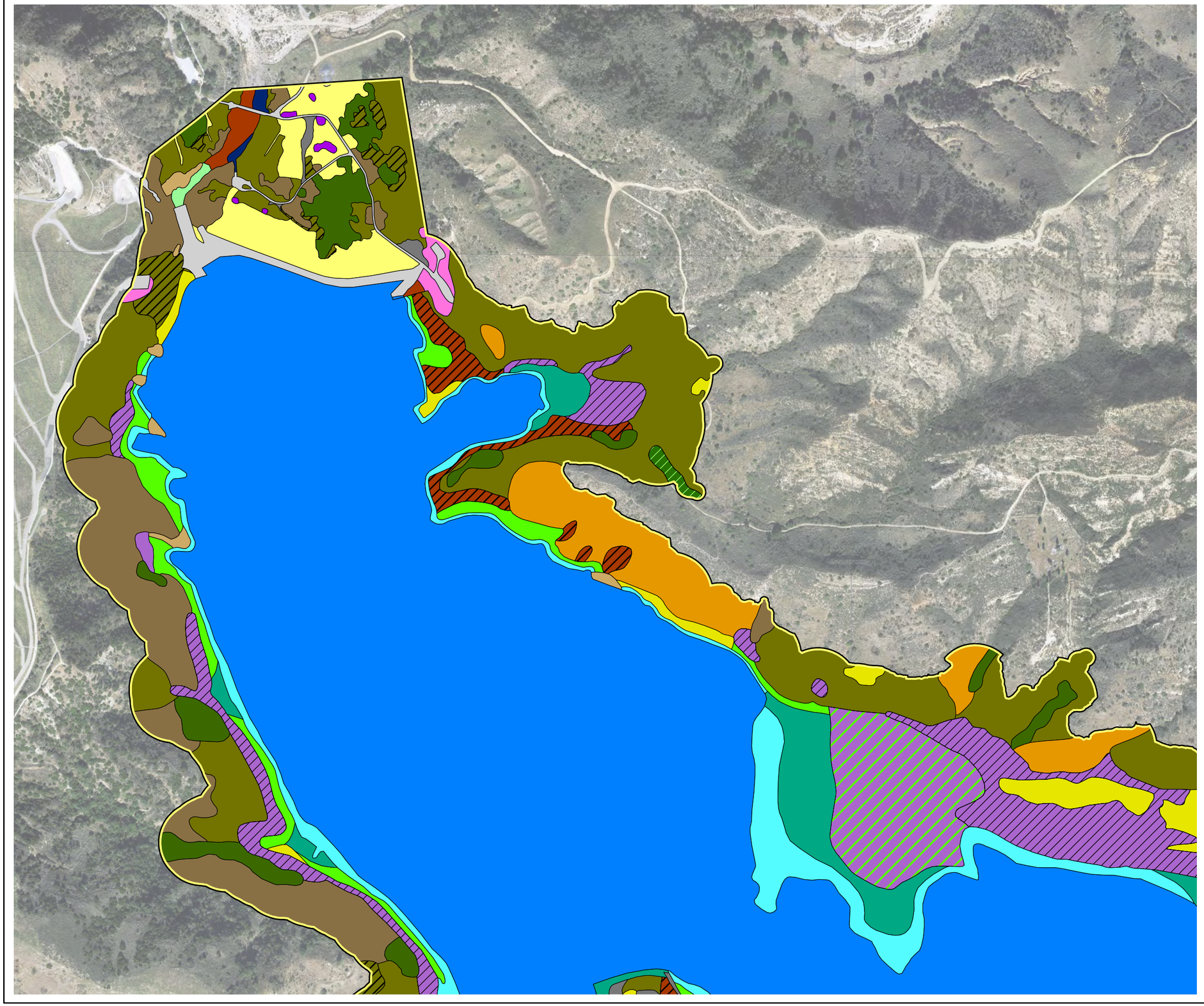
Exhibit 5

N W E S

0 550 1,100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SoilTypes.pdf



Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources

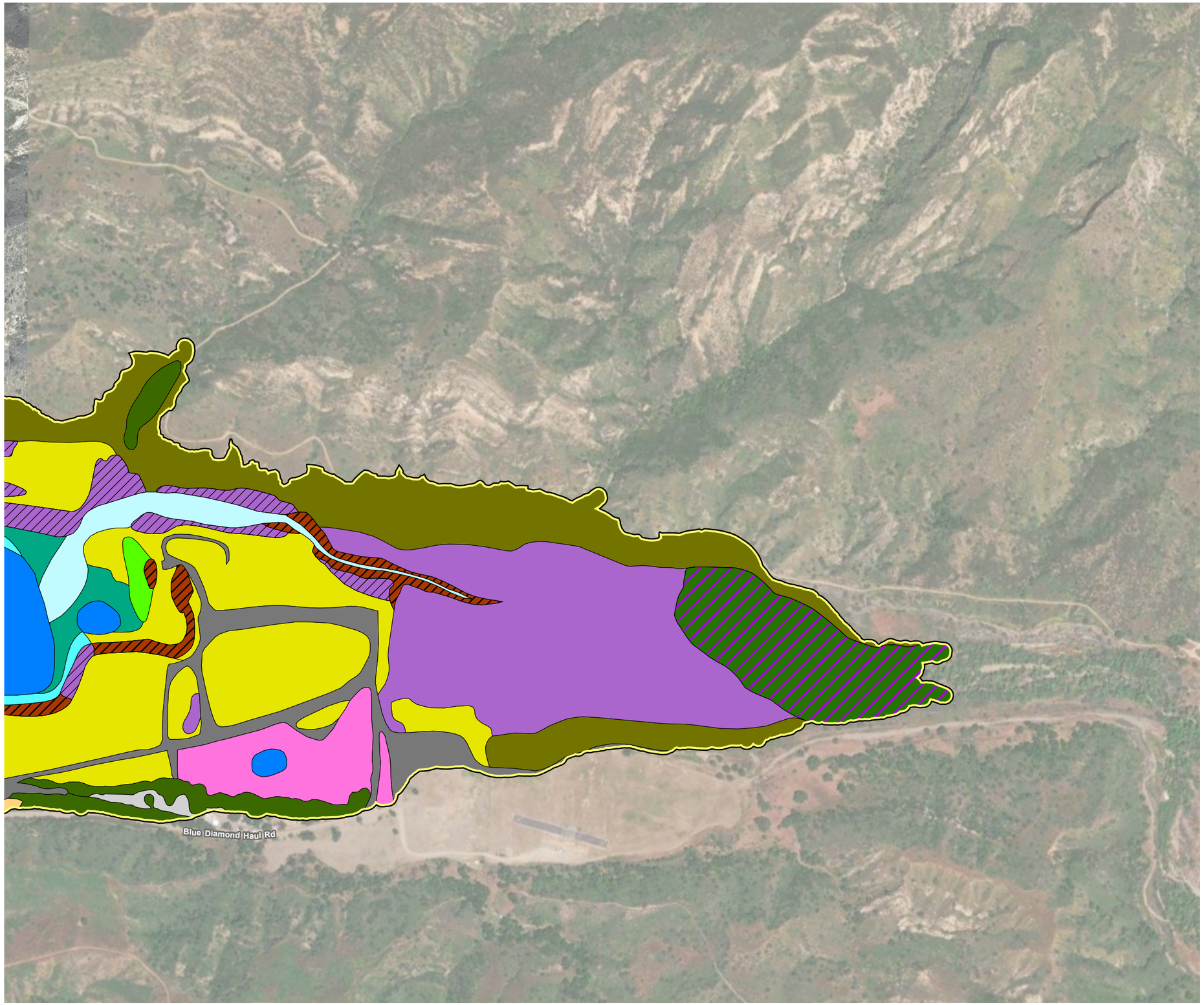
Exhibit 6a

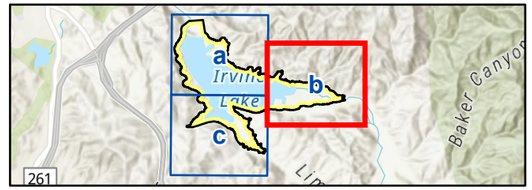
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTRex_BiologicalResources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources

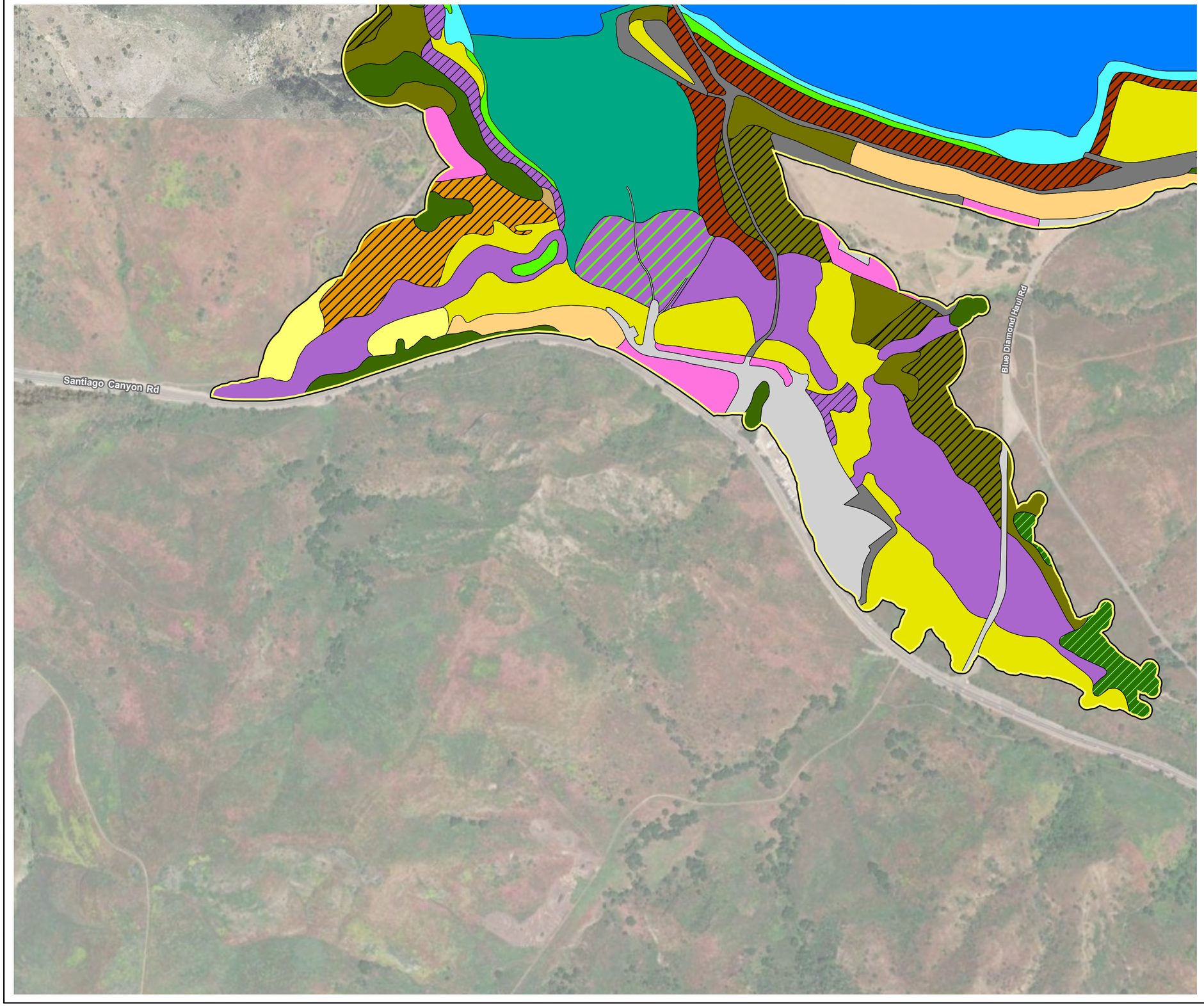
Exhibit 6b

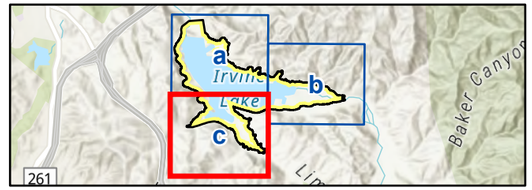
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_BiologicalResources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Biological_Resources





Biological Study Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources

Exhibit 6c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTRex_BiologicalResources.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_Biological_Resources

3.2.2 Disturbed Sagebrush Scrub (2.3.6)

Disturbed sagebrush scrub is distributed downstream of the dam and along slopes in the southern portion of the BSA. It is similar in composition to sagebrush scrub but it has an open canopy and the spaces between the shrubs are degraded (disturbed) by the presence of non-native grasses and herbs such as bromes (*Bromus* spp.), oats (*Avena* spp.), grayish shortpod mustard (*Hirschfeldia incana*), and/or black mustard (*Brassica nigra*).

Disturbed sagebrush scrub is consistent with the *Artemisia californica* association mixed with one or more of the annual brome grasslands or the upland mustard associations in *A Manual of California Vegetation* (CNPS 2024). These associations are not considered sensitive natural communities by CDFW (2025b). However, disturbed sagebrush scrub is protected by the NCCP/HCP.

3.2.3 Sagebrush – Coyote Brush Scrub (2.3.12)

Sagebrush – coyote brush scrub is distributed on slopes in the southern portion of the BSA. This vegetation type is co-dominated by California sagebrush and coyote brush (*Baccharis pilularis* ssp. *consanguinea*) with lesser amounts of leafy California buckwheat, laurel sumac, lemonade berry, toyon, and white sage (*Salvia apiana*).

Sagebrush – coyote brush scrub is consistent with the *Baccharis pilularis – Artemisia californica* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b). However, sagebrush – coyote brush scrub is protected by the NCCP/HCP.

3.2.4 Southern Cactus Scrub (2.4)

Southern cactus scrub is distributed on slopes on the northern side of Irvine Lake. This vegetation type is characterized by approximately 20 percent cover of prickly-pear (either *Opuntia littoralis* or *Opuntia x vaseyi*). These areas also contain California sagebrush, leafy California buckwheat, laurel sumac, and other sagebrush scrub species.

Southern cactus scrub is consistent with the *Artemisia californica – Opuntia littoralis* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a provisional[10] sensitive natural community by CDFW (2025b). Southern cactus scrub is also protected by the NCCP/HCP.

3.2.5 Disturbed Southern Cactus Scrub (2.4)

Disturbed southern cactus scrub is located in the southwestern portion of the BSA. This vegetation type is characterized by the presence of prickly-pear with other native shrubs such as California sagebrush and leafy California buckwheat. However, it is degraded (disturbed) by the presence of non-native grayish shortpod mustard and pepper tree (*Schinus molle*).

[10] Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2023a).

Disturbed southern cactus scrub is consistent with the *Artemisia californica – Opuntia littoralis* association mixed with one or more of the annual brome grasslands or the upland mustard associations in *A Manual of California Vegetation* (CNPS 2024). The *Artemisia californica – Opuntia littoralis* association is considered a provisional[3] sensitive natural community by CDFW (2025b). Disturbed southern cactus scrub is also protected by the NCCP/HCP.

3.2.6 Disturbed Floodplain Sage Scrub (2.6)

Disturbed floodplain sage scrub occurs along the active floodplain/low terrace of Santiago Creek downstream of the dam. This vegetation type is characterized by the presence of scaly scale-broom along a rocky alluvial wash. As is typical of this vegetation type, shrub density is relatively low. Other species that co-occur include California sagebrush, California brickellbush (*Brickellia californica*), straw-colored cudweed (*Pseudognaphalium stramineum*), and chilicothe (*Marah macrocarpa*). This vegetation type is degraded (disturbed) by the presence of non-native fennel (*Foeniculum vulgare*) and non-native grasses.

Disturbed floodplain sage scrub is consistent with the *Lepidospartum squamatum – Artemisia californica* association mixed with the *Foeniculum vulgare* association in *A Manual of California Vegetation* (CNPS 2024). The *Lepidospartum squamatum – Artemisia californica* association is considered a sensitive natural community by CDFW (2025b). Disturbed floodplain sage scrub is also protected by the NCCP/HCP.

3.2.7 Toyon – Sumac Chaparral (3.12)

Toyon – sumac chaparral is distributed downstream of the dam and on the slopes in the western portion of the BSA. The dominant shrub is laurel sumac; however, lemonade berry, toyon, blue elderberry (*Sambucus mexicana*), and coast live oak (*Quercus agrifolia*) co-occur in some areas. The patch on the east side of Santiago Creek downstream of the dam also contains Coulter's matilija poppy (*Romneya coulteri*), a special status plant species. This vegetation type intergrades with coastal sage scrub and annual brome grassland.

Toyon – sumac chaparral is consistent with the *Malosma laurina* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.8 Annual Grassland (4.1)

Annual grassland is distributed primarily downstream of the dam but also occurs in small patches in the southwestern portion of the BSA. This vegetation type is dominated by non-native grasses, including red brome (*Bromus rubens*), ripgut grass (*Bromus diandrus*), slender wild oat (*Avena barbata*), wild oat (*Avena fatua*), and wall barley (*Hordeum murinum*). Other non-native species, such as grayish shortpod mustard, black mustard, and tocalote (*Centaurea melitensis*) are also present. Most areas contain scattered native species such as miner's-lettuce (*Claytonia perfoliata*), fascicled tarplant (*Deinandra fasciculata*), telegraph weed (*Heterotheca grandiflora*), turkey-mullein (*Croton setiger*), and fiddleneck (*Amsinckia* spp.). The slope up to the dam contains a greater cover of native species,

including miniature lupine (*Lupinus bicolor*), common goldfields (*Lasthenia gracilis*), erect plantain, and valley popcorn flower (*Plagiobothrys canescens*). This slope may have been seeded with a native seed mix following a previous disturbance.

Annual grassland has characteristics of the *Bromus diandrus – Avena* spp., *Bromus diandrus* – mixed herbs, *Bromus rubens* – mixed herbs, *Brassica nigra – Bromus diandrus*, and *Hirschfeldia incana* associations in *A Manual of California Vegetation* (CNPS 2024). None of these associations are considered sensitive natural communities by CDFW (2025b).

3.2.9 Ruderal (4.6)

Ruderal (weedy) vegetation occurs in broad, flat areas and slopes in the eastern and southern portions of the BSA and along small portions of the shoreline around Irvine Lake. This vegetation type is dominated by grayish shortpod mustard. The area adjacent to the west of the dam is a monoculture of common castor bean (*Ricinus communis*), a non-native species.

Most of the ruderal vegetation in the BSA is consistent with the *Hirschfeldia incana* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.10 Riparian Herb (7.1)

Riparian herb is distributed just above the shoreline around Irvine Lake throughout the BSA. This vegetation type is dominated by cocklebur (*Xanthium strumarium*) with lesser amounts of white sweetclover (*Melilotus albus*), alkali-mallow (*Malvella leprosa*), and grayish shortpod mustard.

Riparian herb is consistent with the *Xanthium strumarium* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.11 Southern Willow Scrub (7.2)

Southern willow scrub occurs in one location along Santiago Creek downstream of the dam. This vegetation type is dominated by arroyo willow (*Salix lasiolepis*) with scattered white alder (*Alnus rhombifolia*), western sycamore (*Platanus racemosa*), and Fremont cottonwood (*Populus fremontii* ssp. *fremontii*). The understory contains scattered mule fat (*Baccharis salicifolia* ssp. *salicifolia*), California sagebrush, flatsedge (*Cyperus* sp.), and non-native grasses. A depression in the streambed holds standing water surrounded by broad-leaved cattail (*Typha latifolia*).

Southern willow scrub is consistent with the *Salix lasiolepis* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.12 Mulefat Scrub (7.3)

Mulefat scrub primarily occurs along the low flow channel of Santiago Creek downstream of the dam. It also occurs upstream of the dam in one patch adjacent to the east end of the dam structure. It is dominated by a varying cover of mule fat; scaly scale-broom also occurs. Downstream of the dam, this vegetation type includes some low cover of non-native fennel and mustards.

Mulefat scrub is consistent with the *Baccharis salicifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.13 Disturbed Mulefat Scrub (7.3)

Disturbed mulefat scrub is distributed above the shoreline of Irvine Lake and extending upstream of the lake along the low-flow channel of Santiago Creek. This vegetation type is dominated by scattered mule fat; however, it is degraded (disturbed) by the presence of saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), and grayish shortpod mustard.

Disturbed mulefat scrub is consistent with the *Baccharis salicifolia – Tamarix ramosissima* or *Baccharis salicifolia – Arundo donax* associations in *A Manual of California Vegetation* (CNPS 2024). These associations are not considered sensitive natural communities by CDFW (2025b).

3.2.14 Southern Sycamore Riparian Woodland (7.4)

Southern sycamore riparian woodland is located in one location at the upstream end of Santiago Creek in the eastern portion of the BSA. This vegetation type consists of a closed riparian canopy dominated by western sycamore. Other species in the tree canopy include Goodding's black willow, arroyo willow, Fremont cottonwood, and coast live oak; a few scattered gum trees (*Eucalyptus* spp.) are also present. The understory and margins contain mule fat.

Southern sycamore riparian woodland is consistent with the *Platanus racemosa–Populus fremontii/Salix lasiolepis* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.15 Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest (7.4/7.5)

Southern sycamore riparian woodland/coast live oak riparian forest is distributed in a few patches in the southeastern portion of the BSA and in one location north of Irvine Lake. This vegetation type is co-dominated by western sycamore and coast live oak trees in a savannah-like setting. The understory and area between trees are dominated by grayish shortpod mustard and tree tobacco (*Nicotiana glauca*).

Southern sycamore riparian woodland/coast live oak riparian forest is consistent with the *Platanus racemosa–Quercus agrifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.16 Southern Black Willow Forest (7.7)

Southern black willow forest occurs along tributary drainages in the southern portion of the BSA, upstream of the lake along Santiago Creek, and in a few patches above the shoreline of Irvine Lake. This vegetation type is dominated by a tree canopy of Goodding's black willow (*Salix gooddingii*); mule fat is abundant in the understory, along the margins, and between the tree canopy.

Southern black willow forest is consistent with the *Salix gooddingii/Baccharis salicifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.17 Disturbed Southern Black Willow Forest (7.7)

Disturbed southern black willow forest is distributed above the shoreline of Irvine Lake and upstream of the lake along Santiago Creek. This vegetation type is characterized by the presence of Goodding's black willow and mule fat; however, it is degraded (disturbed) by the presence of non-native species such as saltcedar, giant reed, grayish shortpod mustard, and non-native grasses. In many areas, the tree canopy is sparse.

Disturbed southern black willow forest is consistent with the *Salix gooddingii/Baccharis salicifolia* association mixed with the *Tamarix* spp. association in *A Manual of California Vegetation* (CNPS 2024). The *Salix gooddingii/Baccharis salicifolia* association is considered a sensitive natural community by CDFW (2025b).

3.2.18 Southern Black Willow Forest/Riparian Herb (7.7/7.1)

Southern black willow forest/riparian herb is distributed in broad, flat areas near fluctuating shoreline and vegetated fluctuating shoreline near the upstream end of Irvine Lake and in the southern portion of the BSA. This vegetation type contains sparse Goodding's black willow scattered throughout an area dominated by cocklebur. Based on historic aerial images, these areas are inundated or partially inundated when the water level in the lake is higher.

Southern black willow forest/riparian herb is generally consistent with the *Xanthium strumarium* association mixed with the *Salix gooddingii* association in *A Manual of California Vegetation* (CNPS 2024). While the *Salix gooddingii* association is considered a sensitive natural community by CDFW (2025b), these areas would not be considered a sensitive natural community due to the extremely low tree cover.

3.2.19 Coast Live Oak Woodland (8.1)

Coast live oak woodland occurs scattered throughout the BSA. This vegetation type is dominated by coast live oak. In some areas, the understory consists of lemonade berry,

toyon, laurel sumac, and California sagebrush while in other areas understory is primarily non-native grasses, miner's-lettuce, and chilicothe. At its margins, coast live oak intergrades with sagebrush scrub, toyon – sumac chaparral, and annual grassland.

Coast live oak woodland is consistent with the *Quercus agrifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.20 Western Sycamore (8.x)

Western sycamore trees occur scattered throughout the central portion of the BSA downstream of the dam. Areas mapped as western sycamore consists of individual trees and small groups of western sycamore trees in a savannah-like setting. The understory consists of non-native grasses.

Western sycamore is similar to the *Platanus racemosa*/annual grass association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.21 Cliff (10.0)

Cliffs occur on the western side of Santiago Creek downstream of the dam and along the slopes of Irvine Lake in the western portion of the BSA. This landcover consists of a steep, bare rock face with little to no vegetation.

3.2.22 Open Water (12.1)

Open water occurs in Irvine Lake. Areas mapped as open water were inundated at the time of the survey and unvegetated.

3.2.23 Fluctuating Shoreline (12.2)

Fluctuating shoreline is distributed along the margins of Irvine Lake above the waterline and where the water level has recently receded at the upstream end of the lake. These areas are submerged frequently enough that vegetation has not established. Based on historic aerial images, these areas are inundated or partially inundated when the water level in the lake is higher. These areas fluctuate between open water, unvegetated shoreline, and/or partially vegetated depending on water level.

3.2.24 Vegetated Fluctuating Shoreline (12.2)

Vegetated fluctuating shoreline is distributed along portions of Irvine Lake where the water level has receded long enough for vegetation to become established. These areas are dominated by the non-native swamp prickly grass (*Crypsis schoenoides*) with lesser amounts of flatsedge, seaside healiotrope (*Heliotropium curassavicum* var. *oculatum*), willow weed (*Persicaria lapathifolia*), alkali-mallow, and Bertero's burhead (*Echinodorus berteroi*). Based on historic aerial images, these areas are inundated or are partially inundated when the water level in the lake is higher.

Vegetated fluctuating shoreline is consistent with the *Crypsis* (*C. schoenoides, C. vaginiflora*) association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.25 Perennial Stream (13.1)

Perennial stream is located along Santiago Creek upstream of Irvine Lake. It includes a low flow channel and lower portions of the active floodplain; this area broadens as it discharges into Irvine Lake. The low flow channel was primarily unvegetated and flowing water was present at the time of the site visit. The upstream portion of the channel contains seedlings and low-growing vegetation, indicating that it is periodically scoured. Vegetation includes mule fat seedlings (approximately 6 inches high), marsh pulicaria (*Pulicaria paludosa*), white lamb cudweed (*Pseudognaphalium luteoalbum*), fringed willowherb (*Epilobium ciliatum*), willow weed, white sweetclover, annual beard grass (*Polypogon monspeliensis*), southern cattail (*Typha domingensis*), and broad-leaved cattail.

Because of the dynamic nature of this portion of Santiago Creek and the limited amount of vegetation, it does not represent a vegetation association in *A Manual of California Vegetation* (CNPS 2024).

3.2.26 Ornamental (15.5)

Ornamental vegetation is primarily located in association with development and consists of species planted for landscaping purposes. This vegetation type consists of non-native tree species (i.e., pepper tree [*Schinus* sp.], European olive (*Olea europaea*), and gum tree [*Eucalyptus* spp.]), sometimes intermixed with planted native trees such as coast live oak, western sycamore, and Fremont cottonwood. In some areas, the understory is dominated by turf grass.

Ornamental vegetation is consistent with the *Eucalyptus* (*globulus*, *camaldulensis*) association and the *Schinus molle* association in *A Manual of California Vegetation* (CNPS 2024). It is not considered a sensitive natural community by CDFW (2025b).

3.2.27 Developed (15.6)

Developed areas consist of an impermeable landcover and include the dam embankment, spillway channel, buildings, parking lots, and paved roads. These areas are unvegetated.

3.2.28 Disturbed (16.1)

Disturbed areas occur throughout the BSA and consist of bare ground (e.g., graded access roads). Note that graded areas overgrown with vegetation were mapped according to the vegetation. Smaller access roads were not mapped separately from the surrounding vegetation.

3.3 WILDLIFE POPULATIONS AND MOVEMENT PATTERNS

Vegetation in the BSA provides habitat for many wildlife species. Common wildlife species observed or expected to occur in the BSA are discussed below.

3.3.1 Fish

Irvine Lake is stocked with fish, including rainbow trout (*Oncorhynchus mykiss*), bass (*Morone* sp.), catfish (*Ictalurus* sp.), common carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis* sp.). Non-native fish are predators on native species; no native fish (with the exception of the stocked rainbow trout) are expected to occur in Irvine Lake.

3.3.2 Amphibians

Amphibians require moisture for at least a portion of their life cycle, and many require standing or flowing water for reproduction. Terrestrial species may or may not require standing water for reproduction; they survive in dry areas by aestivating (i.e., remaining beneath the soil in burrows or under logs and leaf litter and emerging only when temperatures are low and humidity is high). Many of these species' habitats are associated with water, and they emerge to breed once the rainy season begins. Soil moisture conditions can remain high throughout the year in some habitat types, depending on factors such as amount of vegetation cover, elevation, and slope/aspect.

Amphibian species observed in the BSA include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), and the non-native American bullfrog (*Lithobates catesbeianus*). Other amphibian species expected to occur include garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

3.3.3 Reptiles

Reptiles are well-adapted to life in arid habitats. They have several physiological adaptations that allow them to conserve water. Reptiles can also become dormant during weather extremes, allowing them to survive prolonged droughts and paucity of food (Ruben and Hillenius 2005). Reptilian diversity and abundance typically vary with vegetation type and character.

Common reptile species observed in the BSA include common side-blotched lizard (*Uta stansburiana*) and western fence lizard (*Sceloporus occidentalis*). Other reptile species expected to occur include southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), northern three-lined boa [rosy boa] (*Lichanura orcutti*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

3.3.4 Birds

A variety of bird species are expected to be residents in the BSA, using the habitats throughout the year. Other species are present only during certain seasons. For example, the white-crowned sparrow (*Zonotrichia leucophrys*) is expected to occur in the BSA during the winter and migrate to the northern forests for breeding in the spring.

The following resident bird species were observed in the BSA: mallard (*Anas platyrhynchos*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), double-crested cormorant (*Phalacrocorax auritus*), snowy egret (*Egretta thula*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), California scrub jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Polioptila caerulea*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melozone crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*).

Migratory species observed in the BSA that are present during the nesting season include lesser nighthawk (*Chordeiles acutipennis*), barn swallow (*Hirundo rustica*), and black-headed grosbeak (*Pheucticus melanocephalus*). Other migratory species that would be expected to occur in the spring/summer include black-chinned hummingbird (*Archilochus alexandri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), phainopepla (*Phainopepla nitens*), hooded oriole (*Icterus cucullatus*), and Bullock's oriole (*Icterus bullockii*). Wintering species observed or expected to occur in the BSA include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), Townsend's warbler (*Setophaga townsendi*), and white-crowned sparrow.

Raptors (birds of prey) observed or expected to occur in the BSA include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and American kestrel (*Falco sparverius*). The turkey vulture (*Cathartes aura*), a scavenger, was also observed. Each of these species also has potential to nest in the BSA.

3.3.5 Mammals

Small mammals observed in the BSA include Eastern fox squirrel (*Sciurus niger*), California ground squirrel (*Otospermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), mouse (*Peromyscus sp.*), and desert cottontail (*Sylvilagus audubonii*). Medium to large-sized mammals, or their sign, observed include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern mule deer (*Odocoileus hemionus*).

Bats occur throughout most of Southern California and may use any portion of the BSA as foraging habitat. Most of the bats that could potentially occur in the BSA are inactive during the winter and either hibernate or migrate, depending on the species. Bats may roost in cliffs

or rocky outcroppings, crevices of structures, or large oak or sycamore trees in the BSA. Bat species that may occur in the BSA for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis californicus),* Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

3.3.6 Wildlife Movement

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic information (MacArthur and Wilson 1967; Soule 1987; Harris and Gallagher 1989; Bennett 1990). Corridors mitigate the effects of this fragmentation by (1) allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move in their home ranges in search of food, water, mates, and other necessary resources (Noss 1983; Farhig and Merriam 1985; Simberloff and Cox 1987; Harris and Gallagher 1989).

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas or individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (e.g., foraging for food or water; defending territories; or searching for mates, breeding areas, or cover). A number of terms such as "wildlife corridor," "travel route," "habitat linkage," and "wildlife crossing" have been used in various wildlife movement studies to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and to facilitate the discussion on wildlife movement in this analysis, these terms are defined as follows:

A. ***Travel route –*** a landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and to provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another. It contains adequate food, water, and/or cover while moving between habitat areas; and it provides a relatively direct link between target habitat areas.

B. ***Wildlife corridor –*** a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bound by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or

water to support species and to facilitate their movement while in the corridor. Larger, landscape-level corridors (often referred to as "habitat linkages" or "landscape linkages") can provide both transitory and resident habitat for a variety of species.

C. ***Wildlife crossing*** **–** a small, narrow area, relatively short in length and generally constricted in nature that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are man-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent "choke points" along a movement corridor, which may impede wildlife movement and increase the risk of predation.

It is important to note that in a large, open space area with few or no man-made or naturally occurring physical constraints to wildlife movement, wildlife corridors (as defined above) may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and to provide a variety of travel routes (e.g., canyons, ridgelines, trails, riverbeds, and others), wildlife will use these "local" routes while searching for food, water, shelter, and mates and will not need to cross into other large, open space areas. Based on their size, location, vegetative composition, and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water, and cover, particularly for small- and medium-sized animals. This is especially true if the travel route is within a larger open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles (such as roads and highways), the remaining landscape features or travel routes that connect the larger open space areas become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (e.g., man-made noise, lighting) that would generally hinder wildlife movement.

In general, wildlife corridor discussions typically focus on larger, more mobile mammal species such as southern mule deer, mountain lion, and coyote. Discussing the needs of larger mammal species typically also captures the needs of mid-sized mammals such as foxes (*Vulpes* sp.), northern raccoon, striped skunk (*Mephitis mephitis*), and American badger (*Taxidea taxus*). Most mammal species have relatively large home ranges through which they move to find adequate food, water, and breeding and wintering habitat. It is assumed that corridors that serve larger, more mobile mammal species also serve as corridors for many smaller, less mobile species, such as reptiles, amphibians, and rodents. Regional movement for these species facilitates gene flow and requires at least some local "stepping stone" movement of individuals between populations.

Discussions of wildlife corridors generally focus less on bird species because they are more mobile and can fly over inhospitable habitat. Long-distance migrants are able to move great distances over unsuitable habitat; however, they must have stopover sites to rest and forage in order to continue their migration. Many resident species are habitat-specific, moving only through their preferred habitat type(s), or similar adjacent habitat; wildlife corridors would be more important for these bird species.

Ideally, an open space corridor should encompass a heterogeneous mix of vegetation types to accommodate the ecological requirements of a wide variety of resident species in any particular region. Most species typically prefer adequate vegetation cover during movement, which can serve as both a food source and as protection from weather and predators. Drainages, riparian areas, and forested canyon bottoms typically serve as natural movement corridors because these features provide cover, food, and often water for a variety of species. Very few species will move across large expanses of open, uncovered habitat unless it is the only option available to them. Landscape linkages must also provide "live-in" habitat (food and cover) to support smaller and less mobile species, such as amphibians, reptiles, and rodents, that require longer periods to traverse a corridor.

The BSA is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the BSA, wildlife movement is generally unconstrained in and around the BSA. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream of the BSA. The existing dam structure and associated reservoir may be a barrier to movement for amphibians, reptiles, and small mammals moving along the drainage; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes. Santiago Canyon Road to the south of the BSA may be a barrier to wildlife movement for small animals; however, small animals could use drainage structures under the road as wildlife crossings. The roadway would not be expected to be a barrier to movement for medium and large-sized mammals due to the relatively low level of traffic on the road; the medium and large-sized mammals would be expected to cross over the roadway when traffic is low.

A NCCP "Special Linkage" area occurs in the southern portion of the BSA, extending southeast along Santiago Canyon Road (Exhibit 4). It connects Habitat Reserve areas to the west and north of Irvine Lake to Habitat Reserve areas south of Santiago Canyon Road (i.e., Limestone Canyon). Special Linkages include areas where proposed development or existing uses would provide either an opportunity to conserve habitat useful for biological connectivity or support target species while permitting compatible non-habitat uses. Special Linkages are not part of the Reserve System. Existing uses within the Special Linkage in the BSA include development associated with Irvine Lake and Santiago Canyon Road.

3.4 SPECIAL STATUS BIOLOGICAL RESOURCES

The following section addresses special status biological resources that were observed, reported, or have the potential to occur in the BSA. These resources include plant and wildlife species that have been afforded special status and/or recognition by federal and State resource agencies, as well as private conservation organizations. In general, the principal reason an individual taxon (i.e., species, subspecies, or variety) is given such recognition is the documented or perceived decline or limitations of its population size, geographic range, and/or distribution resulting in most cases from habitat loss. In addition to species, special status biological resources include vegetation types and habitats that are either unique; of relatively limited distribution in the region; or provide a high value for wildlife. These resources have been defined by federal, State, and local government conservation programs. Sources used to determine the special status of biological resources are listed below.

- ***Habitats* –** the CNDDB (CDFW 2025a); *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks* (Faber-Langendoen et al. 2012); and the *California Natural Communities List* (CDFW 2025b).
- ***Plants* –** the CNDDB (CDFW 2025a); the Inventory of Rare and Endangered Plants (CNPS 2025); various USFWS *Federal Register* notices regarding listing status of plant species; and the *List of Special Vascular Plants, Bryophytes, and Lichens* (CDFW 2025c).
- ***Wildlife* –** the CNDDB (CDFW 2025a); the California Wildlife Habitat Relationships Database System (CDFW 2014); various USFWS *Federal Register* notices regarding listing status of wildlife species; and the *List of Special Animals* (CDFW 2025d).

3.4.1 Definitions

A federally **Endangered** species is one facing extinction throughout all or a significant portion of its geographic range. A federally **Threatened** species is one likely to become Endangered within the foreseeable future throughout all or a significant portion of its range. The presence of any federally listed Threatened or Endangered species in a project impact area generally imposes constraints on development, particularly if development would result in "take" of the species or its habitat. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct. "Harm" in this sense can include any disturbance of species' habitats during any portion of its life history.

Federally **Proposed** or **Candidate** species are those officially proposed by the USFWS to be added to the federal Threatened and Endangered species list. Because proposed species may soon be listed as Threatened or Endangered, these species could become listed prior to or during implementation of a proposed project. The presence of a Proposed or Candidate species within a project impact area may impose constraints on development if they are listed prior to issuance of project permits, particularly if a project would result in "take" of the species or its habitat.

The State of California considers an **Endangered** species to be one whose prospects of survival and reproduction are in immediate jeopardy, a **Threatened** species as one present in such small numbers throughout its range that it is likely to become an Endangered species in the near future in the absence of special protection or management, and a **Rare** species as one present in such small numbers throughout its range that it may become Endangered if its present environment worsens. "Rare species" only applies only to California native plants. State-listed Threatened and Endangered species are protected against take unless an Incidental Take Permit is obtained from the resource agencies. The presence of any State-listed Threatened or Endangered species in a project impact area generally imposes constraints on development, particularly if a project would result in "take" of the species or its habitat.

California **Species of Special Concern** is an informal designation used by CDFW for some declining wildlife species that are not State Candidates for listing. This designation does not provide legal protection but signifies that these species are recognized as special status by CDFW. A few years ago, CDFW down-listed several species from Species of Special Concern

to the **Watch List**. Although not considered special status, Watch List species are tracked by the CNDDB.

Species that are California **Fully Protected** and **Protected** include those protected by special legislation for various reasons, such as the mountain lion and white-tailed kite (*Elanus leucurus*). Fully Protected species may not be taken or possessed at any time. California Protected species include those species that may not be taken or possessed at any time except under special permit from CDFW issued pursuant to Sections 650 and 670.7 of the *California Code of Regulations,* or Section 2081 of the *California Fish and Game Code.*

Species of **Local Concern** are those that have no official status with the resource agencies but are being watched because either the region has a unique population or the species is declining in the region.

Special Animal is a general term that refers to species that the CNDDB is interested in tracking, regardless of legal or protective status. This term includes species designated as any of the above terms but also includes species that may be considered biologically rare; restricted in distribution; declining throughout their range; have a critical, vulnerable stage in their life cycle that warrants monitoring; are on the periphery of their range and are threatened with extirpation in California; are associated with special status habitats; or are considered by other State or federal agencies or private organizations to be sensitive or declining.

The **CRPR**, formerly known as CNPS List, is a ranking system by the Rare Plant Status Review group[11] and managed by the CNPS and CDFW (CDFW 2025). A CRPR summarizes information on the distribution, rarity, and endangerment of California's vascular plants. Plants with a CRPR of **1A** are presumed extirpated from the state because they have not been seen in the wild in California for many years and they are either rare or extinct elsewhere. Plants with a CRPR of **1B** are Rare, Threatened, or Endangered throughout their range. Plants with a CRPR of **2A** are presumed extirpated from California but are more common elsewhere. Plants with a CRPR of **2B** are considered Rare, Threatened, or Endangered in California, but are more common elsewhere. Plants with a CRPR of **3** require more information before they can be assigned to another rank or rejected; this is a "review" list. Plants with a CRPR of **4** are of limited distribution or are infrequent throughout a broader area in California; this is a "watch list". The Threat Rank is an extension that is added to the CRPR to designate the plant's endangerment level. An extension of **.1** is assigned to plants that are considered to be "seriously threatened" in California (i.e., over 80 percent of the occurrences are threatened or have a high degree and immediacy of threat). Extension **.2** indicates the plant is "fairly threatened" in California (i.e., between 20 and 80 percent of the occurrences are threatened or have a moderate degree and immediacy of threat). Extension **.3** is assigned to plants that are considered "not very threatened" in California (i.e., less than 20 percent of occurrences are threatened or have a low degree and immediacy of threat or no current threats are known). The absence of a threat code extension indicates that this information is lacking for the plant(s) in question.

[11] This group consists of over 300 botanical experts from the government, academia, non-governmental organizations, and the private sector.

In addition to providing an inventory of special status plant and wildlife species, CDFW also provides an inventory of vegetation types that are considered special status by the State and federal resource agencies, academic institutions, and various conservation groups (e.g., the CNPS). Special status natural communities are "of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects"; they may or may not contain special status species (CDFG 2009). Determination of the level of imperilment (i.e., exposure to injury, loss, or destruction) is based on the NatureServe Heritage Program Status Ranks that rank both species and vegetation types on a global and statewide basis according to their rarity, trend in population size or area, and recognized threats (e.g., proposed developments, habitat degradation, and non-native species invasion) (Faber-Langendoen et al. 2012).

3.5 SPECIAL STATUS VEGETATION TYPES

Coastal sage scrub vegetation (i.e., sagebrush scrub, disturbed sagebrush scrub, sagebrush – coyote brush scrub, southern cactus scrub, disturbed southern cactus scrub and disturbed floodplain sage scrub) is considered a special status vegetation type in the Central–Coastal NCCP/HCP area because of its potential to support NCCP/HCP Covered Species. Additionally, southern cactus scrub and disturbed southern cactus scrub are considered sensitive natural communities by CDFW (2025b; Table 12).

Riparian vegetation types are often considered special status because they are often under the regulatory authority of the resource agencies (i.e., USACE, CDFW, and RWQCB); jurisdictional resources are discussed in the next section. Riparian vegetation types in the BSA include riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb. Other mapped areas that may be considered riparian and jurisdictional resources include open water, fluctuating shoreline, vegetated fluctuating shoreline, and perennial stream. Of these riparian vegetation types, southern willow scrub, southern black willow forest, and disturbed southern black willow forest are considered sensitive natural communities by CDFW (2025b; Table 12).

Sycamore and oak woodlands provide high quality habitat for wildlife. These trees are large enough to provide cavities for shelter (e.g., roosting) and breeding (e.g., cavity-nesting) for wildlife species. Downed wood provides important cover for amphibians, reptiles, and small to medium-sized mammals; nest sites for cavity-nesting and ground-nesting birds; nutrients into the soil as they decompose; and favorable microhabitat for emerging seedlings (Tietje et al. 2005). Southern sycamore riparian woodland/coast live oak forest and western sycamore are considered sensitive natural communities by CDFW (2025b; Table 12). Coast live oak woodland is not considered a sensitive natural community but is generally considered of local concern because of the habitat value that it provides.

Toyon–sumac chaparral, annual grassland, ruderal, and ornamental are not considered sensitive natural communities by CDFW (2025b). Cliff, disturbed and developed are not given threat rankings because they are unvegetated landcovers.

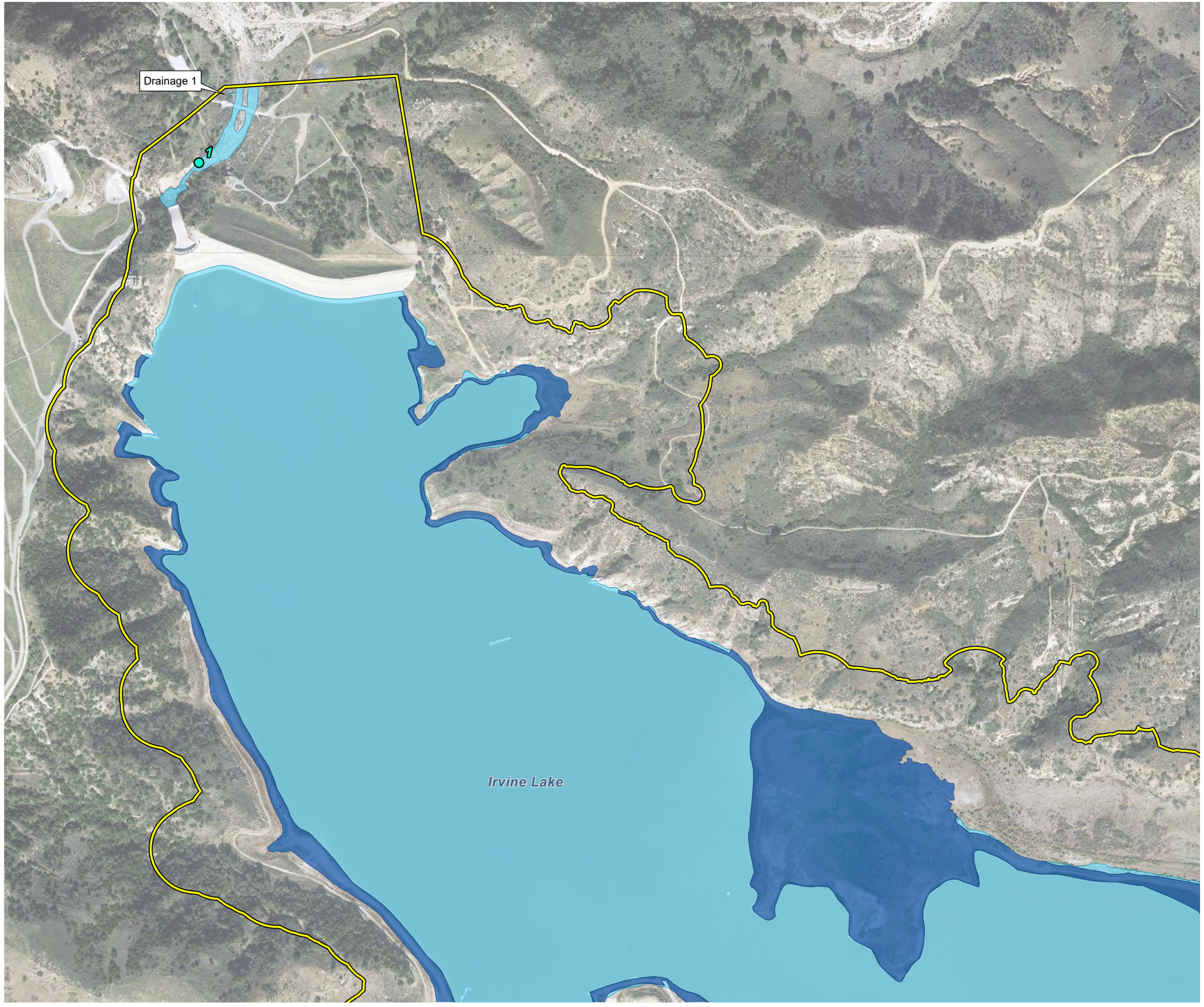
3.6 JURISDICTIONAL RESOURCES

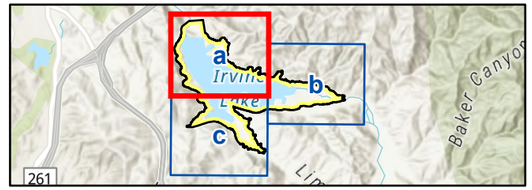
Seventeen potential jurisdictional features were mapped in the BSA: Irvine Lake, Santiago Creek, and 15 smaller drainages that discharge into either Irvine Lake or Santiago Creek. Based on an assessment of jurisdictional waters, a total of 428.476 acres of WOTUS under the regulatory authority of the USACE, 435.205 acres of waters of the State under the regulatory authority of the RWQCB, and 669.630 acres of waters under the regulatory authority of CDFW occurs in the BSA (Table 13, Exhibits 7, 8, and 9).

TABLE 13
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

Feature	Jurisdiction (acres)						
	USACE WOTUS			RWQCB Waters of the State			CDFW Jurisdictional Resources
	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Total
Irvine Lake	94.582	312.959	407.541	94.582	312.959	407.541	614.135
Santiago Creek	7.124	13.803	20.927	7.124	13.803	20.927	36.024
Drainage 1	—	0.008	0.008	—	0.008	0.008	0.027
Drainage 2	—	—	—	—	0.025	0.025	0.074
Drainage 3	—	—	—	—	0.071	0.071	0.168
Drainage 4	—	—	—	—	0.048	0.048	0.094
Drainage 5	—	—	—	—	0.144	0.144	0.359
Drainage 6	—	—	—	—	0.369	0.369	0.149
Drainage 7	—	—	—	—	0.100	0.100	0.148
Drainage 8	—	—	—	—	0.024	0.024	0.042
Drainage 9	—	—	—	—	0.066	0.066	1.237
Drainage 10	—	—	—	—	0.167	0.167	0.245
Drainage 11	—	—	—	—	0.114	0.114	0.318
Drainage 12	—	—	—	—	4.894	4.894	13.517
Drainage 13	—	—	—	—	0.039	0.039	0.114
Drainage 14	—	—	—	—	0.235	0.235	0.416
Drainage 15	—	—	—	—	0.433	0.433	2.563
Total	**101.706**	**326.770**	**428.476**	**101.706**	**333.499**	**435.205**	**669.630**

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

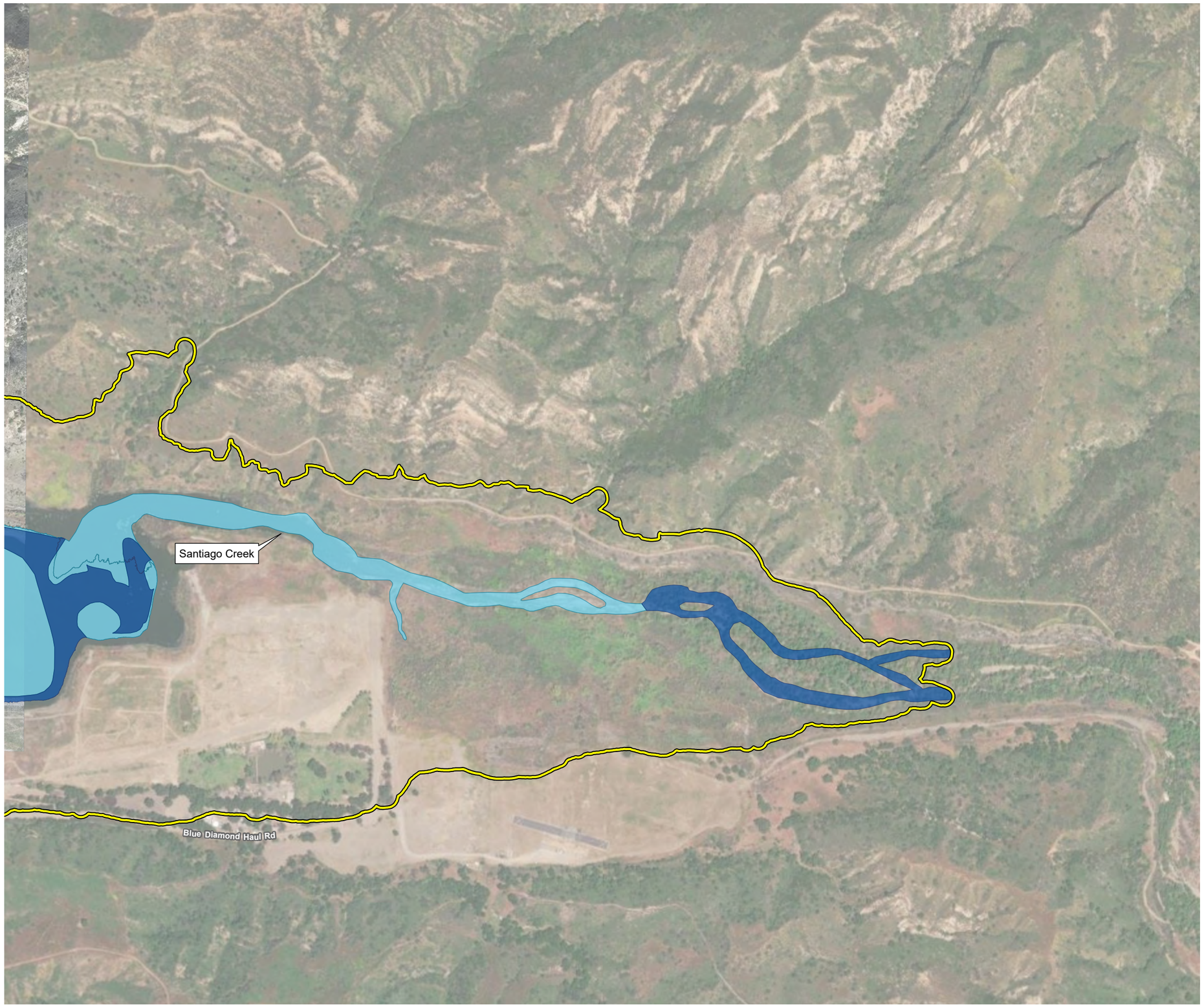
Exhibit 7a

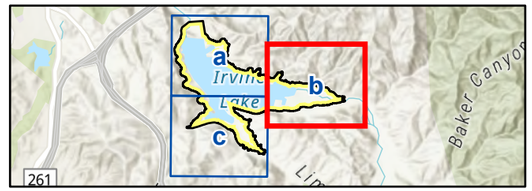
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

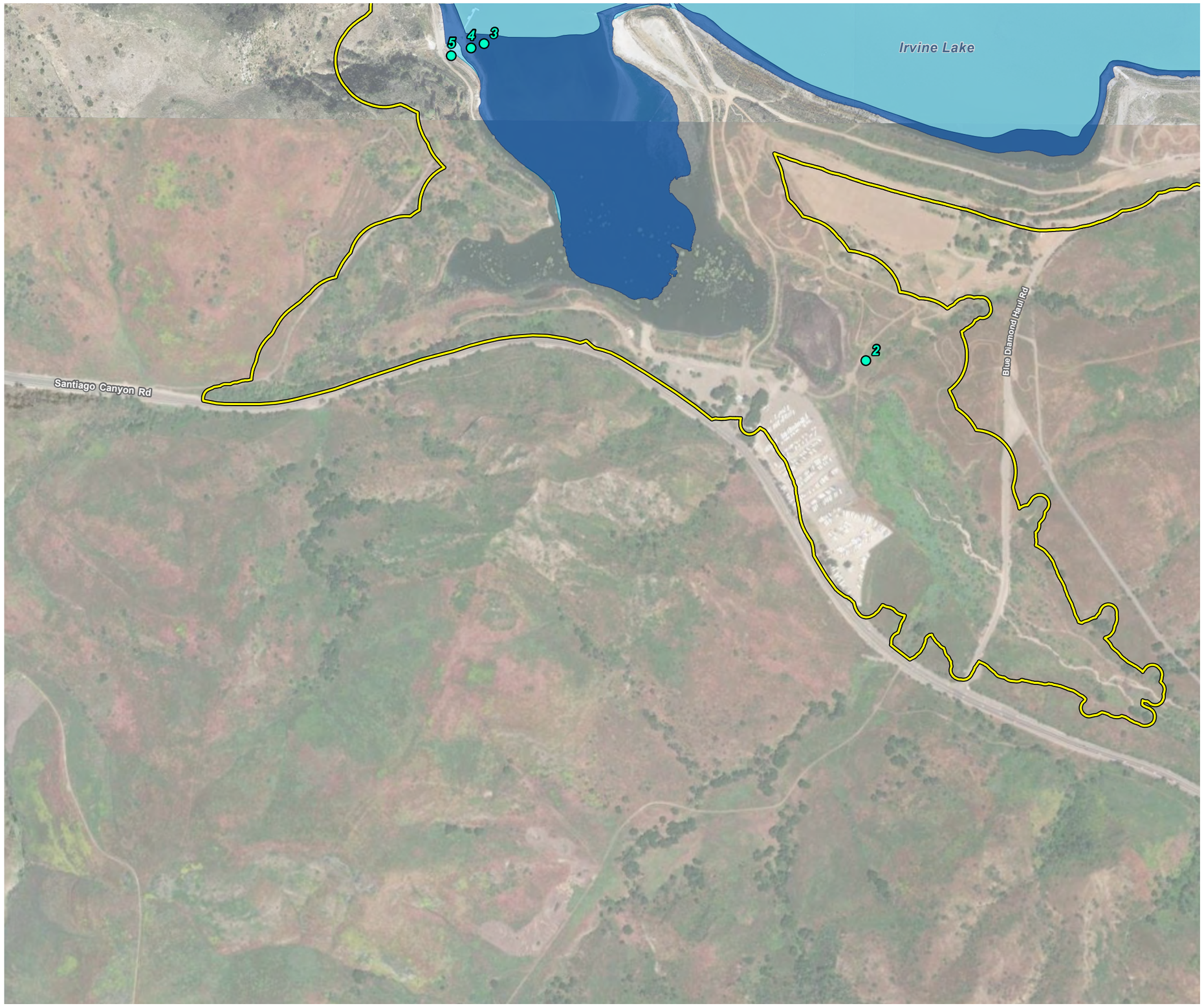
Exhibit 7b

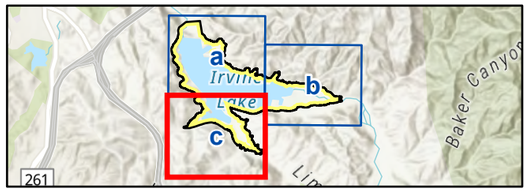
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

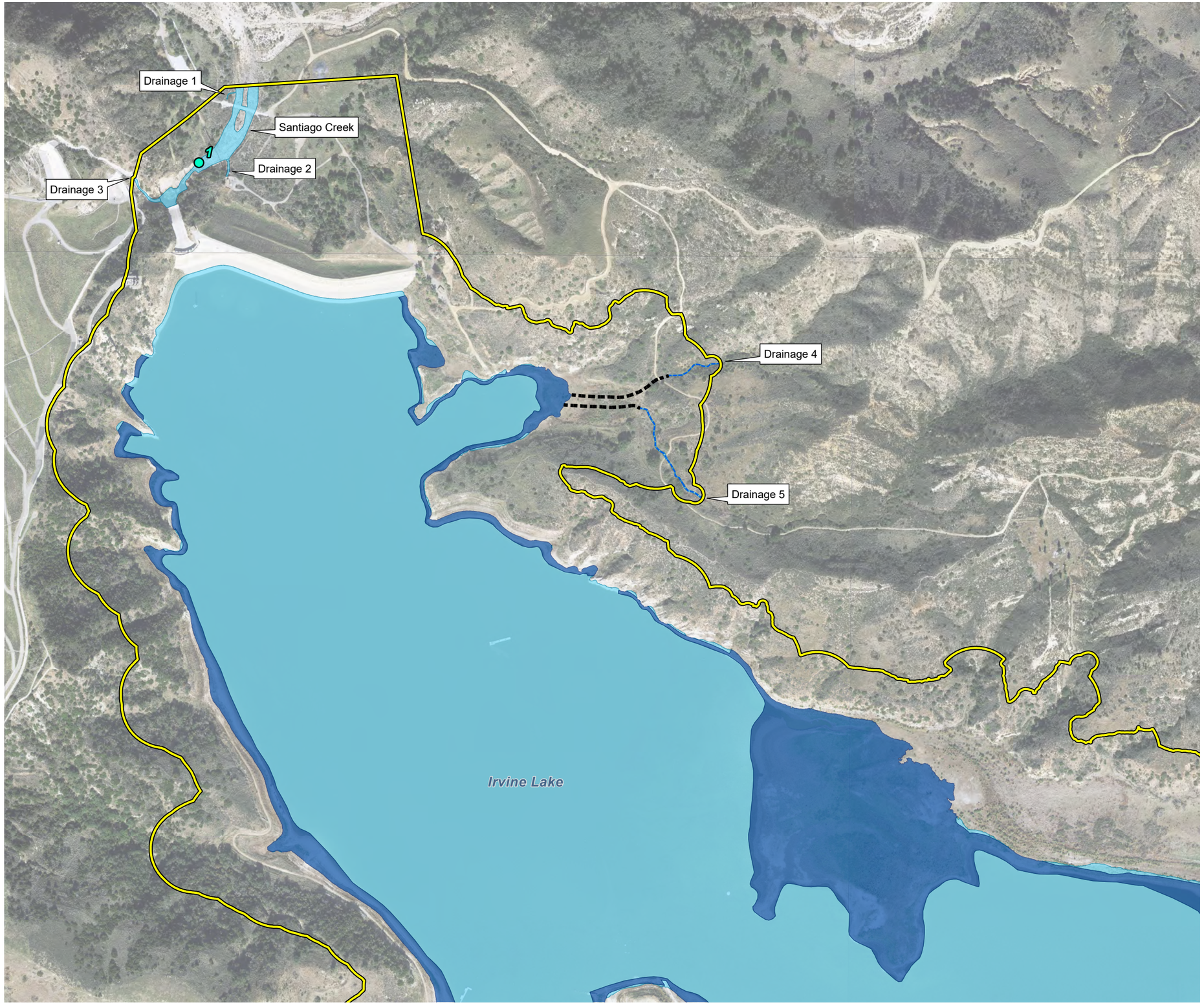
Exhibit 7c

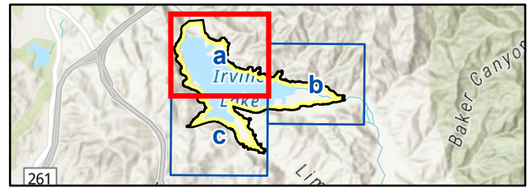
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

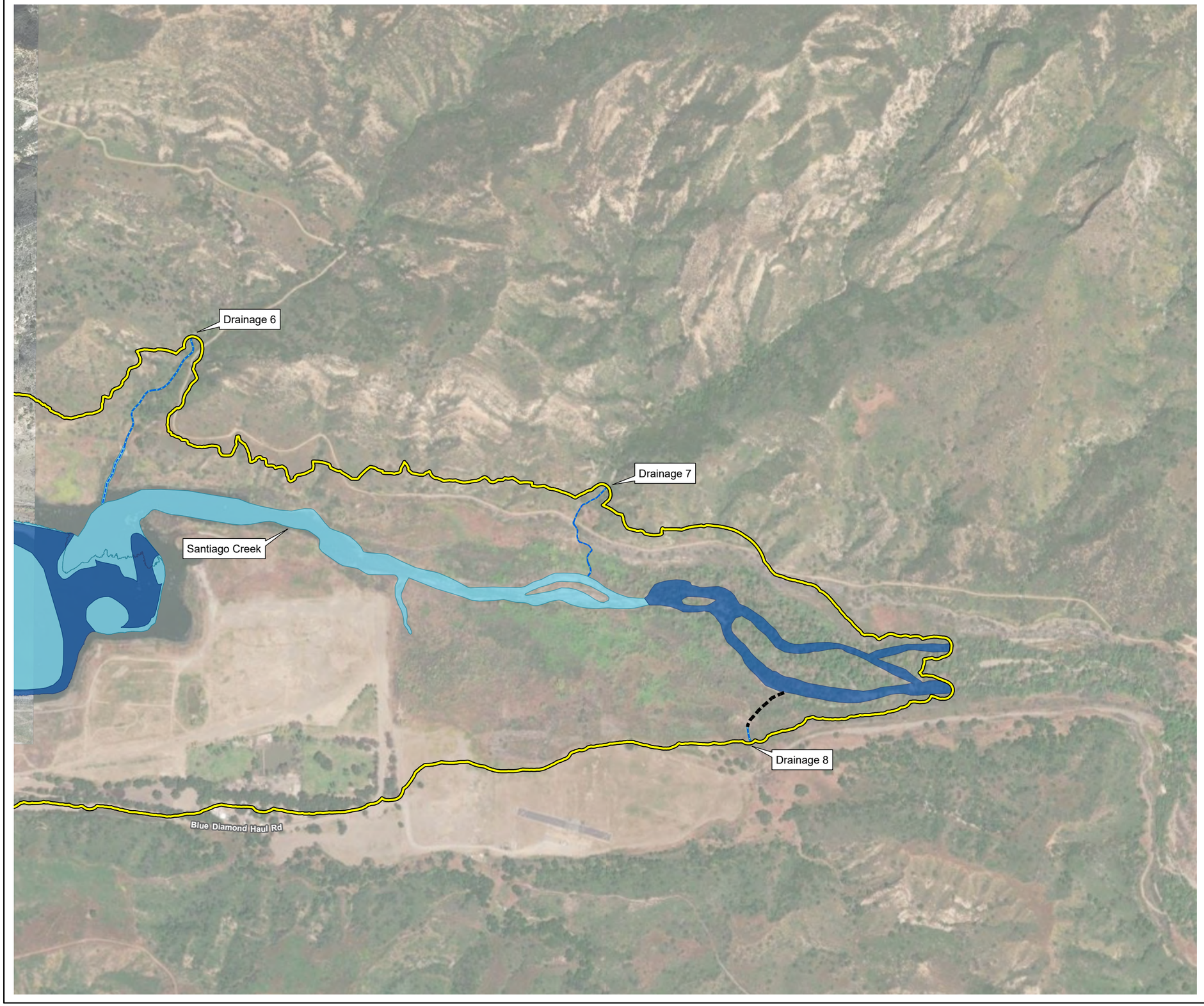
Exhibit 8a

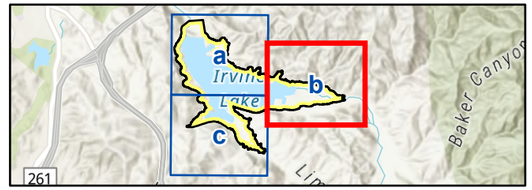
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

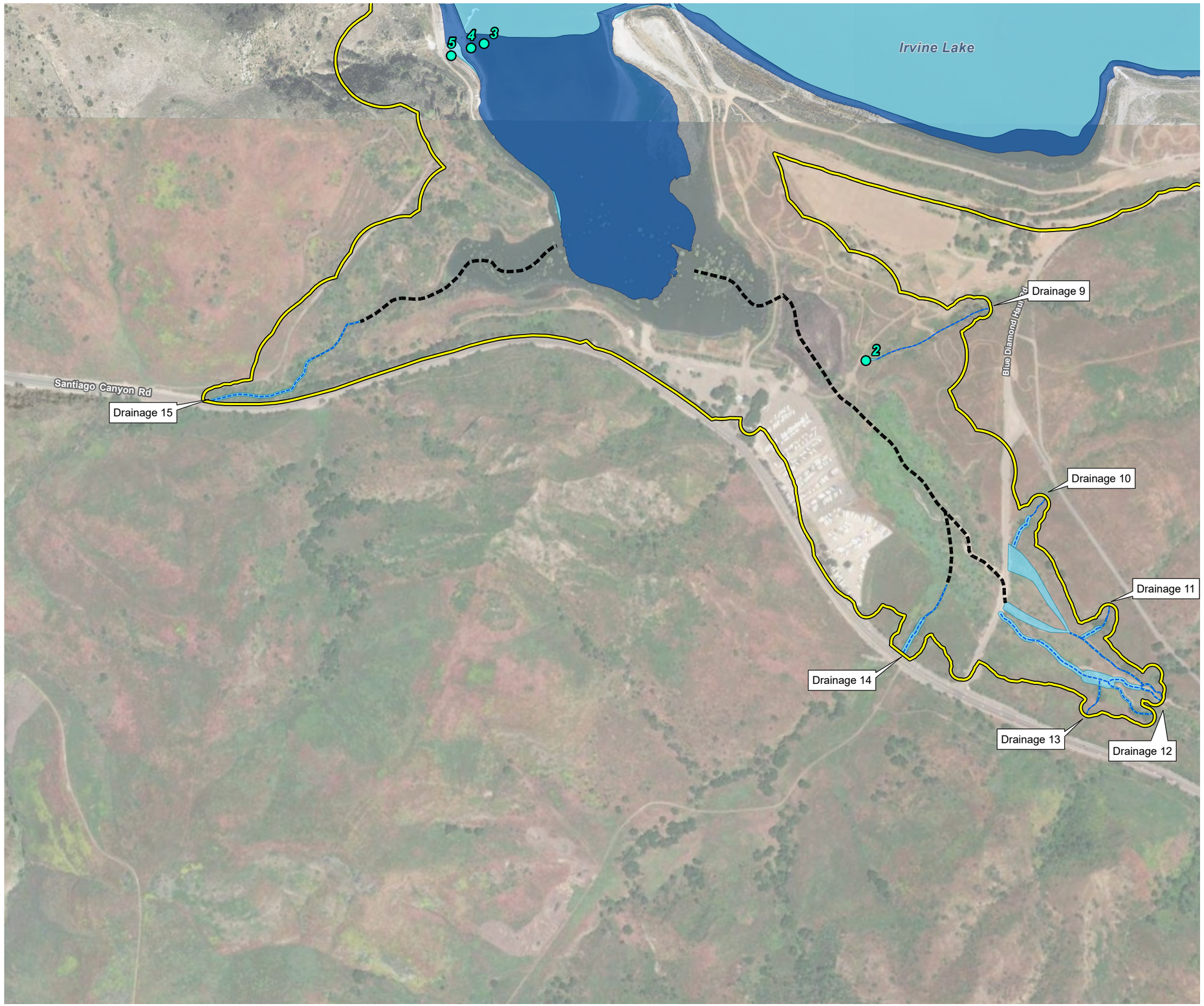
Exhibit 8b

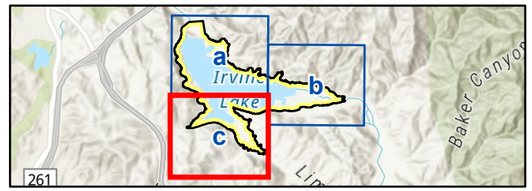
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\IBTR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)

Waters of the State

- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

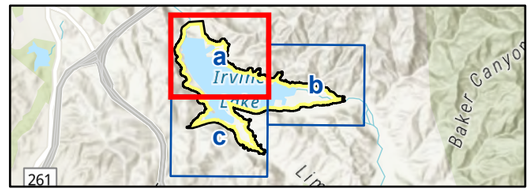
Exhibit 8c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\SCD_Project.aprx\ex_JD_RWQCB



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

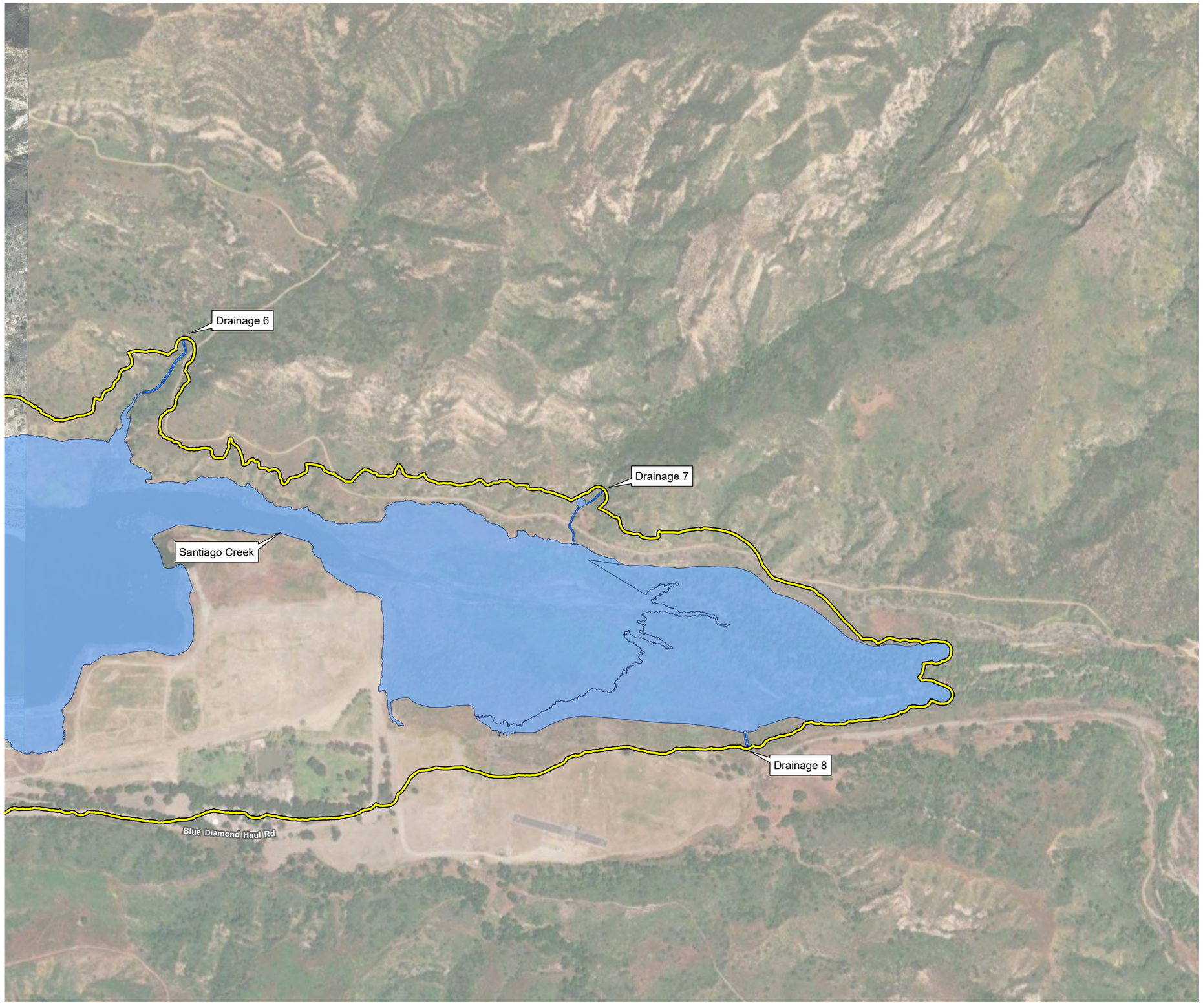
Exhibit 9a

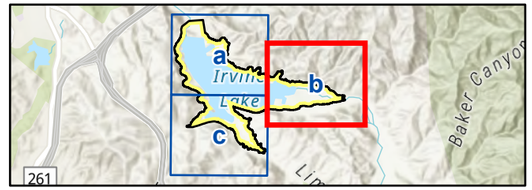
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW





Survey Area

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

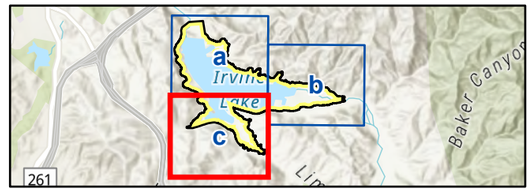
Exhibit 9b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

Exhibit 9c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW

3.7 SPECIAL STATUS PLANTS

Table 14 provides a summary of special status plant species reported to occur in the Project region (i.e., the USGS' Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles). This list includes species reported by the CNDDB and the CNPS, supplemented with species from the Project Biologist's experience that either occur nearby or could occur based on the presence of suitable habitat. The table includes information on the status, NCCP/HCP coverage, species habitat, and potential for occurrence. Note that these species are listed alphabetically according to their scientific name.

Focused surveys for special status plants were conducted downstream of the dam in spring/summer 2020 and upstream of the dam in spring/summer 2022. The potential for occurrence in the area where additional inundation would occur is also shown in Table 14.

Focused surveys were conducted for all special status plant species with potential to occur in the BSA based on the presence of suitable habitat. Three special status plant species, intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*), and Coulter's matilija poppy, were observed downstream of the dam during the 2020 focused surveys (Appendix E). Four special status plant species, Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily, mud nama (*Nama stenocarpa*), and Coulter's matilija poppy, were observed upstream of the dam during the 2022 focused surveys (Appendix E). The five special status species that were observed in the BSA are discussed in more detail following the table. The remaining species would not be expected to occur because the BSA lacks suitable habitat or because they were not observed during the focused surveys.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Abronia villosa var. *aurita*	chaparral sand-verbena	—	—	1B.1	No	Sandy areas in chaparral, coastal scrub, desert dunes.	Not expected to occur; not observed during focused surveys; suitable habitat.
Allium marvinii	Yucaipa onion	—	—	1B.2	No	Dry slopes and ridges in chaparral.	Not expected to occur; outside current known range.
Astragalus brauntonii	Braunton's milk-vetch	FE	—	1B.1	No	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland. Reported immediately north of the BSA in 2012 (CDFW 2025a).	**Observed in the survey area**
Atriplex coulteri	Coulter's saltbush	—	—	1B.2	No	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Atriplex pacifica	south coast saltscale	—	—	1B.2	No	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Atriplex serenana var. *davidsonii*	Davidson's saltscale	—	—	1B.2	No	Alkaline soils in coastal bluff scrub, coastal scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Baccharis malibuensis	Malibu baccharis	—	—	1B.1	No	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland. Reported immediately north of the BSA in 2000 (CCH 2020).	Not expected to occur; not observed during focused surveys; suitable habitat.
Bahiopsis laciniata	San Diego County viguiera	—	—	4.3	No	Chaparral and coastal scrub	Not expected to occur; not observed during focused surveys; suitable habitat.
Brodiaea filifolia	thread-leaved brodiaea	FT	SE	1B.1	No	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Calandrinia breweri	Brewer's calandrinia	—	—	4.2	No	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Calochortus catalinae	Catalina mariposa lily	—	—	4.2	Covered	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat. Incidentally observed on access road outside survey area.
Calochortus plummerae	Plummer's mariposa-lily	—	—	4.2	No	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest.	Not expected to occur; not observed during focused surveys; suitable habitat.
Calochortus weedii var. *intermedius*	intermediate mariposa-lily	—	—	1B.2	Conditionally Covered	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland.	**Observed in the survey area.**

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Camissoniopsis lewisii	Lewis' evening-primrose	—	—	3	No	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Centromadia parryi ssp. *australis*	southern tarplant	—	—	1B.1	No	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	—	SE	1B.1	No	Sandy soils in coastal scrub, valley and foothill grasslands. Historic (1902) occurrence within 0.5 mile of the BSA, but the BSA is outside the current known range of the species (CDFW 2025a).	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside current known range.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Chorizanthe polygonoides var. *longispina*	long-spined spineflower	—	—	1B.2	No	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools. BSA is at the edge of the current known range.	Not expected to occur; not observed during focused surveys; suitable habitat.
Convolvulus simulans	small-flowered morning-glory	—	—	4.2	No	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands. Reported just west of Irvine Lake in 2016 (CCH 2020).	Not expected to occur; not observed during focused surveys; suitable habitat.
Deinandra paniculata	paniculate tarplant	—	—	4.2	No	Usually vernally mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Diplacus clevelandii	Cleveland's bush monkeyflower	—	—	4.2	No	Disturbed areas and open borders of chaparral, cismontane woodland, and lower montane coniferous forest.	Not expected to occur; outside current known elevational range.
Dodecahema leptoceras	slender-horned spineflower	FE	SE	1B.1	No	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub.	Not expected to occur; outside current known range.
Dudleya cymosa ssp. *ovatifolia*	Santa Monica Mountains dudleya	FT	—	1B.1	Covered	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Dudleya multicaulis	many-stemmed dudleya	—	—	1B.2	No	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland. Reported in immediate vicinity of the BSA in 2008 (CDFW 2025a).	**Observed in the 2020 plant focused survey area.**

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Eriastrum densifolium ssp. *sanctorum*	Santa Ana River woollystar	FE	SE	1B.1	No	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
Harpagonella palmeri	Palmer's grapplinghook	—	—	4.2	Covered	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	—	—	1A	No	Coastal and freshwater marshes and swamps.	Not expected to occur; not observed during focused surveys; presumed extinct; suitable habitat.
Hesperocyparis forbesii	Tecate cypress	—	—	1B.1	Covered	Clay or gabbro soils in closed-cone coniferous forest and chaparral.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.
Hesperocyparis goveniana	Gowen cypress	FT	—	1B.2	No	Closed-cone coniferous forest, mixed evergreen forest, chaparral, and coastal terraces. Perennial species observable year-round.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Hordeum intercedens	vernal barley	—	—	3.2	No	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools. Reported just south of Irvine Lake in 1998 (CCH 2020).	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Horkelia cuneata var. *puberula*	mesa horkelia	—	—	1B.1	No	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Juglans californica	Southern California black walnut	—	—	4.2	No	Chaparral, cismontane woodland, coastal scrub, and riparian woodland. Perennial species observable year-round.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.
Juncus acutus ssp. *leopoldii*	southwestern spiny rush	—	—	4.2	No	Moist, saline places including coastal dunes, marshes and swamps, and meadows and seeps. Perennial species observable year-round.	Not expected to occur; perennial species not observed during focused surveys; marginally suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	—	—	1B.1	No	Usually on alkaline soils in coastal salt marsh, playas, vernal pools. Reported from oak woodland in 2008 (CCH 2020).	Not expected to occur; not observed during focused surveys; no suitable habitat.
Lepechinia cardiophylla	heart-leaved pitcher sage	—	—	1B.2	Covered	Closed-cone coniferous forest, chaparral, cismontane woodland.	Not expected to occur; outside current known elevational range.
Lepidium virginicum var. *robinsonii*	Robinson's pepper-grass	—	—	4.3	No	Dry soils in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
Lilium humboldtii ssp. *ocellatum*	ocellated Humboldt lily	—	—	4.2	No	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Lycium californicum	California box-thorn	—	—	4.2	No	Coastal bluff scrub and coastal scrub. Perennial species observable year-round.	Not expected to occur; outside current known range.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Monardella hypoleuca ssp. *intermedia*	intermediate monardella	—	—	1B.3	No	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Nama stenocarpa	mud nama	—	—	2B.2	No	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps. BSA is at the edge of the current known range.	**Observed in the survey area.**
Nasturtium gambelii	Gambel's water cress	FE	ST	1B.1	No	Freshwater and brackish marshes at the martins of lakes and along streams; in or just above the water level.	Not expected to occur; not observed during focused surveys; suitable habitat.
Nolina cismontana	chaparral nolina	—	—	1B.2	No	Primarily sandstone and shale substrates in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Penstemon californicus	California beardtongue	—	—	1B.2	No	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland.	Not expected to occur; outside current known range.
Pentachaeta aurea ssp. *allenii*	Allen's pentachaeta	—	—	1B.1	No	Openings in coastal scrub and valley and foothill grasslands.	Not expected to occur; not observed during focused surveys; suitable habitat.
Phacelia hubbyi	Hubby's phacelia	—	—	4.2	No	Open gravelly or rocky slopes of chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Pickeringia montana var. *tomentosa*	woolly chaparral-pea	—	—	4.3	No	Gabbroic, granitic, or clay soil in chaparral.	Not expected to occur; no suitable habitat.
Pseudognaphalium leucocephalum	white rabbi-tobacco	—	—	2B.2	No	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Rhinotropis [*Polygala*] *cornuta* var. *fishiae*	Fish's milkwort	—	—	4.3	No	Chaparral, cismontane woodland, riparian woodland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Romneya coulteri	Coulter's matilija poppy	—	—	4.2	Covered	Chaparral and coastal scrub, often in burns.	**Observed in the survey area.**
Senecio aphanactis	chaparral ragwort	—	—	2B.2	No	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Sidalcea neomexicana	salt spring checkerbloom	—	—	2B.2	No	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
Suaeda esteroa	estuary seablite	—	—	1B.2	No	Coastal salt marshes in clay, silt, and sand substrates.	Not expected to occur; no suitable habitat.
Suaeda taxifolia	woolly seablite	—	—	4.2	No	Coastal bluff scrub, coastal dunes, and salt marshes.	Not expected to occur; outside current known range; no suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
Symphyotrichum defoliatum	San Bernardino aster	—	—	1B.2	No	Disturbed areas, vernally mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
Viguiera laciniata	San Diego County viguiera	—	—	4.3	No	Chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

CRPR: California Rare Plant Rank; NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan

LEGEND:

Federal Status

FE Endangered
FT Threatened

State Status

SE Endangered
ST Threatened

CRPR

1A Plants presumed extirpated in California and either rare or extinct elsewhere
1B Plants Rare, Threatened, or Endangered in California and elsewhere
2B Plants Rare, Threatened, or Endangered in California but more common elsewhere
3 Plants about which we need more information – A Review List
4 Plants of limited distribution – A Watch List

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
CRPR Threat Code Extensions None Plants lacking any threat information .1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat) .2 Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat) .3 Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known) Species that were observed on site are shown in **boldface type.** * Sources include CDFW 2025a, CNPS 2025, and Jepson Flora Project 2024.							

3.7.1 Braunton's Milkvetch

Braunton's milkvetch is a federally listed Endangered species and has a CRPR of 1B.1. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and August (CNPS 2025). This perennial herb occurs in chaparral, coastal scrub, and valley and foothill grassland at elevations between approximately 15 and 2,100 feet above msl (Jepson Flora Project 2024; CNPS 2025). It generally occurs after recent burns or in disturbed areas, usually in sandstone with carbonate layers (CNPS 2025). This species is known from the western portion of the Western Transverse Ranges, the San Gabriel Mountains, tentatively from the San Gabriel Mountains/South Coast, and the northern Peninsular Ranges (Jepson Flora Project 2024); it is known from a few canyons in Orange County (Allen and Roberts 2013).

One individual Braunton's milkvetch was observed in the 2022 survey area (Psomas 2022a; Exhibit 10). It was observed in the sandy channel of Santiago Creek, upstream of the lake. The species associated with the Braunton's milkvetch observed in the survey area include mule fat, cicuta-leaved phacelia (*Phacelia cicutaria*), and horseweed (*Erigeron canadensis*). A voucher specimen was not collected due to the limited population size.

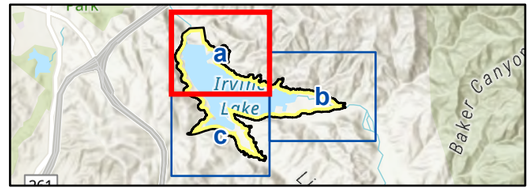
3.7.2 Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species[12] in the Central–Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2024; CNPS 2025). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2024). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2024).

One individual intermediate mariposa lily was observed in the 2020 focused survey area (Psomas 2020d, Exhibit 10). This individual was observed in the eastern portion of the 2020 focused survey area on a moderately steep, south facing slope in disturbed sagebrush scrub with Ceineba-rock outcrop complex soil. The species associated with the intermediate mariposa lily observed include California sagebrush, black mustard, coast morning glory (*Calystegia macrostegia*), and oats.

Four individual intermediate mariposa lilies were observed in the 2022 focused survey area and an additional individual was observed just outside the survey area (Psomas 2022a; Exhibit 10). The four individuals were observed in two populations in the northwestern portion of the 2022 survey area on moderately steep, southeast- to east-facing slopes in sagebrush scrub. The species associated with the intermediate mariposa lilies observed in the survey area include California sagebrush, black sage (*Salvia mellifera*), chilicothe, mule fat, California encelia (*Encelia californica*), and smilo grass (*Stipa miliacea* var. *miliacea*).

[12] The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.



- Biological Study Area
- Arroyo Toad Survey Area

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Many-Stemmed Dudleya Population
- Mud Nama Population (mapped polygon)

Special Status Species

- American Peregrine Falcon
- American White Pelican
- Coastal Cactus Wren
- Coastal California Gnatcatcher
- Grasshopper Sparrow
- Least Bell's Vireo
- Southern California Rufous-Crowned Sparrow
- White-Tailed Kite
- Yellow-Breasted Chat
- Two-Striped Gartersnake

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

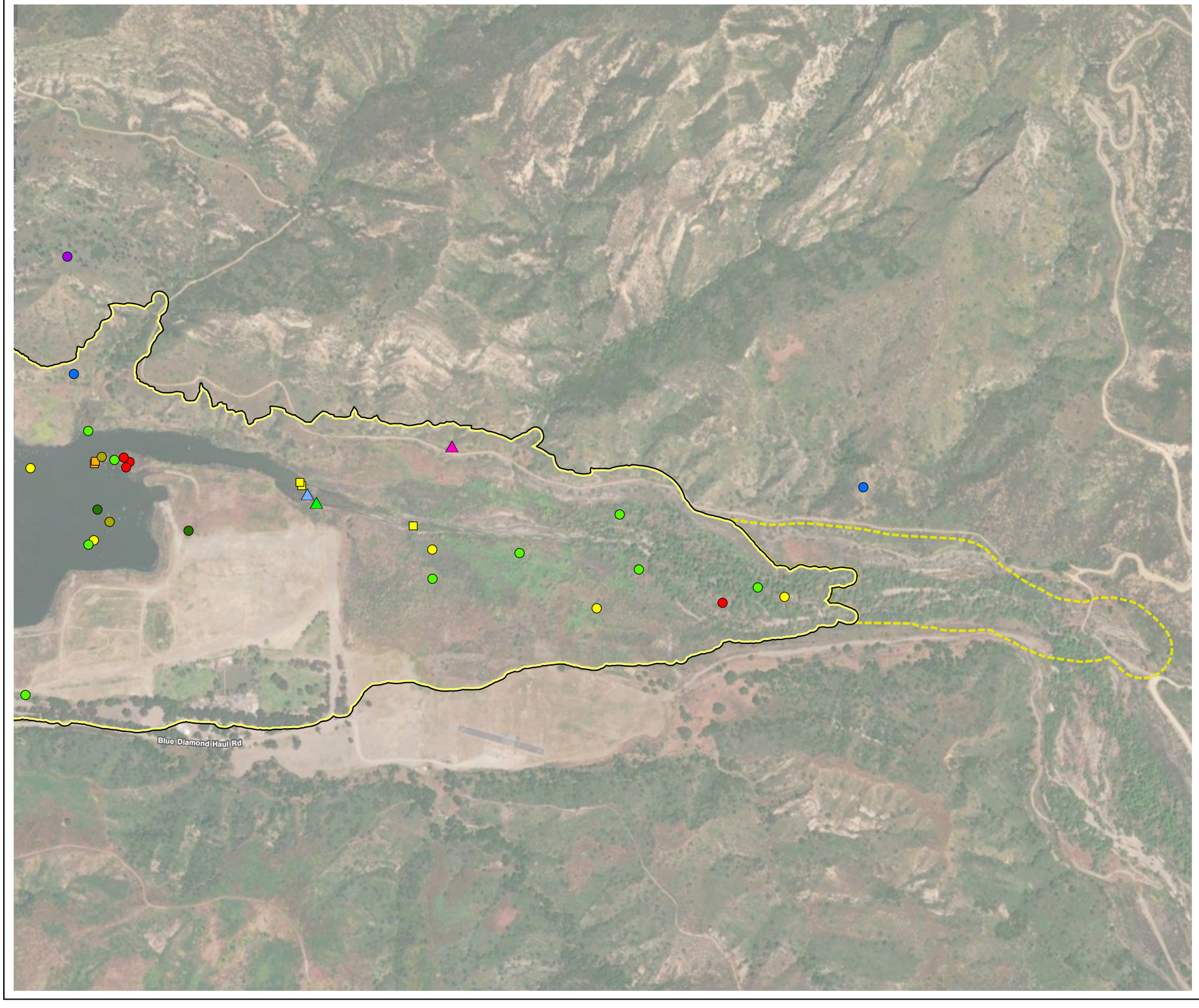
Exhibit 10a

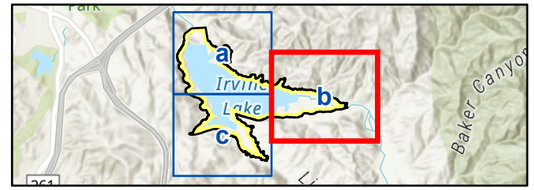
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_SS_Species





Biological Study Area

Arroyo Toad Survey Area

Special Status Plants

- Coulter's Matilija Poppy Population
- Intermediate Mariposa Lily Population
- Braunton's Milkvetch Population

Special Status Species

- Bald Eagle (Nest)
- Coastal Cactus Wren
- Grasshopper Sparrow
- Least Bell's Vireo
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat
- Belding's Orange-Throated Whiptail
- Two-Striped Gartersnake

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

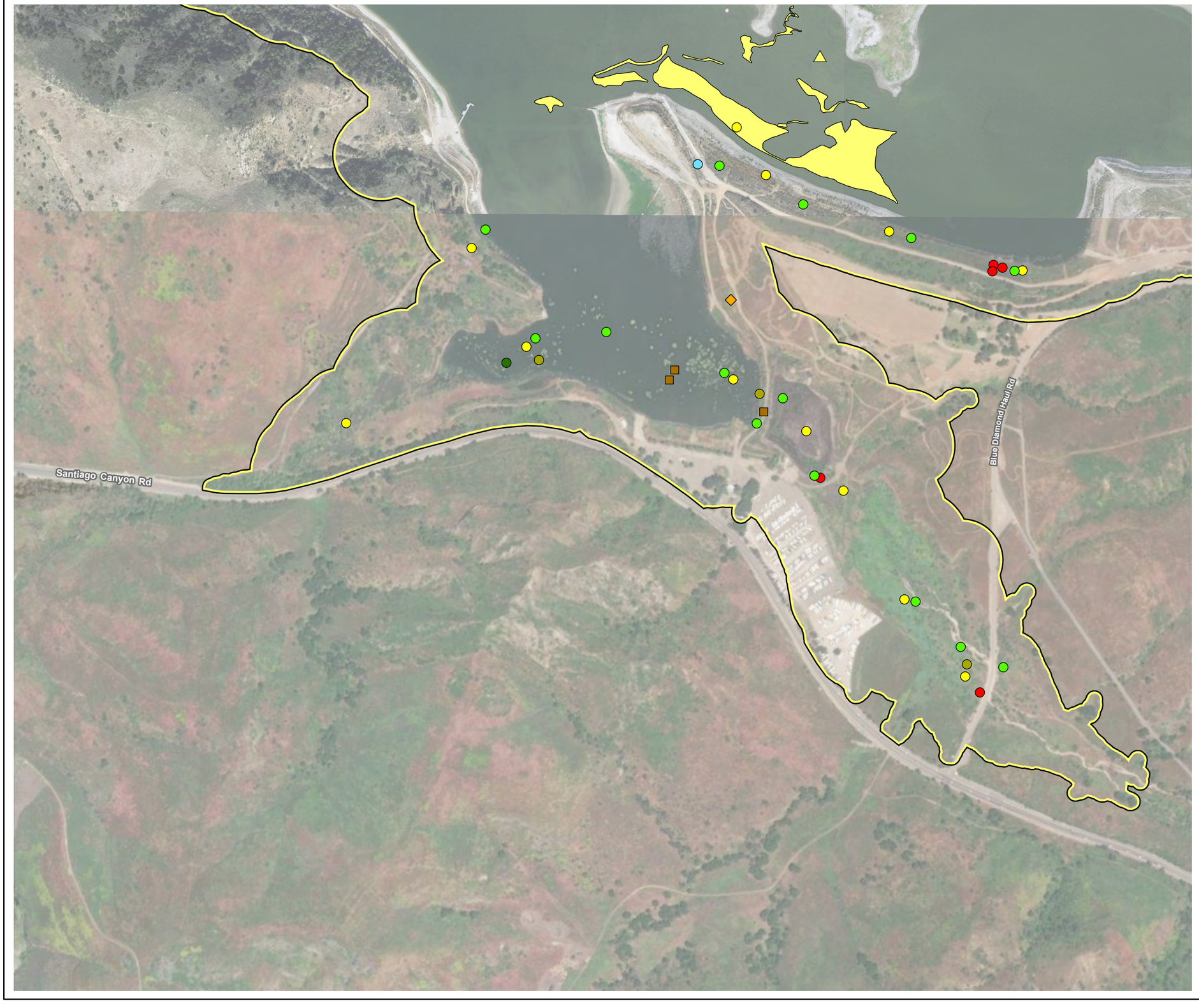
Exhibit 10b

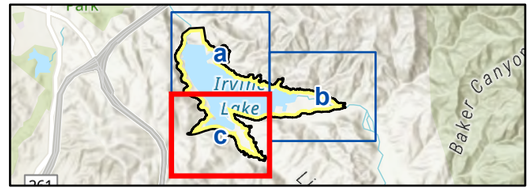
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTRex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_SS_Species





Biological Study Area

Special Status Plants

- Mud Nama Population (point location)
- Mud Nama Population (mapped polygon)

Special Status Species

- Crotch's Bumble Bee
- Coastal California Gnatcatcher
- Grasshopper Sparrow
- Least Bell's Vireo
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat
- Coastal Whiptail

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

Exhibit 10c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTRex_SS_Species.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_SS_Species

3.7.3 Many-stemmed Dudleya

Many-stemmed dudleya has a CRPR of 1B.2. It is not covered by the Central–Coastal NCCP/HCP. It typically blooms between April and June (Jepson Flora Project 2024; CNPS 2025). This perennial herb occurs on heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley, and foothill grassland at elevations between approximately 5 and 2,975 feet above msl (Roberts 2008; Jepson Flora Project 2024). This species is known from the South Coast (Jepson Flora Project 2024).

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations in the 2020 focused survey area (Psomas 2020d, Exhibit 10). Approximately 800 individuals were observed in the eastern portion of the 2020 focused survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the 2020 focused survey area. The majority of individuals (eastern location) were observed in disturbed sagebrush scrub with Ceineba-rock outcrop complex and pits soil. The smaller population (western location) was observed in toyon-sumac chaparral with Sorrento loam soil. The species associated with the many-stemmed dudleya included California sagebrush, California buckwheat, daggerleaf cottonrose (*Filago gallica*), white sage, splendid mariposa lily (*Calochortus splendens*), common goldfields (*Lasthenia gracillis*), osmadenia (*Osmadenia tenella*), and little California melica (*Melica imperfecta*).

3.7.4 Mud Nama

Mud nama has a CRPR of 2B.2. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and October (Jepson Flora Project 2024; CNPS 2025). This annual herb occurs in intermittently wet areas of marshes and swamps, including lake margins and riverbanks at elevations between approximately 15 and 1,640 feet above msl (Jepson Flora Project 2024; CNPS 2025). This species is known from the San Joaquin Valley, South Coast, southern Channel Islands, western Peninsular Ranges, and southeastern Sonoran Desert (Jepson Flora Project 2024). The CNDDB contains 22 records of this species in Imperial, Kings, Los Angeles, Orange, Riverside, and San Diego Counties. Of these, seven locations are reported from Orange County (i.e., Anaheim Marsh [historic occurrence, 1932], Laguna Lakes in Laguna Canyon, Emerald Canyon, Lambert Reservoir, Peters Canyon Channel, Fairview Park, and Ladera Ranch); all the records are over 25 years old. Of these records, the largest reported population was 30 individuals, most other records did not include a count or reported less than 10 individuals (CDFW 2025a).

Multiple populations of mud nama were observed in the southern portion of Irvine Lake in the 2022 focused survey area (Psomas 2022a; Exhibit 10). This area experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. The species associated with the mud nama observed in the survey area were primarily annual beard grass, white sweetclover, and sourclover (*Melilotus indicus*) with scattered saltcedar, alkali heliotrope, mule fat, flatsedge, everlasting (*Pseudognaphalium* sp.), water cress (*Nasturtium officinale*), and willow weed.

Individuals covered a large area and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama. This resulted in an average of 37.7 individuals per square foot. Therefore, a "high density" population was considered to have between 35 and 40 individuals per square foot. A "moderate density" population was considered to have between 20 and 25 individuals per square foot and a "low density" population was considered to have between 5 and 10 individuals per square foot. Based on these approximate population densities, the total number of individuals in the survey area was estimated using the square footage of each population. The total population was estimated to be between 3.5 and 5.5 million (Table 15). This is the largest population currently known for this species.

TABLE 15
MUD NAMA POPULATION INFORMATION

Population Number	Estimated Population Density	Population Area (square feet)	Estimated Population Size (Number of Individuals)
1	High density	25,023	875,805 – 1,000,920
2	Moderate density	15,709	314,180 – 392,725
3*	n/a	n/a	100
4*	n/a	n/a	1,000
5	Low density	284,500	1,422,500 – 2,845,000
6	Low density	12,647	63,235 – 126,470
7	Low density	1,121	5,605 – 11,210
8	High density	1,036	36,260 – 41,440
9	Low density	3,053	15,265 – 30,530
10	Low density	9,367	46,835 – 93,670
11	High density	17,305	605,675 – 692,200
12	Low density	8,335	41,675 – 83,350
		Total	**3,428,135 – 5,318,615**

High Density: 35–40 individuals per square foot; Moderate Density: 20–25 individuals per square foot; Low Density: 5–10 individuals per square foot

*Populations 3 and 4 were small and population sizes were estimated directly.

3.7.5 Coulter's Matilija Poppy

Coulter's matilija poppy has a CRPR of 4.2. It is a Covered Species in the Central–Coastal NCCP/HCP. It typically blooms between March and July (Jepson Flora Project 2024; CNPS 2025). This perennial rhizomatous herb occurs in chaparral and coastal scrub, often in elevations between sea level and approximately 3,937 feet above msl (Roberts 2008; Jepson Flora Project 2024). This species grows as clones via rhizomes (Clarke et al. 2007; Jepson Flora Project 2024). This species is known from the South Coast, Western Transverse and Peninsular Ranges, and San Jacinto Mountains (Jepson Flora Project 2024).

Approximately 46 Coulter's matilija poppy clones were observed in 3 populations in the 2020 focused survey area (Psomas 2020d, Exhibit 10). Coulter's matilija poppy clones were observed in the northern and central portions of the 2020 focused survey area. The clones were observed in sagebrush scrub, coast live oak woodland, and toyon–sumac chaparral with Sorrento loam soil. The species associated with the Coulter's matilija poppy include laurel sumac, blue elderberry, California sagebrush, grayish shortpod mustard, chilicothe, black sage (*Salvia melifera*), California buckwheat, coast live oak, long-flowered monkey flower (*Diplicus longiflorus*), and slender wild oat. A voucher specimen was not collected and a CNDDB form was not submitted because this species is not tracked by the CNDDB (i.e., has a CRPR of 4.2).

One individual Coulter's matilija poppy was observed in the 2022 focused survey area (Psomas 2022a; Exhibit 10). It was observed in a sandy/cobbly low terrace of Santiago Creek upstream of the lake. The species associated with the Coulter's matilija poppy observed in the survey area include mule fat, leafy California buckwheat, fennel, and tocalote. A voucher specimen was not collected due to the limited population size and because it is known from the vicinity.

3.8 SPECIAL STATUS WILDLIFE

Table 16 provides a summary of special status wildlife species reported to occur in the Project region (i.e., the USGS' Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles). This list includes species reported by the CNDDB, supplemented with species from the Project Biologist's experience that either occur nearby or could occur based on the presence of suitable habitat. This table includes information on the status, NCCP/HCP coverage, species habitat, and potential for occurrence. Note that these species are listed taxonomically. Species observed in the BSA are discussed further below. Exhibit 10 shows the locations of special status species.

Focused surveys for arroyo toad, coastal California gnatcatcher, and least Bell's vireo were conducted downstream of the dam in spring/summer 2020 (Appendices H, J, and K). Focused surveys for Quino checkerspot butterfly were conducted throughout the BSA in spring 2022 (Appendix F). Focused surveys for arroyo toad, coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo were conducted upstream of the dam in spring/summer 2022 (Appendices H, J, K, and L). Focused surveys for Crotch's bumble bee and southwestern pond turtle were conducted throughout the BSA in summer 2024 (Appendices G and I).

Of the 60 species reported from the Project region, 40 species have potential to occur in the BSA based on the presence of suitable habitat and the results of focused surveys. The remaining species would not be expected to occur because the BSA lacks suitable habitat or because they were not observed during the focused surveys. Sixteen special status wildlife species were observed during the 2020, 2022, and 2024 focused surveys; these species are discussed in more detail following the table. Two federally-listed species (i.e., coastal California gnatcatcher and least Bell's vireo) and one federally Proposed Threatened species (i.e., monarch butterfly [*Danaus plexippus*; overwintering not expected]are known to occur in the BSA. Two State listed species (i.e., bald eagle and least Bell's vireo) and four State Candidate species (i.e., Crotch's bumble bee, white sturgeon [*Acipenser transmontanus*; only sterile individuals], burrowing owl [*Athene cunicularia*], and mountain lion) are known or have potential to occur in the BSA. Special status species that were observed or those with moderate potential to occur are discussed in more detail following the table.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Invertebrates						
Branchinecta sandiegonensis	San Diego fairy shrimp	FE	—	Conditionally Covered	Inhabits vernal pools and ephemeral depressions.	Not expected to occur; no suitable habitat.
Streptocephalus woottoni	Riverside fairy shrimp	FE	—	Conditionally Covered	Inhabits vernal pools and ephemeral depressions.	Not expected to occur; no suitable habitat.
Danaus plexippus (overwintering populations)	monarch butterfly	FPT	—	No	Overwintering sites consist of forested areas that provide protection from the elements and moderate temperatures, as well as nectar and clean water sources located nearby. Overwintering sites are within 1.5 miles of the Pacific Ocean at elevations of 200-300 feet above msl. Reproduction is dependent on the presence of milkweed (*Asclepias* sp.).	**Observed (individual foraging during spring); hostplant present;** not expected for overwintering because BSA is too far inland and is outside the known elevational range for overwintering.
Euphydryas editha quino	quino checkerspot butterfly	FE	CE	Conditionally Covered	Inhabits openings in chaparral and sage scrub and grasslands; erect plantain is one of the specific host plants where females lay eggs.	Not expected to occur; not observed during focused surveys; suitable habitat.
Bombus crotchii	Crotch's bumble bee	—	CE	No	Inhabits areas with appropriate food sources (e.g., *Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, and Boraginaceae*).	Observed; suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Fish						
Acipenser transmontanus	white sturgeon	—	CT	No	Inhabits large rivers with deep waters (>12 feet deep) and swift currents; brackish and estuarine environments.	Sterile individuals known to be stocked in Irvine Lake by OC Parks; no suitable habitat and outside current known range of natural populations.
Oncorhynchus mykiss irideus pop. 10	steelhead – southern California DPS	FE	CE	No	Inhabits streams; can tolerate warmer water and more variable conditions.	Not expected to occur; no suitable habitat; outside current known range.
Rhinichthys gabrielino [*osculus* ssp. 8]	Santa Ana speckled dace	FPT	SSC	No	Inhabits permanently flowing streams, usually in shallow cobble and gravel riffles.	Not expected to occur; outside current known range[b].
Catostomus santaanae	Santa Ana sucker	FT	SSC	No	Inhabits coastal streams; prefer sand-rubble-boulder bottoms; cool, clear water; and algae.	Not expected to occur; outside current known range.
Amphibians						
Taricha torosa	Coast Range newt	—	SSC	No	Breeds in ponds, reservoirs, and slow-moving streams and lives in terrestrial habitats.	May occur; suitable habitat.
Spea hammondii	western spadefoot	FPT	SSC	Not Covered	Breeds in vernal pools in grassland habitats, but also hardwood woodlands.	May occur for foraging; not expected to occur for breeding because not observed during 2025 focused surveys; suitable foraging habitat; limited suitable breeding potential in pools or along slow-moving portions of Santiago Creek.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Anaxyrus californicus	arroyo toad	FE	SSC	Conditionally Covered	Inhabits rivers with sandy banks, willows, cottonwoods, and sycamores. Not observed during surveys for NCCP/HCP but area not thoroughly surveyed (County of Orange 1996).	Not expected to occur; not observed during focused surveys; suitable habitat.
Reptiles						
Actinemys pallida [*Emys marmorata*]	southwestern [western] pond turtle	FPT	SSC	No	Inhabits marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation and basking sites and suitable upland habitat.	Not expected to occur; not observed during focused surveys; suitable habitat.
Phrynosoma blainvillii	coast horned lizard	—	SSC	Covered	Inhabits a wide variety of habitats with open areas for sunning, bushes for cover, and patches of loose soil for burial.	Expected to occur; suitable habitat.
Aspidoscelis hyperythra	orange-throated whiptail	—	WL	Covered	Inhabits coastal scrub, chaparral, and hardwood woodlands; prefers washes and other sandy areas with patches of brush and rocks.	**Observed in the survey area.**
Aspidoscelis tigris stejnegeri	coastal whiptail	—	SSC	Covered	Inhabits deserts and semi-arid areas with sparse vegetation and open areas, woodland, and riparian areas.	**Observed in the survey area.**
Anniella stebbinsi	southern California legless lizard	—	SSC	No	Inhabits a variety of habitats, generally in moist, loose soil.	May occur; suitable habitat.
Arizona elegans occidentalis	California glossy snake	—	SSC	No	Inhabits a range of scrub and grassland habitats, often with loose or sandy soils.	May occur; suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Salvadora hexalepis virgultea	coast patch-nosed snake	—	SSC	No	Inhabits brushy or shrubby vegetation with small mammal burrows for refuge and overwintering sites.	May occur; suitable habitat.
Thamnophis hammondii	two-striped gartersnake	—	SSC	No	Found in or near permanent fresh water, often along streams with rocky beds and riparian growth.	**Observed in the survey area.**
Crotalus ruber	red-diamond rattlesnake	—	SSC	Covered	Inhabits rocky areas with dense vegetation in chaparral, woodland, grassland, and deserts.	Expected to occur; suitable habitat.
Birds						
Accipiter cooperii	Cooper's hawk	—	WL (nesting)	No	Forages in woodland. Nests in riparian growths of deciduous trees, such as canyon bottoms on river floodplains and in live oaks.	Expected to occur for foraging; may occur for nesting; suitable foraging and nesting habitat.
Buteo regalis	ferruginous hawk	—	WL (wintering)	No	Inhabits open grasslands, sagebrush flats, desert scrub, low foothills, and fringes of pinyon and juniper woodland.	May occur during migration and wintering; suitable habitat.
Elanus leucurus	white-tailed kite	—	FP (nesting)	No	Inhabits open grasslands, meadows, or marshes close to isolated, dense -topped trees for nesting and perching.	**Observed in the survey area.**
Haliaeetus leucocephalus	bald eagle	Delisted	SE/FP (nesting & wintering)	No	Nests in large, old-growth trees with open branches near water. Forages along ocean shore, lake margins, and rivers.	**Observed (nesting) immediately adjacent to the survey area; observed foraging in the survey area.**

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Aquila chrysaetos	golden eagle	—	WL/FP (nesting & wintering)	Conditionally Covered	Variety of open habitats (desert, grassland, shrubland, agriculture, streams) especially near mountains, hills, and cliffs.	May occur for foraging; not expected to occur for nesting; suitable foraging habitat; no suitable nesting habitat but potentially suitable nesting habitat adjacent.
Falco mexicanus	prairie falcon	—	WL (nesting)	Conditionally Covered	Variety of open habitats (desert, grassland, shrubland, agriculture, streams) especially near bluffs and cliffs that are used for nesting.	May occur for foraging; not expected to occur for nesting; suitable foraging habitat; no suitable nesting habitat but potentially suitable nesting habitat adjacent.
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	Covered	Nests in a scrape, depression, or ledge in an open site on cliffs, banks, dunes, and mounds near wetlands, lakes, rivers, or other water.	**Observed in the survey area.**
Coturnicops noveboracensis	yellow rail	—	SSC	No	Inhabits freshwater marshlands.	Not expected to occur; no suitable habitat.
Laterallus jamaicensis coturniculus	California black rail	—	ST/FP	No	Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.	Not expected to occur; no suitable habitat.
Rallus obsoletus levipes	light-footed Ridgway's rail	FE	SE/FP	No	Inhabits salt marshes with dense growth of pickleweed or cordgrass.	Not expected to occur; no suitable habitat.
Sternula antillarum browni	California least tern	FE (nesting colony)	SE/FP (nesting colony)	No	Colonial breeder on bare or sparsely vegetated, flat substrates such as sand beaches, alkali flats, landfills, or paved areas along the coast.	Not expected to occur; no suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FT (nesting)	SE (nesting)	No	Nests in riparian forests along broad, lower flood-bottoms of larger river systems with willows, often mixed with cottonwoods, with understory of blackberry, nettles, or wild grape.	Not expected to occur; not observed during focused surveys; suitable habitat.
Asio otus	long-eared owl	—	SSC (nesting)	No	Inhabits riparian bottomlands with tall willows and cottonwoods, also belts of live oak along stream courses.	May occur for foraging and nesting; suitable foraging and nesting habitat.
Athene cunicularia	burrowing owl	—	CE/SSC (burrow sites & some wintering sites)	No	Inhabits open, dry annual or perennial grasslands, deserts, and scrublands with low-growing vegetation; uses California ground squirrel burrows and similar openings for breeding.	Limited potential to occur; suitable habitat; limited numbers in the region.
Empidonax traillii extimus	southwestern willow flycatcher	FE (nesting)	SE (nesting)	Conditionally Covered	Inhabits riparian habitat along rivers, stream, and other wetlands with dense growths of willows, mule fat, etc., often with a scattered overstory of cottonwood.	Not expected to occur; not observed during focused surveys; suitable habitat.
Lanius ludovicianus	loggerhead shrike	—	SSC (nesting)	No	Inhabits grasslands and other dry, open habitats.	May occur; suitable habitat.
Vireo bellii pusillus	least Bell's vireo	FE (nesting)	SE (nesting)	Conditionally Covered	Inhabits riparian forest, riparian scrub, and riparian woodland, usually nesting in willows, mule fat, or mesquite.	**Observed in the survey area.**

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Eremophila alpestris actia	California horned lark	—	WL	No	Inhabits short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow agricultural fields, and alkali flats.	May occur; suitable habitat.
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	—	SSC	Covered	Inhabits coastal sage scrub with tall prickly-pear cactus for nesting and roosting.	**Observed in the survey area.**
Polioptila californica californica	coastal California gnatcatcher	FT	SSC	Covered	Inhabits coastal sage scrub in arid washes, on mesas, and slopes.	**Observed in the survey area.**
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	—	WL	Covered	Inhabits coastal sage scrub and sparse mixed chaparral, frequently on relative steep, rocky hillsides with grass and forb patches.	**Observed in the survey area.**
Ammodramus savannarum	grasshopper sparrow	—	SSC (nesting)	No	Inhabits dense grasslands on rolling hills, lowland plains, and valleys and on hillsides on lower mountain slopes.	**Observed in the survey area.**
Passerculus sandwichensis beldingi	Belding's savannah sparrow	—	SE	No	Inhabits coastal salt marshes, nesting in pickleweed on and about the margins of tidal flats.	Not expected to occur; no suitable habitat.
Icteria virens	yellow-breasted chat	—	SSC (nesting)	No	Inhabits riparian thickets of willow and other brushy tangles near watercourses; nests in low, dense riparian vegetation consisting of willows, blackberry, and wild grape.	**Observed in the survey area.**
Agelaius tricolor	tricolored blackbird	—	ST/SSC (nesting colony)	No	Inhabits freshwater marsh, swamps, and wetlands with open water and protected nesting substrate.	Not expected to occur; limited amount of suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Setophaga petechia	yellow warbler	—	SSC (nesting)	No	Inhabits riparian forest, riparian scrub, and riparian woodland, foraging and nesting in willow shrubs and thickets, cottonwoods, sycamores, ash, and alders.	**Observed in the survey area.**
Mammals						
Sorex ornatus salicornicus	southern California saltmarsh shrew	—	SSC	No	Inhabits coastal marshes with dense vegetation and woody debris for cover.	Not expected to occur; no suitable habitat.
Choeronycteris mexicana	Mexican long-tongued bat	—	SSC	No	Inhabits riparian scrub, pinyon and juniper woodland, and Sonoran thorn woodland; roosts in caves and in and around buildings.	Not expected to occur; outside current known range.
Antrozous pallidus	pallid bat	—	SSC	No	Inhabits deserts, grasslands, shrublands, woodlands, and forest, most commonly in open, dry habitats with rocky areas for roosting.	Limited potential to occur for foraging and roosting; suitable foraging and roosting habitat.
Nyctinomops femorosaccus	pocketed free-tailed bat	—	SSC	No	Inhabits pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. Roosts in crevices of cliffs and rocky outcroppings.	May occur for foraging and roosting; suitable foraging and roosting habitat.
Nyctinomops macrotis	big free-tailed bat	—	SSC	No	Rugged and rocky terrain; roosts in buildings, caves, rock crevices in cliffs, and rocky outcroppings.	May occur for foraging and roosting; suitable foraging and roosting habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Lasiurus frantzii	western red bat	—	SSC	No	Riparian habitat near water. Roosts exclusively in trees, particularly sycamore, cottonwood, ash, and elderberry (*Sambucus* sp.).	May occur for foraging and roosting; suitable foraging and roosting habitat.
Lasiurus xanthinus	western yellow bat	—	SSC	No	Inhabits valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	May occur for foraging and roosting; suitable foraging and roosting habitat.
Eumops perotis californicus	western mastiff bat	—	SSC	No	Inhabits many open, semi-arid to arid habitats including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	May occur for foraging and roosting; suitable foraging and roosting habitat.
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	—	—	No	Inhabits coastal scrub, chaparral, grasslands, and sagebrush, usually in association with rocks or coarse gravel.	May occur; suitable habitat.
Perognathus longimembris pacificus	Pacific pocket mouse	FE	SSC	Conditionally Covered	Inhabits coastal scrub with fine alluvial sands; only occurs within a few miles of the coast.	Not expected to occur; outside current known range.
Neotoma bryanti [*lepida*] *intermedia*	Bryant's San Diego desert woodrat	—	SSC	Covered	Inhabits coastal scrub with moderate to dense canopies, rock outcrops, rocky cliffs, and slopes.	May occur; suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat[a]	Potential to Occur
Onychomys torridus ramona	southern grasshopper mouse	—	SSC	No	Inhabits desert areas, especially scrub habitats with friable soils for digging with low to moderate shrub cover.	Not expected to occur; outside current known range
Puma concolor	mountain lion–Southern California/Central Coast Evolutionary Significant Unit (ESU)	—	CE	No	Inhabits various habitats within foothill and mountain areas typically where deer can be found.	**Observed (tracks) in the survey area.**

NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan; BSA: Biological Study Area

LEGEND:

Federal (USFWS)		**State (CDFW)**	
FE	Endangered	SE	Endangered
FT	Threatened	ST	Threatened
FPT	Proposed Threatened	CE	Candidate Endangered
FP	Fully Protected	CT	Candidate Threatened
		CT/E	Candidate Threatened or Endangered
		SSC	Species of Special Concern
		WL	Watch List
		SA	Special Animal

[a] Sources include CDFW 2025a and 2025d.

[b] CDFW is currently considering a translocation of Santa Ana speckled dace to Santiago Creek near its confluence with Black Star Canyon, about a mile upstream of Irvine Lake. Details are still being determined and are not yet available.

3.8.1 Monarch Butterfly

The monarch butterfly is proposed as a federally Threatened species by the USFWS; California overwintering sites would be protected by this status. Monarch butterflies lay their eggs on the obligate milkweed (*Asclepias* sp.). Multiple generations of monarchs are produced through the breeding season, with most adult butterflies living two to five weeks. Overwintering adults enter reproductive diapause and live for six to nine months (USFWS 2023). Each spring, monarchs leave overwintering sites and disperse across California and eventually migrate to all western states, searching for milkweed plants on which to lay their eggs. Several generations are produced throughout the spring, summer, and fall, with each generation spreading further across the landscape. The last generation then migrates all the way back to the overwintering grounds on the Pacific coast in the fall. Monarchs return to the same groves of trees each year (Xeres Society 2023). In the western U.S., monarchs overwinter at groves of trees along the Pacific Coast with a large concentration overwintering in California. Currently, the most common overwintering groves consist of non-native blue gum (*Eucalyptus* sp.), but they also use native Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), western sycamore, coast live oak, and redwood (*Sequoia sempervirens*) (USFWS 2024b). The majority of overwintering sites are found within 1.5 miles of the Pacific Ocean, which moderates temperatures, at lower elevations (i.e., 200 to 300 feet above msl) and situated on slopes oriented to the south, southwest, or west that provide the most solar radiation (Xeres Society 2016).

Along with the proposed listing, the USFWS is proposing 4,395 acres of Critical Habitat for this species to protect overwintering sites in Alameda, Marin, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, and Ventura Counties, California (USFWS 2024b). The BSA is not within proposed Critical Habitat for this species.

Monarch butterfly was recorded as an incidental observation during the Quino checkerspot butterfly surveys and its hostplant, milkweed, was noted during botanical surveys. Western sycamore and coast live oak woodlands are present in the BSA; however, the BSA is over 20 miles from the Pacific Ocean and the elevation of the BSA is too high (i.e., 657 to 996 feet above msl). Additionally, there are no known overwintering sites mapped in the BSA (Xeres Society 2023). Therefore, monarch butterfly is not expected to overwinter in the BSA.

3.8.2 Crotch's Bumble Bee

The Crotch's bumble bee (*Bombus crotchii*) is proposed as a Candidate[13] to be State listed as Endangered. The Crotch's bumble bee is a ground nester and often makes its nest in abandoned mammal burrows and can be found in most native habitat types, although it prefers grassland and scrub habitats. It is primarily associated with plants from the following families: *Fabaceae, Apocynaceae, Asteraceae, Lamiaceae,* and *Boraginaceae* (Richardson 2017, Thorp et. al. 1983). Grassland and scrub habitat, as well as several plant species from these families are present; therefore, suitable habitat is present for this species. This species has been recently observed at multiple locations in the Project region. The most recent

[13] The CDFW treats Candidate species as if they are listed while they determine if they will be formally listed.

observations of this species were in 2020 in the Irvine Ranch Open Space along Santiago Creek in 2016 and in Trabuco Canyon in 2020 (CDFW 2025a).

Focused surveys were conducted in summer 2024; one male Crotch's bumble bee was observed foraging in a small patch of leafy California buckwheat, in the southern portion of the survey area (Exhibit 10). At the time of the focused surveys in the summer months, most plants were no longer flowering; floral resources were likely higher in the spring and early summer. The estimated percent cover of floral resources during the focused surveys was approximately 20 to 30 percent of the survey area during the June visit. During the focused surveys, the species in bloom consisted primarily of leafy California buckwheat, deerweed, short-podded mustard, and black mustard. Potential bumble bee nest sites and overwintering habitat included small rodent burrows and leaf litter.

3.8.3 White Sturgeon

White sturgeon is a Candidate to be listed as State Threatened. This species occurs in deep rivers (more than 12 feet deep) with swift flows. White Sturgeon can live in excess of 100 years, and historically grew to sizes of approximately 20 feet and 1,300 pounds (Moyle 2002). White Sturgeon are an anadromous fish native to California, where they primarily occur in San Francisco Bay and the Delta and spawn in the Sacramento and San Joaquin rivers and associated tributaries (CDFW 2024c). White sturgeon are not expected to occur in southern California streams, and therefore, are not expected to occur naturally in the BSA as it is outside the species' known range and does not provide suitable habitat. However, sterile individuals of white sturgeon are stocked in Irvine Lake by OC Parks (Hayes, pers. comm. 2023).

3.8.4 Santa Ana Speckled Dace

Santa Ana speckled dace (*Rhinichthys gabrielino* [*osculus* ssp. 8]) is proposed as a federally Threatened species by the USFWS. The Santa Ana speckled dace is a small freshwater fish that occurs in perennial streams and rivers. The species was historically found throughout the upper and middle reaches of the Los Angeles, San Gabriel, Santa Ana, and San Jacinto Rivers. Currently, Santa Ana speckled dace is restricted to the headwaters of those river systems, with limited connectivity for populations in the Santa Ana River and San Jacinto River. Santa Ana speckled dace inhabit a variety of stream habitats, with a preference for cool, moving water and gravel substrate that have aquatic invertebrates as a food source (USFWS 2024a). This species was reported from Modjeska Canyon near its confluence with Santiago Creek in 1999 (CDFW 2025a). The BSA is outside the current known range of the Santa Ana speckled dace. However, CDFW is currently considering translocating this species to a site along Santiago Creek near its confluence with Black Star Canyon, approximately 1.25 mile upstream of Irvine Lake (Pareti, pers. comm. 2024). If this species is translocated, the translocation success will be monitored by CDFW. Therefore, while this species is not currently expected to occur in the BSA, it could occur along Santiago Creek upstream of the lake in the future.

3.8.5 Western Spadefoot

The western spadefoot has recently been proposed as a federally Threatened species by the USFWS; it is also a California Species of Special Concern. Western spadefoot are restricted to California and northwestern Baja California, Mexico between sea level and 4,500 feet above msl. Adult toads forage and burrow in open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, and alkali flats in foothills and mountains. They feed primarily on insects, worms, and other invertebrates. Western spadefoot are rarely seen, spending most of their life underground in earthen burrows up to three feet deep. Adults emerge from dry season refuges during late winter or spring rains, typically in February and March, and proceed to nearby breeding pools. Breeding habitat consists primarily of shallow, temporary rain pools that should persist for a minimum of 30 days following egg-laying. The temporary nature of the breeding habitat ensures a lack of predators such as fish, American bullfrog (*Lithobates catesbeiana*), and red-swamp crayfish (*Procambarus larkia*) that would otherwise reduce the likelihood of tadpoles reaching metamorphosis and adulthood. In Southern California, over 80 percent of habitat once known to be occupied by western spadefoot has been lost through loss of breeding habitat and/or fragmentation of breeding and foraging/burrowing habitat by development. The Central Coastal Subregion of the NCCP/HCP proposed to include western spadefoot as a Covered Species; however, there were not enough breeding pools conserved in the Central Subregion. Therefore, western spadefoot was designated a Covered Species only in the Coastal Subregion; it is not covered in the Central Subregion, which is where the BSA occurs. Suitable foraging habitat is present in the BSA; limited suitable breeding pools were observed in the BSA and the species also has a limited potential to breed along slow-moving portions of Santiago Creek. The western spadefoot has potential to occur within the BSA for foraging but has only a limited potential to breed in the BSA because the presence of suitable pools is limited and variable from year to year. Areas that appeared suitable for pooling in 2024 did not pool in 2025; new pools were observed in 2025 that were not observed in prior years. Focused surveys were conducted throughout the BSA in spring 2025; no western spadefoot were observed. While this species may occur in the BSA for foraging, it is not expected to occur in the BSA for breeding because it was not observed during focused surveys.

3.8.6 Southwestern Pond Turtle

The southwestern pond turtle is proposed as a federally Threatened species by the USFWS; it is also a California Species of Special Concern. The western pond turtle is the only native turtle species in coastal California; the former northwestern and southwestern subspecies were recently split into separate species, with the southwestern pond turtle (*Actinemys pallida*) occurring in Southern California. It is found in ponds, lakes, marshes, reservoirs, seasonal standing or slow-moving streams, canals, sloughs, vernal pools, and occasionally in brackish water (Germano and Bury 2001). Sufficient cover (e.g., vegetation, undercut banks) and basking sites are important components of suitable habitat (Spinks et al. 2003). Suitable basking sites include partially submerged logs, rocks, floating vegetation, and open mud banks (CDFW 2000). Adults are often observed basking on logs or other objects protruding out of the water or floating in the warmer surface water. They have both good hearing and

eyesight and are easily disturbed; they are often heard splashing into the water to take cover before they are seen (USGS 2006a). Southwestern pond turtles are omnivorous; aquatic invertebrates are the mainstay of the adult diet; but carrion, small fish, frogs, and some plants are also consumed (USGS 2006a). Adult southwestern pond turtles in Southern California may remain active in the water year-round if conditions are suitable (enough water, warm temperatures) (USGS 2006a). However, during the coldest months (October to April), this species will often seek upland refugia (i.e., shelter with appropriate temperature and moisture conditions) and enter a period of aestivation. Western pond turtles can also hibernate underwater in bottom mud (CDFW 2000). Habitat destruction for urban (primarily flood control) and agricultural development has resulted in population declines throughout the western pond turtle's range (Spinks et al. 2003). Over 90 percent of the wetland habitats within the historic range of the western pond turtle throughout California have been lost (USFWS 1992). Additionally, invasion of non-native plant and wildlife species into habitats occupied by western pond turtles is another threat to the continued survival of the species. Suitable habitat for western pond turtle is present throughout the BSA. Focused visual surveys and a trapping program were conducted in the BSA, including 108 trap days (27 traps multiplied by 4 days of trapping for each), in summer 2024. No southwestern pond turtles were observed during the focused surveys. Therefore, southwestern pond turtle is not expected to occur in the BSA.

3.8.7 Orange-throated Whiptail

Orange-throated whiptail is a California Watch List Species. It is a Covered species in the Central–Coastal NCCP/HCP. This species occurs in coastal scrub, chamise-redshank chaparral, mixed chaparral, and valley-foothill hardwood habitats from sea level to 3,410 feet above msl (Jennings and Hayes 1994). It prefers washes and other sandy areas with patches of brush and rocks (Stebbins 2003). It occurs in Orange, Riverside, and San Diego counties west of the crest of the Peninsular Ranges, especially in areas with summer morning fog. It also occurs in southwestern San Bernardino County (Zeiner et al. 1990).

Two juvenile orange-throat whiptails were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable habitat for this species is present throughout the BSA.

3.8.8 Coastal Whiptail

Coastal whiptail is a California Species of Special Concern. It is a Covered species in the Central–Coastal NCCP/HCP. This species occurs in a variety of habitats including valley-foothill hardwood, valley-foothill hardwood conifer, valley-foothill riparian, mixed conifer, pine-juniper, chamise-redshank chaparral, mixed chaparral, desert scrub, desert wash, alkali scrub, and annual grassland from sea level to 7,500 feet above msl. It occurs throughout much of the state (Zeiner et al. 1990).

Three adult coastal whiptails were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable habitat for this species is present throughout the BSA.

3.8.9 Two-striped Garter Snake

Two-striped garter snake is a California Species of Special Concern. This highly aquatic species occurs primarily in or near perennial or intermittent freshwater streams with rocky beds bordered by willows or other dense vegetation (Jennings and Hayes 1994; Stebbins 2003). The two-striped garter snake feeds on tadpoles, newt larvae, toads, frogs, fish, fish eggs, and earthworms (Stebbins 2003). It occurs from Monterey County south to El Rosario in Baja California, Mexico at elevations between sea level and approximately 8,000 feet above msl (Stebbins 2003). It is considered locally rare in southwestern California. It is estimated that development and other human impacts have reduced the historic range of this species in California by 40 percent (Stebbins 2003).

An individual two-striped garter snake was observed during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam (Exhibit 10). Three individual two-striped garter snakes were observed during the 2022 focused arroyo toad surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable habitat for this species is present along Santiago Creek throughout the BSA.

3.8.10 White-tailed Kite

White-tailed kite is a California Fully Protected species; its nesting locations are protected. This species nests in oak and sycamore woodlands, mature willows with adjacent grasslands, agricultural fields, and other open areas. Kites prey on voles (*Microtus* sp.) and other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians. Kites forage in undisturbed, open grasslands, meadows, farmlands and emergent wetlands. They soar, glide, and hover (i.e., "kite") less than 100 feet above the ground in search of prey.

A pair of white-tailed kites was observed foraging during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable foraging habitat for this species is present throughout the BSA; woodlands in the BSA provide suitable nesting habitat.

3.8.11 Bald Eagle

The bald eagle is a State-listed Endangered species, a California Fully Protected species, and is also protected by the Federal Bald Eagle Act. Through protection under the Endangered Species Act, bald eagle populations recovered through captive breeding programs, reintroduction efforts, the banning of DDT, and public education (USDA 2023). This species was delisted by the USFWS in 2007 and will be monitored for 20 years as part of the Post-Delisting Monitoring Plan for the species. This species requires large bodies of water or free-flowing rivers with abundant fish and adjacent snags or perches, and nests in large, old-growth trees or snags in remote stands near water (Zeiner et al. 1990). Bald eagles are usually found close to water because their diet is primarily made up of fish and waterfowl. When waterfowl migrate south for the winter, bald eagles follow and winter in southern California from November to March (USDA 2023). Most breeding territories are in northern California, but the eagles also nest in scattered locations in the central and southern Sierra Nevada mountains and foothills, in several locations from the Central Coast Range to inland southern California, and on Santa Catalina Island (CDFW 2024a). Breeding populations of

bald eagles in southern California were extirpated in the 1950s until reintroduction efforts began on Catalina Island in the 1980s. Since 2003, several pairs of bald eagles have nested in southern California at Lake Hemet, Lake Skinner, Lake Matthews, and Big Bear Lake (USDA 2023). CDFW tracks information on occupied territories for bald eagles in California; the location at Irvine Lake has been mapped as the only bald eagle nesting location in Orange County (CDFW 2024a).

An individual bald eagle was incidentally observed during vegetation mapping upstream of Santiago Creek Dam in fall 2020 and a nesting pair was observed during focused surveys in spring/summer 2022 (Exhibit 10). The pair nested in a pine tree in a canyon adjacent to the BSA. Suitable foraging and wintering habitat for this species is present throughout the BSA. While the ornamental trees within the BSA are not suitable because they are not mostly gum trees or too small for eagle nesting, suitable nesting habitat is adjacent to the BSA.

3.8.12 American Peregrine Falcon

The American peregrine falcon is a Covered species in the Central–Coastal NCCP/HCP. This species was delisted from the federal list of Endangered species in 1999 (USFWS 1999), and from the California list of Endangered species in 2008. It was recently removed from the CDFW list of Fully Protected species (CDFW 2025d). Peregrine falcons prey almost exclusively on birds and use a variety of habitats, particularly wetlands and coastal areas. While this falcon is a rare summer resident in Southern California, it is more common during migration and the winter season. For nesting, this falcon prefers inaccessible areas such as those provided by cliffs, high building ledges, bridges, and other such structures.

A peregrine falcon was observed foraging during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam (Exhibit 10). Suitable foraging habitat is present for this species throughout the BSA. While there are cliffs in the BSA, they are limited in extent and do not provide many ledges for nesting raptors; however, cliffs suitable for nesting are adjacent to the BSA.

3.8.13 Least Bell's Vireo

Least Bell's vireo is a federal and state Endangered species. The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Cowbirds are nest parasites that lay their eggs in the nests of other birds and leave the host bird to raise their young, often to the detriment of the host's own young (USFWS 1998). With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) that generally nests in early-successional stages of riparian habitats. The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately three to six feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989).

A total of 29 least Bell's vireo locations were observed during the 2022 focused surveys upstream of the dam (Exhibit 10). A total of 27 locations consisted of territories occupied by breeding pairs, 1 location consisted of a territory occupied by an unpaired male, and 1 location consisted of a transient male. A territory is defined as a singing male observed or heard consistently in the same general location on multiple surveys (i.e., defending a territory). A transient male is one observed during only one survey. The territory points shown on Exhibit 10 represent either a nest location or the general area where least Bell's vireos were observed and/or detected most of the time. A total of 25 pairs were observed to have successfully nested; a total of 38 juveniles were observed during the 2022 focused surveys. The survey results include only the number of nestlings/fledglings that were visually or aurally confirmed; additional fledglings may have been undetected in the habitat. Least Bell's vireo was incidentally observed in the riparian habitat downstream of the dam during focused surveys conducted in summer 2024 (Psomas 2024a; Exhibit 10). Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

On February 2, 1994, the USFWS published a final critical habitat for the least Bell's vireo, designating approximately 37,560 acres of land in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties, California (USFWS 1994). The Project site is not located in designated critical habitat for this species.

3.8.14 Coastal Cactus Wren

Coastal cactus wren is a California Species of Special Concern; only individuals in San Diego and Orange Counties are special status. It is a Covered species in the Central–Coastal NCCP/HCP. The full species occurs in arid and semi-arid regions from California, Nevada, Utah, Arizona, New Mexico, and Texas south to Mexico and Baja California, Mexico (Shuford and Gardali 2008). The *sandiegensis* subspecies occurs from northwestern Baja California, Mexico through San Diego County and into southern Orange County, though the taxonomic status of cactus wrens and northern limits of this subspecies is uncertain (Shuford and Gardali 2008; Proudfoot et al. 2000). Coastal cactus wrens typically inhabit coastal sage scrub and alluvial sage scrub habitats that have sufficient amounts of prickly pear cactus and/or cholla (*Opuntia prolifera*) (Shuford and Gardali 2008). Nests are built almost exclusively in cholla or prickly pear cactus (Shuford and Gardali 2008).

Coastal cactus wrens were observed during both the 2020 focused surveys downstream of Santiago Creek Dam and the 2022 focused surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable foraging and nesting habitat for this species is present throughout the BSA.

3.8.15 Coastal California Gnatcatcher

The coastal California gnatcatcher is a federally Threatened species and a California Species of Special Concern. It is a Covered species in the Central–Coastal NCCP/HCP. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are

generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

One California gnatcatcher territory was observed during the 2020 focused California gnatcatcher surveys downstream of Santiago Creek Dam (Exhibit 10). This territory included a breeding pair, which successfully fledged at least three chicks. No coastal California gnatcatchers were observed breeding upstream of the dam within the BSA during the 2022 focused surveys; however, one coastal California gnatcatcher was detected just outside the BSA (Exhibit 10). Additionally, four gnatcatcher locations were incidentally observed during vegetation mapping and the jurisdictional delineation upstream of Santiago Creek Dam (Exhibit 10). These four locations consisted of two individual juveniles, one male, and one unidentified individual. Coastal California gnatcatcher was also incidentally observed downstream of the dam during focused surveys conducted in summer 2024 (Psomas 2024a; Exhibit 10). Suitable habitat for this species is present throughout the BSA.

USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This Revised Critical Habitat designates 197,303 acres in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The Project is not located within the designated Revised Critical Habitat for the coastal California gnatcatcher.

3.8.16 Southern California Rufous-Crowned Sparrow

Southern California rufous-crowned sparrow is a Watch List species. In California, the subspecies occurs on moderate to steep, dry, rocky, south- or west-facing slopes in scrub vegetation interspersed with patches of grasses and forbs or rock outcrops (Collins 1999). It is present throughout the year in Southern California and is threatened by loss of habitat due to urban and agricultural development.

Southern California rufous-crowned sparrows were observed during the 2020 focused surveys downstream of Santiago Creek Dam (Exhibit 10). Suitable foraging and nesting habitat for this species is present throughout the BSA.

3.8.17 Grasshopper Sparrow

Grasshopper sparrow is a California Species of Special Concern; its nesting locations are protected. This species nests in short to medium-height moderately open grasslands with scattered shrubs, alkaline meadows, and sage scrub-grassland ecotones. Loss of habitat to urbanization is the primary threat to this species.

Four individual grasshopper sparrows were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). At least one pair was observed defending a territory and is presumed to have nested in ruderal habitat.

3.8.18 Yellow-breasted Chat

Yellow-breasted chat is a California Species of Special Concern; its nesting locations are protected. This species nests in early successional riparian habitats with a well-developed shrub layer and open canopy. The loss and degradation of riparian habitat, as well as nest parasitism by brown-headed cowbirds have contributed to this species' decline in California.

A total of 43 yellow-breasted chats (15 pairs, 6 individual adults, and 7 juveniles) were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

3.8.19 Yellow Warbler

Yellow warbler is a California Species of Special Concern; its nesting locations are protected. This species occurs in riparian vegetation in close proximity to water along streams and in wet meadows. The loss and degradation of riparian habitat, as well as nest parasitism by brown-headed cowbirds have contributed to this species' decline in California.

A total of 10 yellow warblers (5 pairs) were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

3.8.20 Mountain Lion

The mountain lion is currently a Candidate to be State listed as Threatened as an Evolutionary Significant Unit comprised of the following subpopulations: (1) Santa Ana Mountains; (2) Eastern Peninsular Ranges; (3) San Gabriel/San Bernardino Mountains; (4) Central Coast South (Santa Monica Mountains); (5) Central Coast North (Santa Cruz Mountains); and (6) Central Coast Central. CDFW is in the process of reviewing the petition for listing and evaluating available information (CDFW 2024b). CDFW status review report was expected in November 2021; as of June 2023, its status has not been updated (CDFW 2024b). The mountain lion occurs throughout most of California except for the Mojave and Colorado Deserts and the croplands of the Central Valley. Mountain lions occur in a variety of habitats, especially brushy habitats and riparian areas with interspersed irregular terrain, rocky outcrops, and tree/brush edges. Mountain lions use caves, natural cavities and thickets for cover. Mountain lions use habitat connections for movement among fragmented core habitat (Zeiner 1988). A major threat to this species is fragmentation of habitat by spread of human developments and associated roads. Estimates of effective population size highlight genetic isolation and raise significant concerns for viability in Southern California and the Central Coast (Center for Biological Diversity 2019).

Tracks of a mountain lion were observed during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam and during the 2022 focused surveys upstream of Santiago Creek Dam. Suitable habitat for this species is present throughout the BSA.

4.0 PROJECT IMPACTS

The determination of impacts in this analysis is based on a comparison of maps depicting Project grading limits and maps of biological resources in the BSA. The Project would modify the existing dam embankment, spillway/outlet tower along with raising the spillway, which would lead to infrequent inundation of the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as "additional inundation area") for an approximate maximum period of up to 45 days following large storms. Additionally, a SCE power line would need to be relocated around the Project (referred to as the "SCE Realignment"); impacts for the SCE Realignment are only shown where they are outside the permanent and temporary impact areas for the Project.

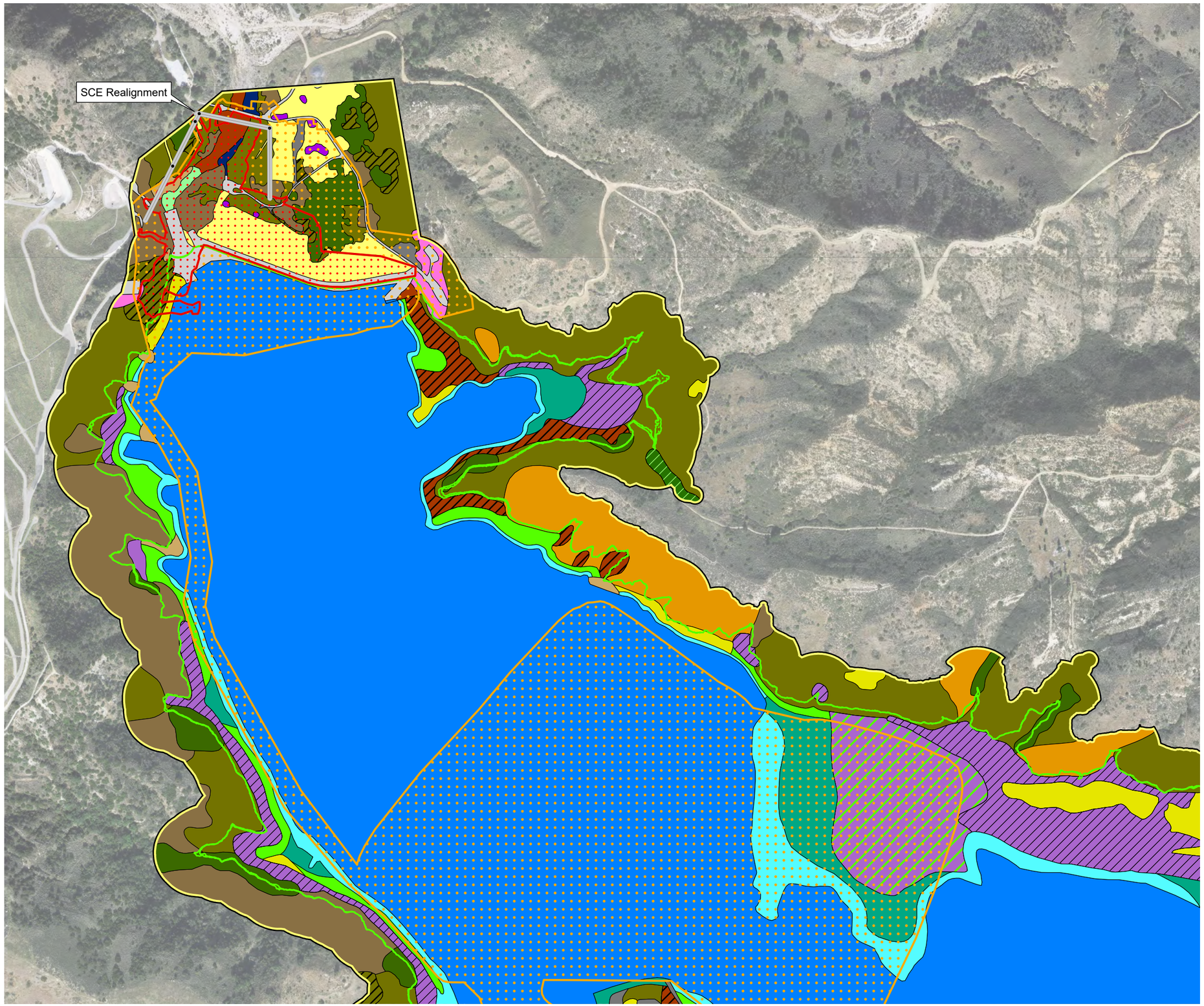
All permanent structural impacts are assumed to be contained within the permanent impact line identified on Exhibit 11. All construction activities, including equipment staging areas, borrow sites, and remedial grading are assumed to be contained within the temporary impact line identified on Exhibit 11. It should be noted that Irvine Lake will be partially or completely dewatered prior to construction of the access road along a dry portion of the lake bottom. Should these impact areas extend beyond the limits shown, additional analysis would be required.

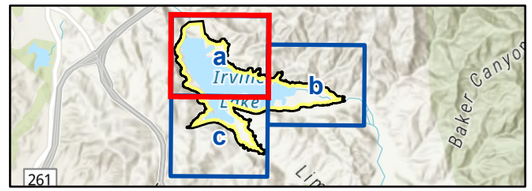
Both direct and indirect impacts on biological resources have been evaluated. Direct impacts are those that involve the initial loss of habitats due to grading, construction, and construction-related activities. Indirect impacts are those that would be related to temporary disturbance from construction activities (e.g., noise, dust) and the long-term use of the Project. Raising the spillway would have the indirect effect of infrequent additional inundation following larger storm events during operation of the Project.

Biological impacts associated with the Project were evaluated with respect to the following special status biological issues:

- Species listed under federal or State Endangered Species Acts;
- Species proposed for listing under federal or State Endangered Species Acts;
- Non-listed species that meet the criteria in the definition of "Rare" or "Endangered" in the CEQA Guidelines (i.e., 14 California Code of Regulations, Section 15380)[14];
- Species designated as California Species of Special Concern, Fully Protected, or Watch List species;
- Vegetation types (synonymous with "habitat" and "community") suitable to support a federally or State-listed Endangered or Threatened plant or wildlife species;
- Streambeds, waterbodies, wetlands, and their associated vegetation;

[14] Section 15380 of the CEQA Guidelines indicates that a lead agency can consider a non-listed species (e.g., plant with a CRPR of 1B.1) to be Endangered, Rare, or Threatened if the species can be shown to meet the criteria in the definition of Rare or Endangered. For the purposes of this discussion, the current scientific knowledge on the population size and distribution for each special status species was considered in determining if a non-listed species meets the definitions for Rare and Endangered according to Section 15380 of the CEQA Guidelines.





Biological Study Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

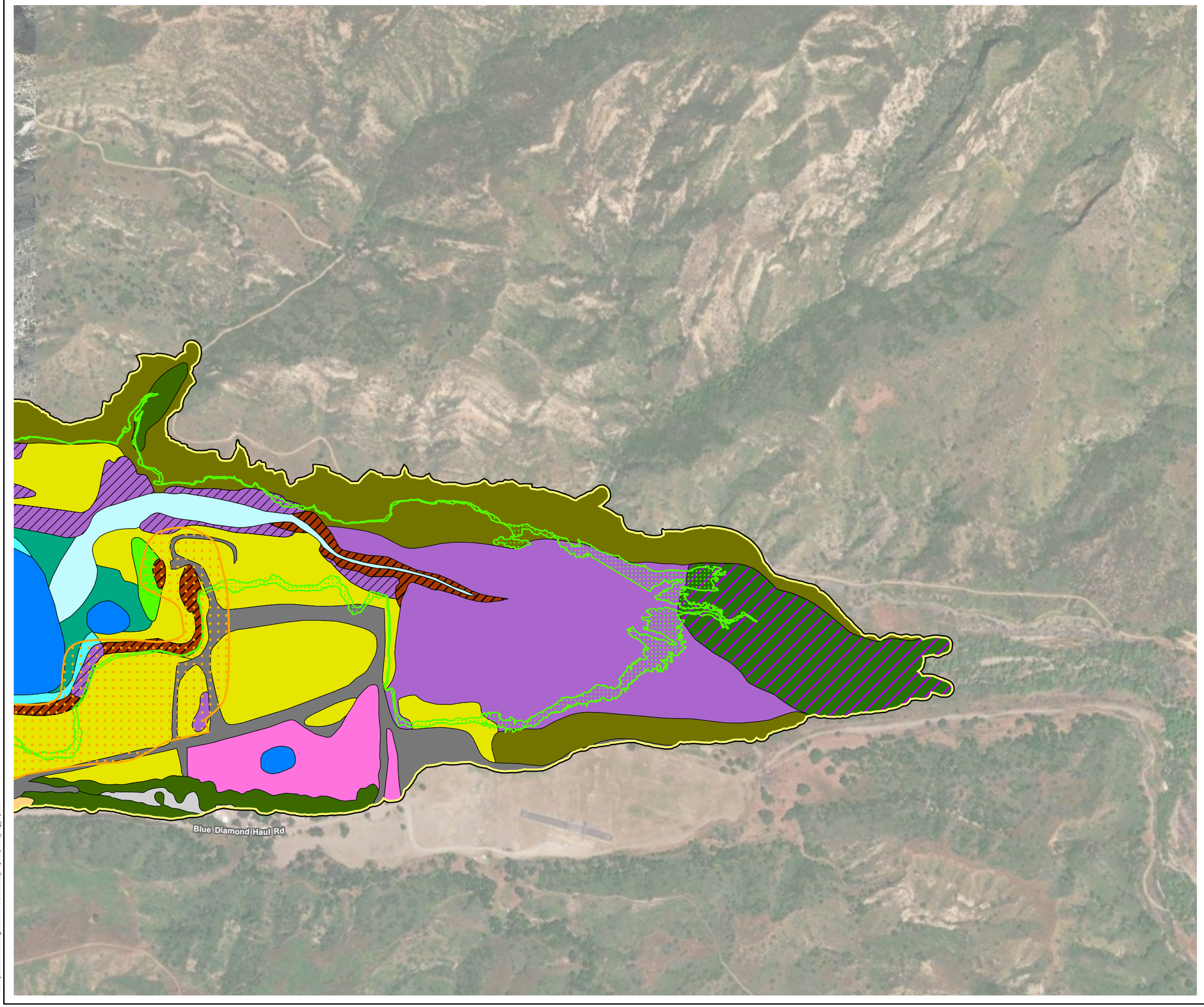
Exhibit 11a

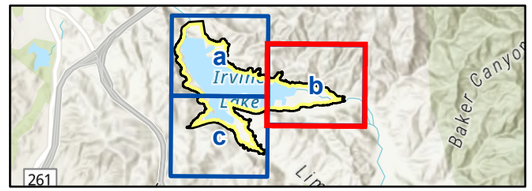
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Project_Impacts_Veg.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Veg_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Vegetation Types and Other Areas

Sagebrush Scrub (2.3.6)

Sagebrush - Coyote Brush Scrub (2.3.12)

Ruderal (4.6)

Riparian Herb (7.1)

Disturbed Mulefat Scrub (7.3)

Southern Sycamore Riparian Woodland (7.4)

Southern Black Willow Forest (7.7)

Disturbed Southern Black Willow Forest (7.7)

Coast Live Oak Woodland (8.1)

Open Water (12.1)

Fluctuating Shoreline (12.2)

Vegetated Fluctuating Shoreline (12.2)

Perennial Stream (13.1)

Ornamental (15.5)

Developed (15.6)

Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Vegetation Types

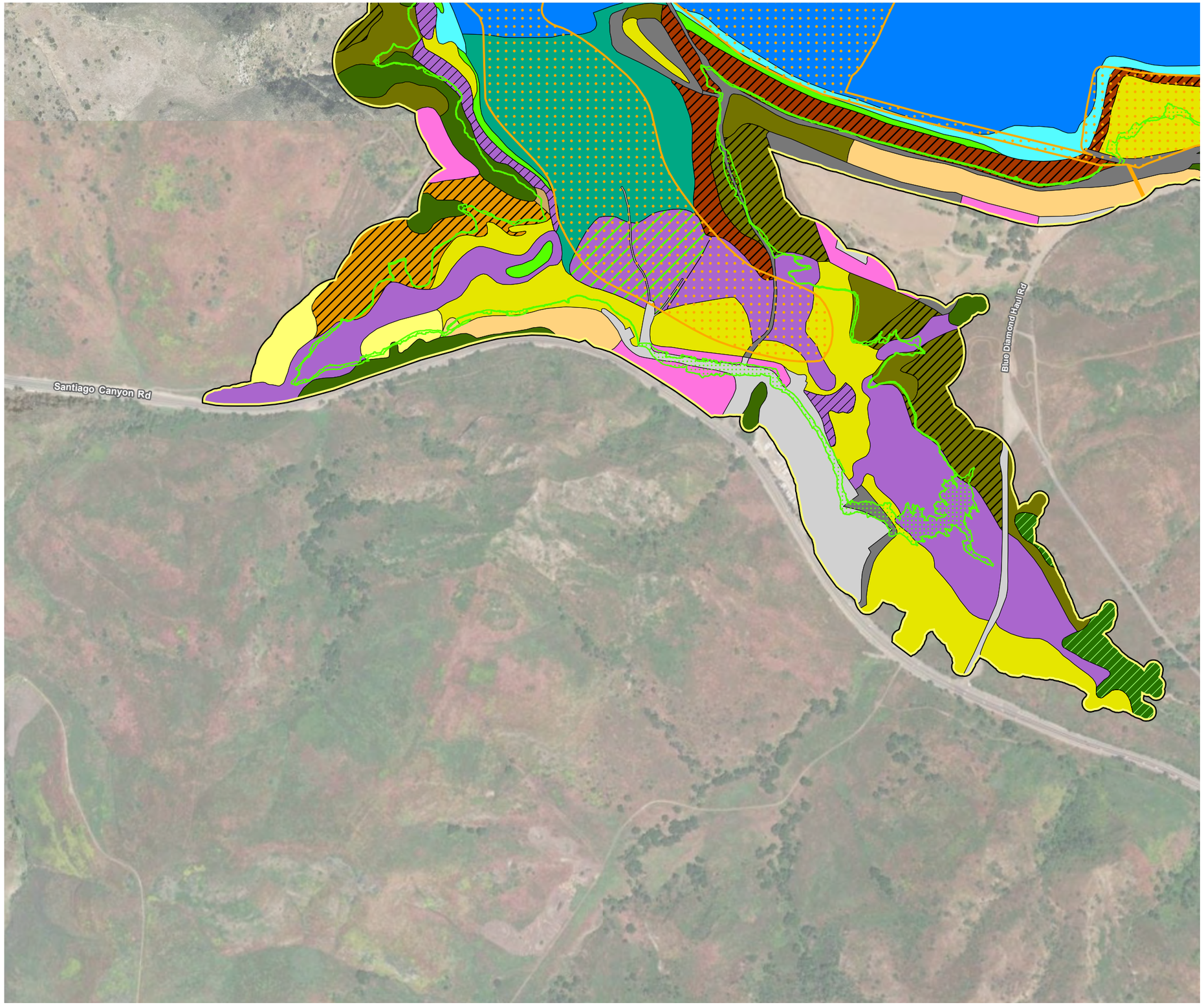
Exhibit 11b

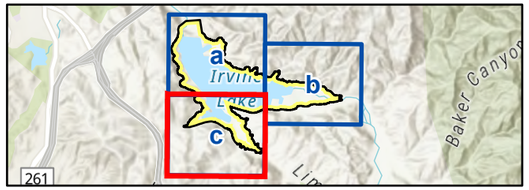
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Project_Impacts_Veg.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprxlex_Veg_Impacts





- Biological Study Area

Project Impacts

- Temporary Impacts*
- Additional Inundation Area

SCE Realignment

- Permanent Impacts
- Temporary Impacts**

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N W E S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts Vegetation Types

Exhibit 11c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_Project_Impacts_Veg.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Veg_Impacts

- Vegetation types, other than wetlands, considered special status by regulatory agencies (e.g., USFWS, CDFW) or resource conservation organizations;
- Other species or issues of concern to regulatory agencies or conservation organizations; and
- Central–Coastal Subregion NCCP/HCP and Implementation Agreement.

The actual and potential occurrence of these resources in the BSA was correlated with the following significance criteria to determine whether the impacts of the Project on these resources would be considered significant.

IRWD has prepared specifications related to construction of the Project. Standard Best Management Practices (BMPs) that would be implemented during construction of the Project; these BMPs are considered Project Design Features (PDF). Project impacts were evaluated assuming the following PDFs would be implemented:

PDF-1. Worker Environmental Awareness Program (WEAP) Training. Prior to the initiation of construction activities, IRWD will retain a qualified Biologist (i.e., Biological Monitor) to provide a WEAP training for construction personnel to review the mitigation measures and permit requirements applicable to the construction phase. The Biological Monitor will require trained personnel to sign the WEAP Log to document that they have been trained and understand the mitigation measures and permit conditions. The Biological Monitor will repeat the WEAP training as-needed for new construction personnel.

PDF-2. Project Limits. Prior to construction, the Project limits will be clearly staked by IRWD or IRWD's Contractor and verified by the Biological Monitor.

PDF-3. NCCP/HCP Construction Minimization Measures. As required by the NCCP/HCP, IRWD will follow standard construction-related minimization Measures. These include removal of coastal sage scrub outside the California gnatcatcher breeding season (i.e., February 15 to July 15); pre-construction surveys for coastal California gnatcatchers; identification of coastal sage scrub habitat areas for protection as Environmentally Sensitive Areas (ESAs); and biological monitoring during all clearing of coastal sage scrub.

PDF-4. Tree Protection. To protect western sycamore and coast live oak trees adjacent to Project's permanent and temporary impact areas (Exhibit 11), protective fencing will be placed around all western sycamore and coast live oak trees located within 50 feet of the Project's permanent and temporary impact areas. The tree protection area will be 1.5 times the dripline of the tree. No stockpiling of materials will occur within the tree protection areas. Limbs of western sycamore and coast live oak trees can be pruned to allow construction equipment access. If large branches need to be removed or if more than 10 percent of the total canopy would be affected, pruning will be supervised by a Certified Arborist retained by IRWD.

PDF-5: Nesting Bird Protection. To the extent practicable, IRWD or IRWD's Contractor will conduct vegetation clearing during the non-breeding season (i.e.,

September 16 to January 31). If vegetation clearing will be initiated during the breeding season for nesting birds/raptors (i.e., February 1–September 15), IRWD or IRWD's Contractor will conduct the construction activity in compliance with the conditions set forth in the Migratory Bird Treaty Act. IRWD will retain a qualified Biologist to conduct a pre-construction survey for nesting birds and/or raptors within seven days prior to clearing of any vegetation or work near existing structures The nesting bird survey area will include a buffer of 100 feet around the work area for nesting birds and a buffer of 500 feet around the work area for nesting raptors. If an active nest is found, the Biologist will determine the appropriate protective buffer depending on the sensitivity of the species and the nature of the construction activity. The protective buffer will be 25–100 feet for nesting birds; 300–500 feet for special status bird species or nesting raptors; and 0.5 mile for golden eagle or prairie falcon. No work will be conducted in the protective buffer until a qualified Biologist determines that the nest is no longer active. The Biologist will map any nests found during survey efforts and their protective buffers and will provide the map to IRWD and the Contractor.

PDF-6. Speed Limit During Construction. The speed limit on construction access roads will be no more than 20 miles per hour. Signage will be posted throughout the construction areas and at multiple locations along the access road between the dam and the staging area at the upstream end of the lake. "Wildlife crossing" signage will also be posted along the access road between the dam and the staging area at the upstream end of the lake. Signage will be verified by the Biological Monitor.

PDF-7. Night Lighting. Night lighting will be directed away from adjacent habitat areas to the extent practicable. Shielding of night lighting during construction will be incorporated to ensure that ambient lighting is directed away from sensitive habitat areas. Appropriate shielding of night lighting will be verified by the Biological Monitor.

PDF-8. Prevent Spread of Invasive Species. Weed seeds entering the construction area via vehicles will be minimized by requiring construction vehicles to be washed prior to delivery to the Project site. Track-clean or other methods of vehicle cleaning will be used by the construction contractor to prevent weed seeds from entering/exiting the Project site on vehicles. Wattles used for erosion control will be biodegradable and certified as weed-free. Seed mixes and/or hydroseed applied to temporarily disturbed areas will consist of native species local to the Project vicinity. IRWD will retain a qualified Biologist to review and approve the seed mix. Use of measures to prevent the spread of invasive species will be verified by the Biological Monitor.

PDF-9. Treatment of Invasive Species. During active construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a monthly basis. If a target species is observed within 100 feet of the active construction area, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed.

For a period of two years following completion of construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a quarterly basis. If a target species is observed within 100 feet of the previously disturbed areas, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed.

4.1 SIGNIFICANCE CRITERIA

The environmental impacts relative to biological resources are assessed using impact significance criteria that mirror the policy contained in CEQA, Section 21001(c) of the California Public Resources Code. Accordingly, the State Legislature has established it to be the policy of the state to:

> *"Prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities…"*

Determining whether a project may have a significant effect, or impact plays a critical role in the CEQA process. According to CEQA, Section 15064.7, Thresholds of Significance, each public agency is encouraged to develop and adopt (by ordinance, resolution, rule, or regulation) thresholds of significance that the agency uses in the determination of the significance of environmental effects. A significant threshold is quantitative, qualitative, or performance level of a particular environmental effect, that would normally be determined to be significant by the agency if the threshold is exceeded.

In the development of thresholds of significance for impacts to biological resources CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the CEQA Guidelines, Appendix G, Environmental Checklist Form. Section 15065(a) states that a project may have a significant effect where:

> *"The Project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species…"*

Appendix G of the CEQA Guidelines is more specific in addressing biological resources and encompasses a broader range of resources to be considered, including: candidate, sensitive, or special status species; riparian habitat or other sensitive natural communities; federally protected wetlands; fish and wildlife movement corridors; local policies or ordinances protecting biological resources; and, adopted HCPs. These factors are considered through the checklist of questions answered during the Initial Study process that is used to determine appropriate environmental documentation for a project (i.e., Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report). Because these questions are derived from standards in other laws, regulations, and other commonly used thresholds, it is reasonable to use these standards as a basis for defining significance thresholds for an environmental document. For each of the thresholds identified below, the section of CEQA

upon which the threshold was derived has been provided. For the purpose of this analysis, impacts to biological resources are considered significant (before considering offsetting mitigation measures) if one or more of the follow conditions would result from implementation of the Project:

1. *If the Project has the potential to substantially degrade the quality of the environment. (15065[a])*
2. *If the Project has the potential to substantially reduce the habitat of a fish or wildlife species. (15065[a])*
3. *If the Project will cause a fish or wildlife populations to drop below self-sustaining levels. (15065[a])*
4. *If the Project will threaten to eliminate a plant or animal community. (15065[a])*
5. *If the Project will reduce the number or restrict the range of an endangered, rare, or threatened species[15]. (15065[a])*
6. *If the Project has a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Game and Wildlife Service (CEQA Guidelines, Appendix G, IV. [a]).*
7. *If the Project has a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service (CEQA Guidelines, Appendix G, IV. [b]).*
8. *If the Project has a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means (CEQA Guidelines, Appendix G, IV. [c]).*
9. *If the Project interferes substantially with the movement of any native or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impedes the use of native wildlife nursery sites (CEQA Guidelines, Appendix G, IV. [d]).*
10. *If the Project conflicts with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance CEQA Guidelines, Appendix G, IV. [e]).*
11. *If the Project conflicts with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan (CEQA Guidelines, Appendix G, IV. [f]).*

[15] Endangered and threatened species as used in this threshold are those listed by USFWS and/or CDFW as Threatened or Endangered. Section 15380 of CEQA indicates that a lead agency can consider a non-listed species (e.g., CRPR 1B plants) to be Endangered, Rare, or Threatened for the purposes of CEQA if the species can be shown to meet the criteria in the definition of rare or endangered. For the purposes of this discussion, the current scientific knowledge on the population size and distribution for each special status species was considered in determining if a non-listed species met the definitions for rare and endangered according to Section 15380 of CEQA.

An evaluation of whether an impact on biological resources would result in a "substantial adverse effect" must consider both the resource itself and how that resource fits into a regional context. For the Project, the regional setting of the Project includes the Central–Coastal Subregion NCCP/HCP. This subregion is bound by the SR-55 and SR-91 freeways to the north, the County boundary to the east, El Toro Road and Interstate-5 to the south, and the Pacific Coast to the west.

For the purposes of the impact analysis, "substantial adverse effect" is defined as the loss or harm of a magnitude which, based on current scientific data and knowledge, would 1) substantially diminish population numbers of a species or distribution of a habitat type within the region, or 2) eliminate the functions and values of a biological resource in the region.

4.2 DIRECT IMPACTS

The actual and potential occurrence of biological resources in the BSA vicinity was correlated with the significance criteria described above to determine whether impacts from the Project on these resources would be significant. Potential direct impacts are described below.

4.2.1 Vegetation Types and Other Areas

Vegetation types and other areas that would be impacted by the Project, SCE Realignment, and Additional Inundation Area are shown in Table 17 and Exhibit 11. It should be noted that within the SCE Realignment outside of the permanent and temporary impact area, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area. The vegetation types that would be impacted by the Project are discussed below.

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	115.81	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	20.11	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.63	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
Subtotal Coastal Sage Scrub		*175.10*	*3.95*	*4.39*	*0.07*	*8.41*	*3.36*
Chaparral							
Toyon – Sumac Chaparral	3.12	30.35	2.52	2.18	0.00	4.70	0.18
Subtotal Chaparral		*30.35*	*2.52*	*2.18*	*0.00*	*4.70*	*0.18*
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	92.38	0.25	25.72	0.00	25.97	3.07
Subtotal Grassland		*107.97*	*5.92*	*28.81*	*0.01*	*34.74*	*3.23*
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	0.00	22.16	0.00	22.16	0.00
Subtotal Riparian		*212.65*	*1.45*	*35.28*	*0.00*	*36.73*	*9.66*

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT[a]

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact[b] (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	31.09	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
Subtotal Woodland		*31.45*	*0.53*	*2.99*	*0.05*	*3.57*	*0.50*
Cliff and Rock							
Cliff	10.0	1.63	0.30	0.21	0.01	0.52	0.01
Subtotal Cliff and Rock		*1.63*	*0.30*	*0.21*	*0.01*	*0.52*	*0.01*
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.13	0.00	31.08	0.00	31.08	0.00
Subtotal Lakes, Reservoirs, and Basins		*383.55*	*0.33*	*183.20*	*0.00*	*183.53*	*0.00*
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
Subtotal Watercourses		*6.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Developed Areas							
Ornamental	15.5	20.77	0.03	1.21	0.00	1.24	0.47
Developed	15.6	20.98	2.44	2.59	0.00	5.03	1.80
Subtotal Developed Areas		*41.75*	*2.47*	*3.80*	*0.00*	*6.27*	*2.27*
Disturbed Areas							
Disturbed	16.1	25.42	0.03	3.95	0.00	3.98	0.83
Subtotal Disturbed Areas		*25.42*	*0.03*	*3.95*	*0.00*	*3.98*	*0.83*
Total		**1,016.85**	**17.50**	**264.81**	**0.14**	**282.45**	**20.04**

[a] The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N.

[b] Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.

Coastal Sage Scrub

A total of 8.41 acres (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment) of coastal sage scrub vegetation would be removed to construct the Project (Table 17). Coastal sage scrub vegetation types that would be impacted include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, and disturbed floodplain sage scrub. The NCCP/HCP protects coastal sage scrub in the Central–Coastal Subregion because it provides habitat for Covered Species. Additionally, disturbed floodplain sage scrub is considered a sensitive natural community by CDFW.

The Project would also temporarily impact up to 3.36 acres of sage scrub vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). Coastal sage scrub in the additional inundation area includes sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, southern cactus scrub, and disturbed southern cactus scrub. The NCCP/HCP protects coastal sage scrub in the Central–Coastal Subregion because it provides habitat for Covered Species. Additionally, southern cactus scrub and disturbed southern cactus scrub are considered sensitive natural communities by CDFW.

Per Section 5.11 of the NCCP/HCP, infrastructure is an existing use that is allowed within the Reserve. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Additionally, the NCCP/HCP requires avoidance and minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species. Implementation of Mitigation Measure #1 would ensure that IRWD's take is accounted for according to the NCCP/HCP. Standard NCCP/HCP construction minimization measures would also be implemented (PDF-3).

Chaparral

A total of 4.70 acres (2.52 acres permanent; 2.18 acres temporary) of toyon–sumac chaparral would be removed to construct the Project (Table 17). While the loss of chaparral would be considered adverse, the loss would be limited in relation to the total amount of chaparral vegetation available in the Project region. Toyon–sumac chaparral is not considered a sensitive natural community by CDFW. Impacts on toyon–sumac chaparral would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 0.18 acre of toyon–sumac chaparral in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on toyon–sumac chaparral would be considered less than significant, and no mitigation would be required.

Grassland

A total of 34.74 acres (5.92 acres permanent; 28.81 acres temporary; 0.01 acre within the SCE realignment) of grassland vegetation would be removed to construct the Project (Table 17). Grassland vegetation types that would be impacted include annual grassland and ruderal. These vegetation types are generally considered of low biological value, are relatively common in the Project region, and are not considered sensitive natural

communities by CDFW. Impacts on grassland would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 3.23 acres of grassland vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on grassland would be considered less than significant; therefore, no mitigation would be required.

Riparian

A total of 36.73 acres (1.45 acre permanent; 35.28 acres temporary) of riparian vegetation would be removed to construct the Project (Table 17). Riparian vegetation types that would be impacted include riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb. Impacts on riparian vegetation types are considered significant because federal and State resource agencies (i.e., USACE, CDFW, and RWQCB) have given these vegetation types special status due to their high biological value; jurisdictional areas are discussed below under Jurisdictional Resources (Section 4.2.2). Riparian vegetation types also provide potential habitat for federal and State-listed species. Additionally, southern willow scrub, southern black willow forest, disturbed southern black willow riparian forest, and southern black willow riparian forest/riparian herb are also considered sensitive natural communities by CDFW.

The Project would also temporarily impact up to 9.66 acres of riparian vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). Riparian vegetation types in the additional inundation area include disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, and disturbed southern black willow forest. As described above, these vegetation types have been given special status due to their high biological value and potential to support federal and State-listed species. Additionally, southern sycamore riparian woodland, southern black willow forest, and disturbed southern black willow forest are considered sensitive natural communities by CDFW.

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of riparian vegetation types.

Woodland

A total of 3.57 acres (0.53 acre permanent; 2.99 acres temporary; 0.05 acre within the SCE realignment) of woodland vegetation would be removed to construct the Project (Table 17). This may include trimming of trees along access roads. Woodland vegetation types that would be impacted include coast live oak woodland and western sycamore. Western sycamore is considered a sensitive vegetation community by CDFW.

The Project would also temporarily impact up to 0.50 acre of woodland vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect

Impacts). Woodland vegetation in the additional inundation area is coast live oak woodland. Coast live oak woodland is not considered a sensitive natural community by CDFW. Impacts on coast live oak woodland would be considered less than significant; therefore, no mitigation would be required for the vegetation community. However, portions of the woodland are within jurisdictional areas (discussed below in Jurisdictional Resources, Section 4.2.2).

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of woodland vegetation types. Implementation of Mitigation Measure #3 would ensure that any western sycamores removed would be replaced. Standard tree protection measures to fence coast live oak and western sycamores within or near the work area would also be implemented (PDF-4).

Cliff

A total of 0.52 acre (0.30 acre permanent, 0.21 acre temporary; 0.01 acre within the SCE realignment) of cliff would be impacted to construct the Project (Table 17). The loss of cliff relative to the availability of this mapping unit in the Project region would be limited in relation to the total amount of cliff available in the Project region. Impacts on cliff would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 0.01 acre of cliff in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As discussed above, impacts on cliff would be considered less than significant; therefore, no mitigation would be required.

Lakes, Reservoirs, and Basins

A total of 183.53 acres (0.33 acre permanent; 183.20 acres temporary) of lakes, reservoirs, and basins would be impacted to construct the Project (Table 17). Mapping units and vegetation types that would be impacted include open water, fluctuating shoreline, and vegetated fluctuating shoreline. Impacts on these areas are considered significant because federal and State resource agencies (i.e., USACE, CDFW, and RWQCB) have given these areas special status due to their high biological value; jurisdictional areas are discussed below in Jurisdictional Resources (Section 4.2.2). These areas are not considered sensitive natural communities by CDFW.

The Project would not impact open water, fluctuating shoreline, or vegetated fluctuating shoreline in the additional inundation area (as they are mapped within the existing inundation area).

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for impacts on these areas.

Watercourses

There would be no impact on watercourses (i.e., perennial stream) and no mitigation would be required.

Developed Areas

A total of 6.27 acres (2.47 acres permanent; 3.80 acres temporary) of developed areas would be impacted to construct the Project (Table 17). Mapping units and vegetation types that would be impacted include ornamental and developed. Developed and ornamental vegetation are generally considered of low biological value and are relatively common in the Project region. Impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 2.27 acres of developed areas in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

Disturbed

Approximately 3.98 acres (0.03 acre permanent; 3.95 acres temporary) of disturbed areas would be impacted to construct the Project (Table 17). These areas are considered of low biological value. Therefore, this impact is considered less than significant, and no mitigation would be required.

The Project would also temporarily impact up to 0.83 acre of disturbed areas in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on disturbed areas would be considered less than significant; therefore, no mitigation would be required.

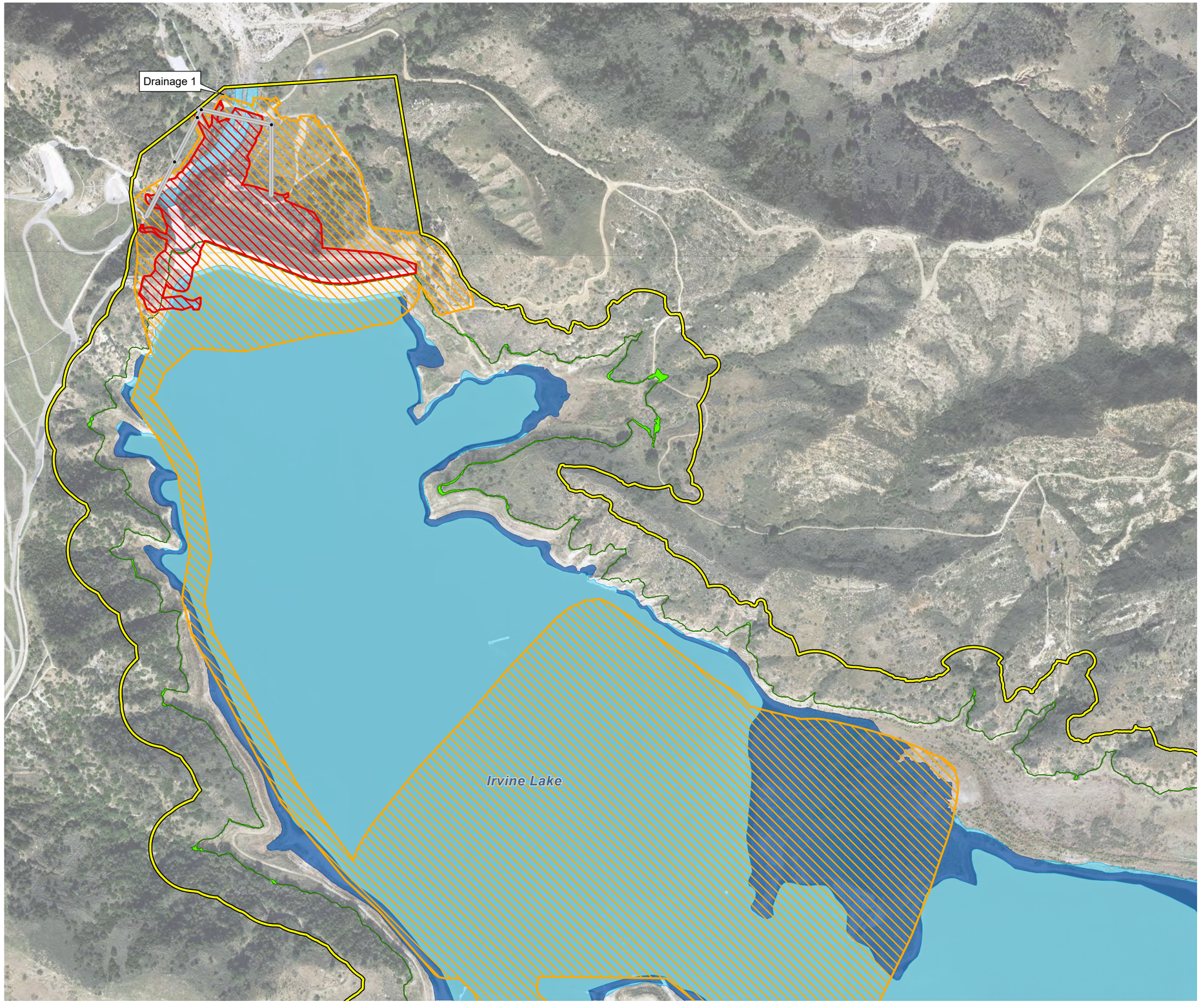
4.2.2 Jurisdictional Resources

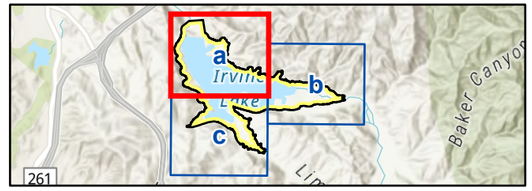
Jurisdictional resources that would be impacted by the Project, SCE Realignment, and Additional Inundation Area are discussed below.

USACE

A total of 203.570 acre of WOTUS under the regulatory authority of the USACE would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) (Table 18; Exhibit 12). This represents impacts to WOTUS in Irvine Lake, Santiago Creek, and Drainage 1. There would be no impact on USACE jurisdiction for the SCE Realignment.

The Project would impact an additional 0.673 acre of WOTUS (0.673 acre wetland) with the additional inundation area (Table 18; Exhibit 12). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM; additional inundation of areas under the jurisdiction of USACE would be considered less than significant.





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

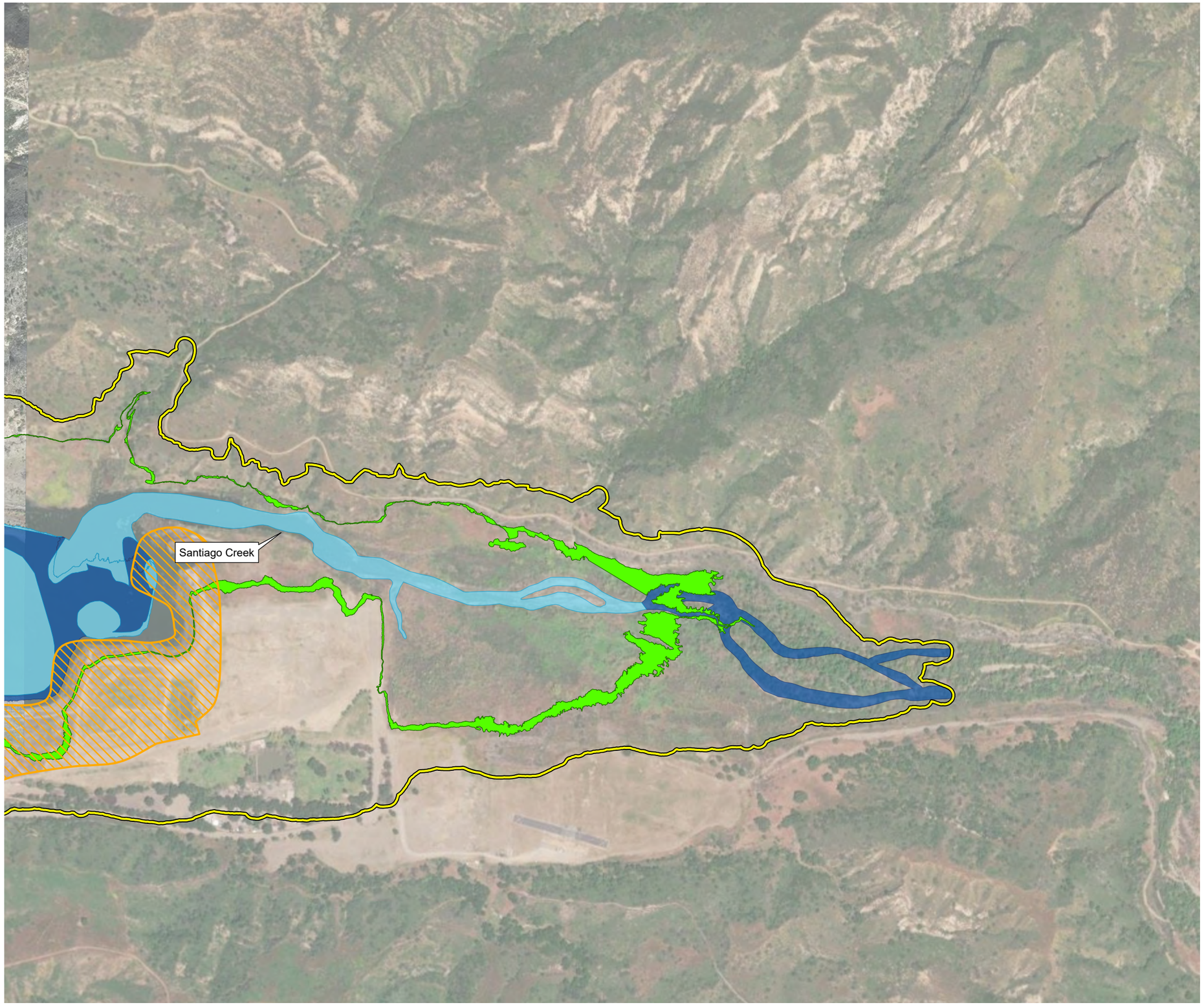
Exhibit 12a

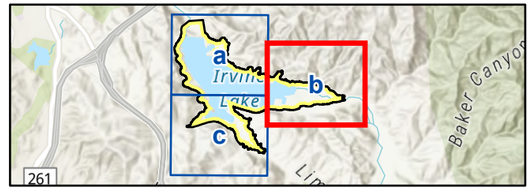
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

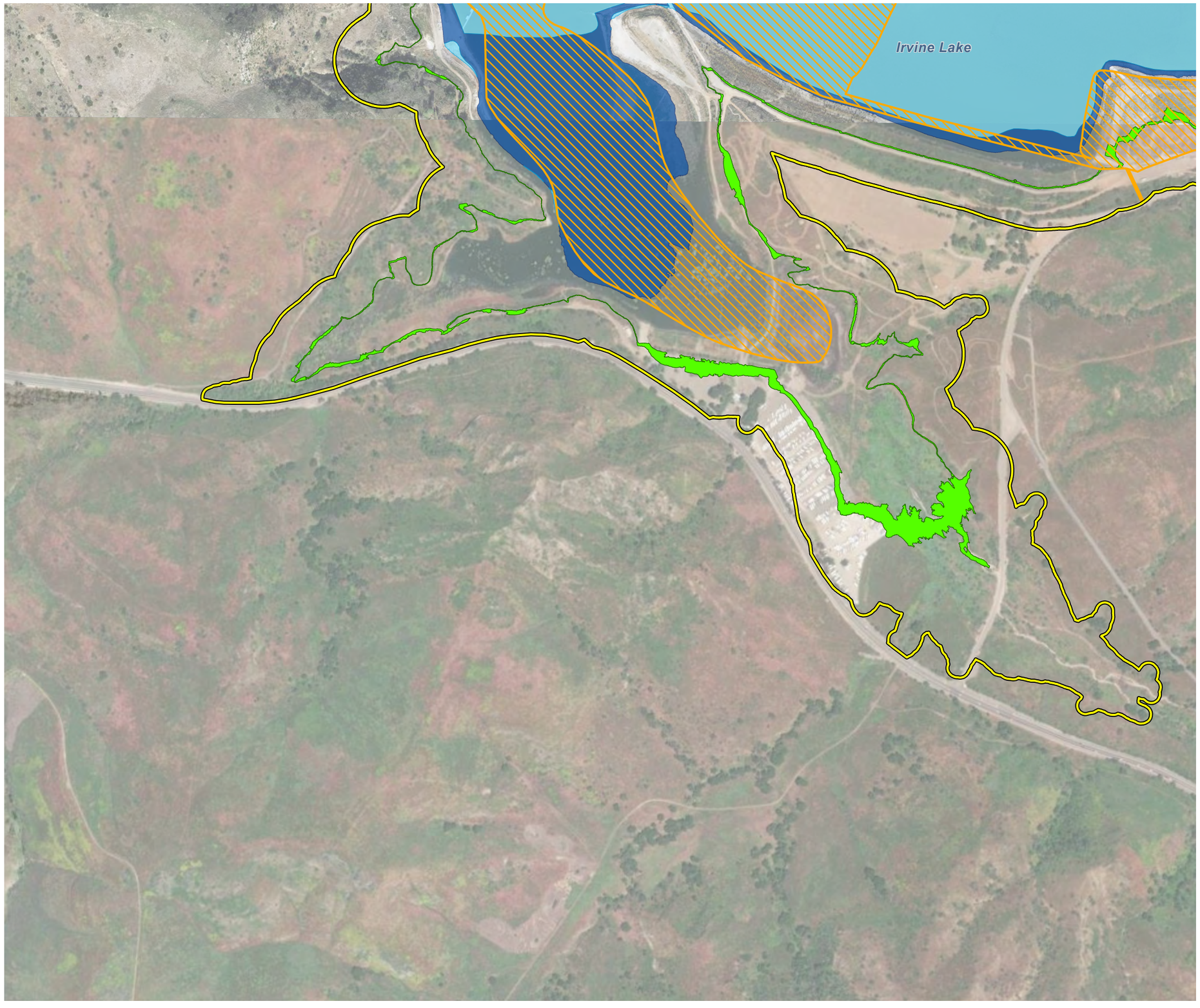
Exhibit 12b

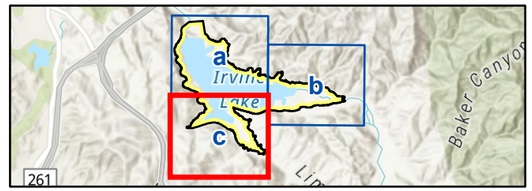
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

Exhibit 12c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_JD_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of WOTUS under the jurisdiction of USACE.

RWQCB

A total of 203.641 acres of waters of the State under the regulatory authority of the RWQCB would be impacted to construct the Project (wetland: 0.000 acres permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary) (Table 18; Exhibit 13). This represents impacts to waters of the State in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. There would be no impact on RWQCB jurisdiction for the SCE Realignment.

The Project would impact an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area (Table 18; Exhibit 13). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of RWQCB would be considered less than significant.

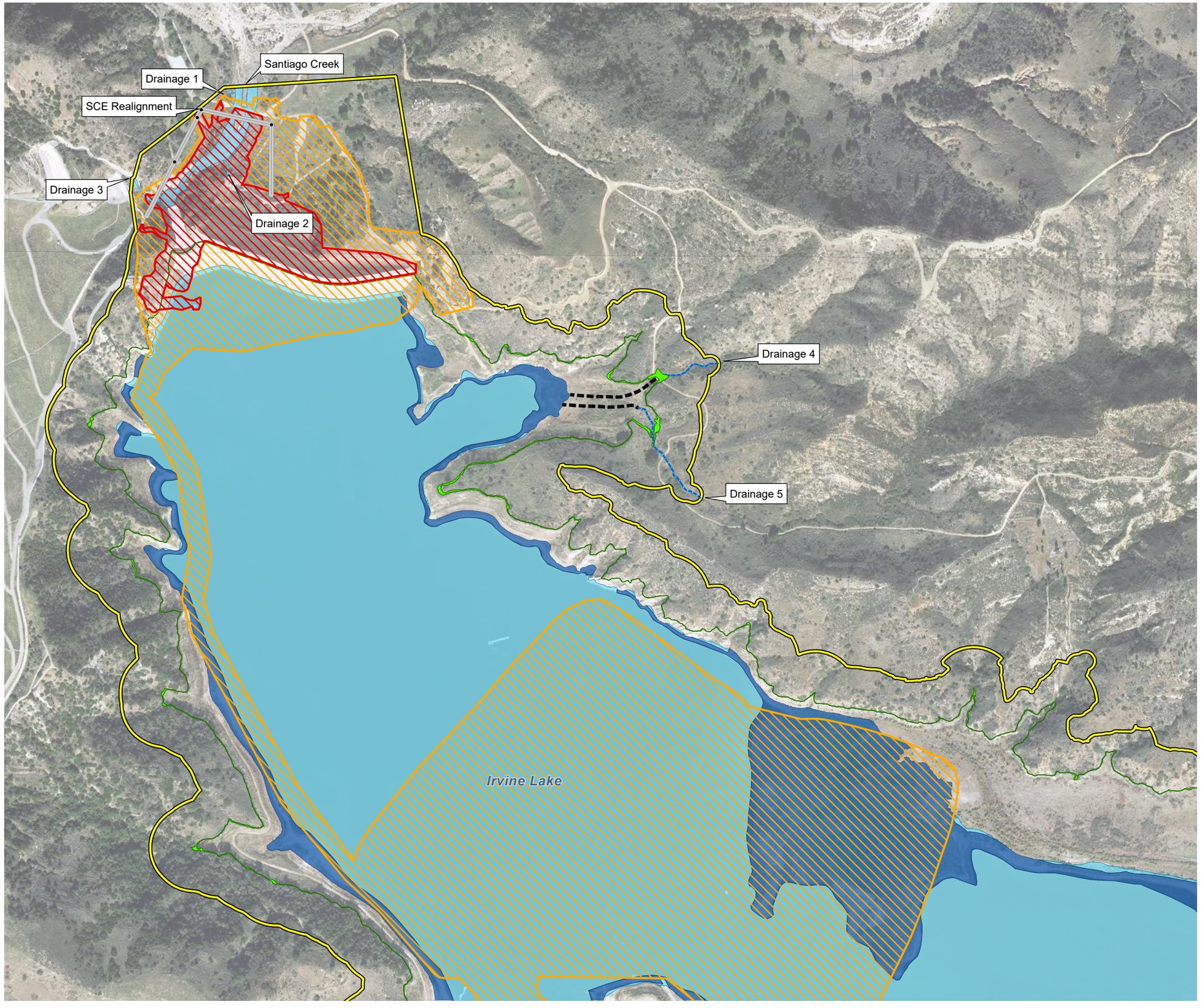
Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of waters of the State under the jurisdiction of RWQCB.

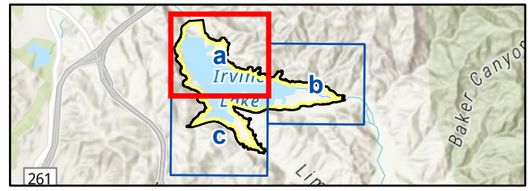
CDFW

A total of 233.774 acres of waters under the regulatory authority of CDFW would be impacted to construct the Project (3.924 acres permanent; 229.850 acres temporary) (Table 18; Exhibit 14). This represents impacts to waters under the authority of CDFW in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3.

The Project would impact an additional 8.980 acres of waters under the authority of CDFW with the additional inundation area (Table 18; Exhibit 14). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the existing bed and bank, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of CDFW would be considered less than significant.

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of waters of the State under the jurisdiction of CDFW.





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W
E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

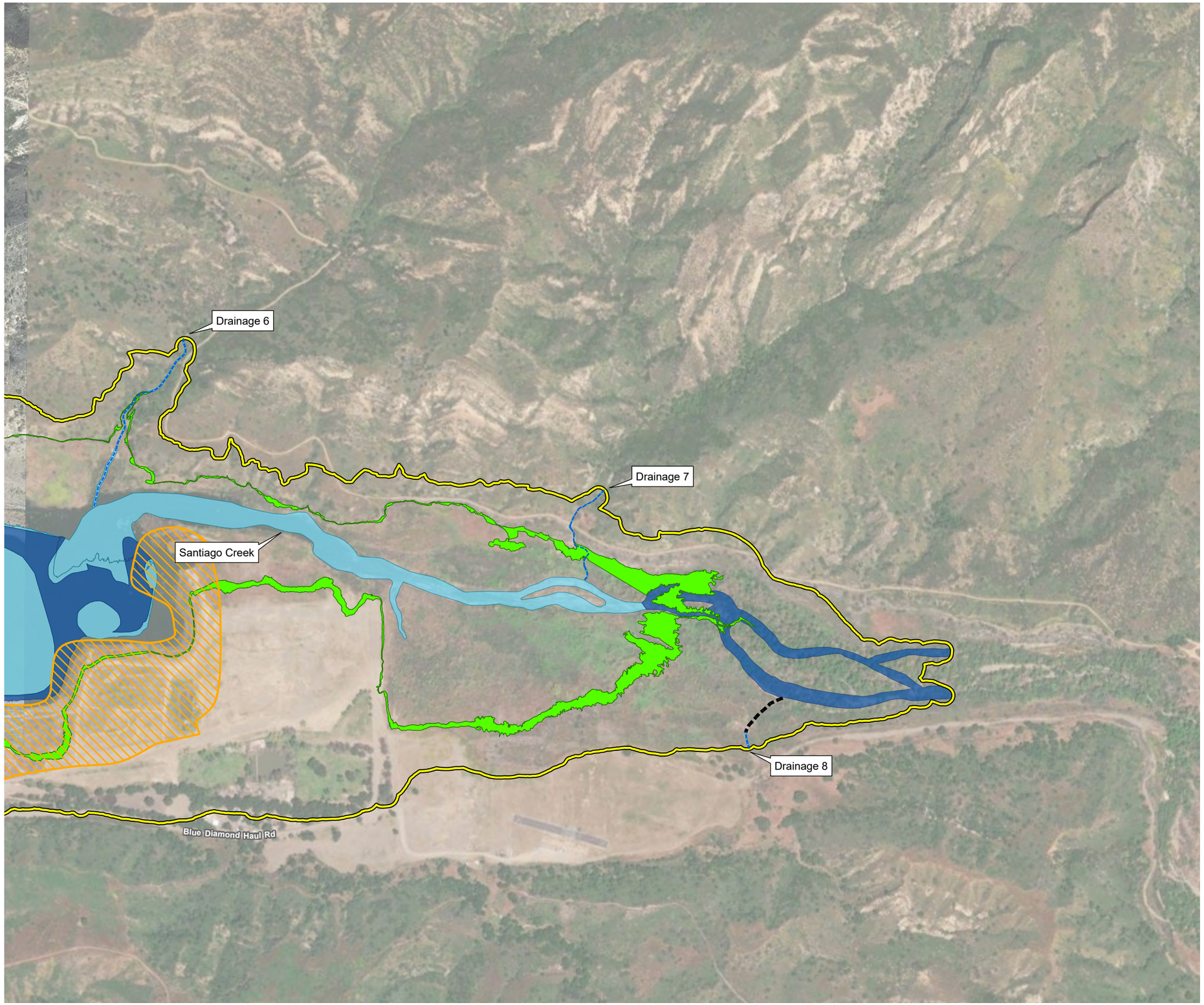
Exhibit 13a

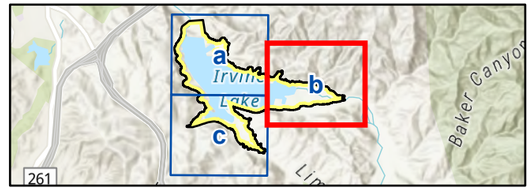
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW10205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprvlex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

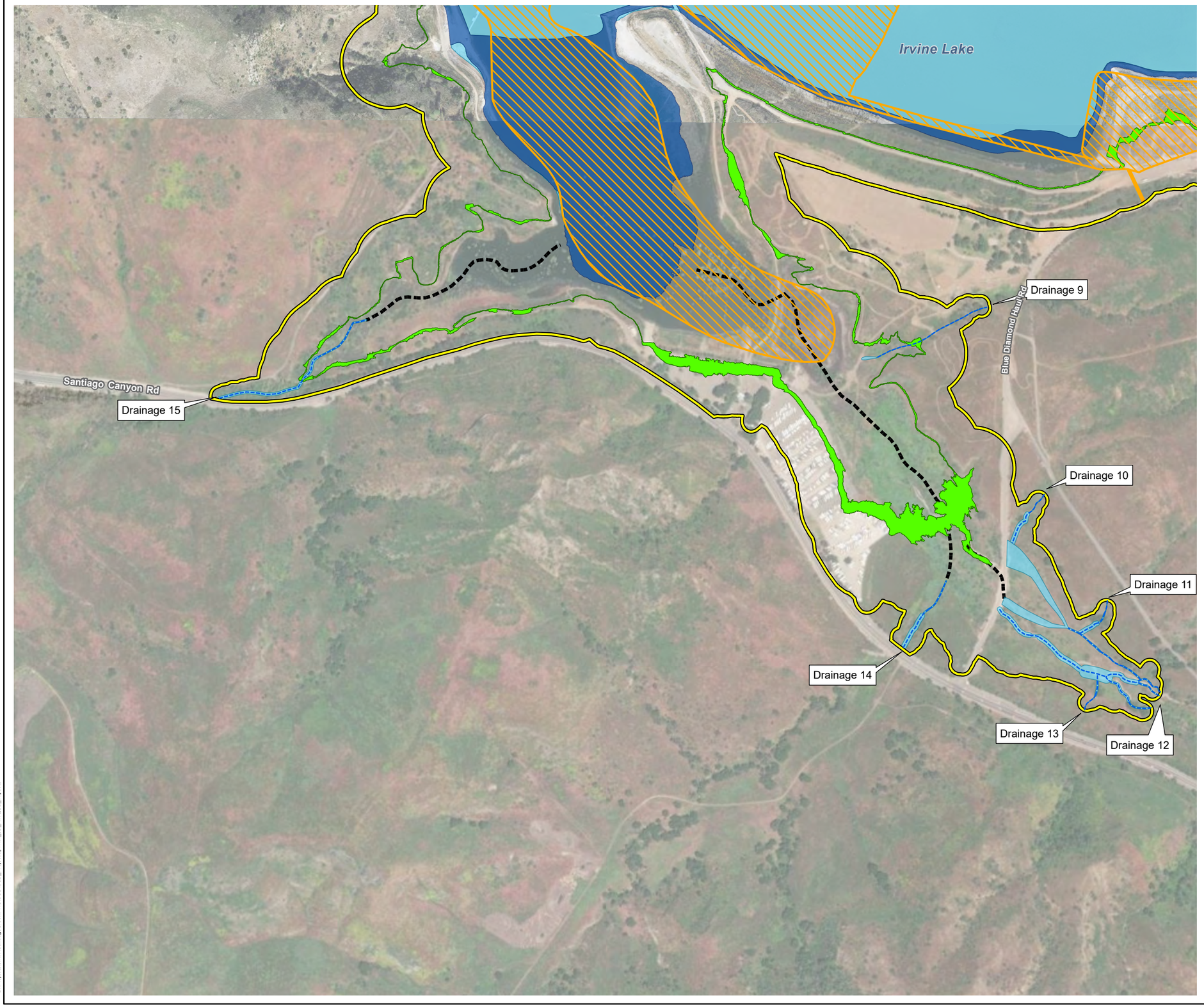
Exhibit 13b

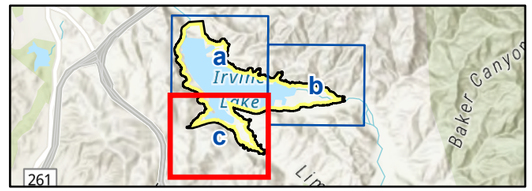
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW01020S\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

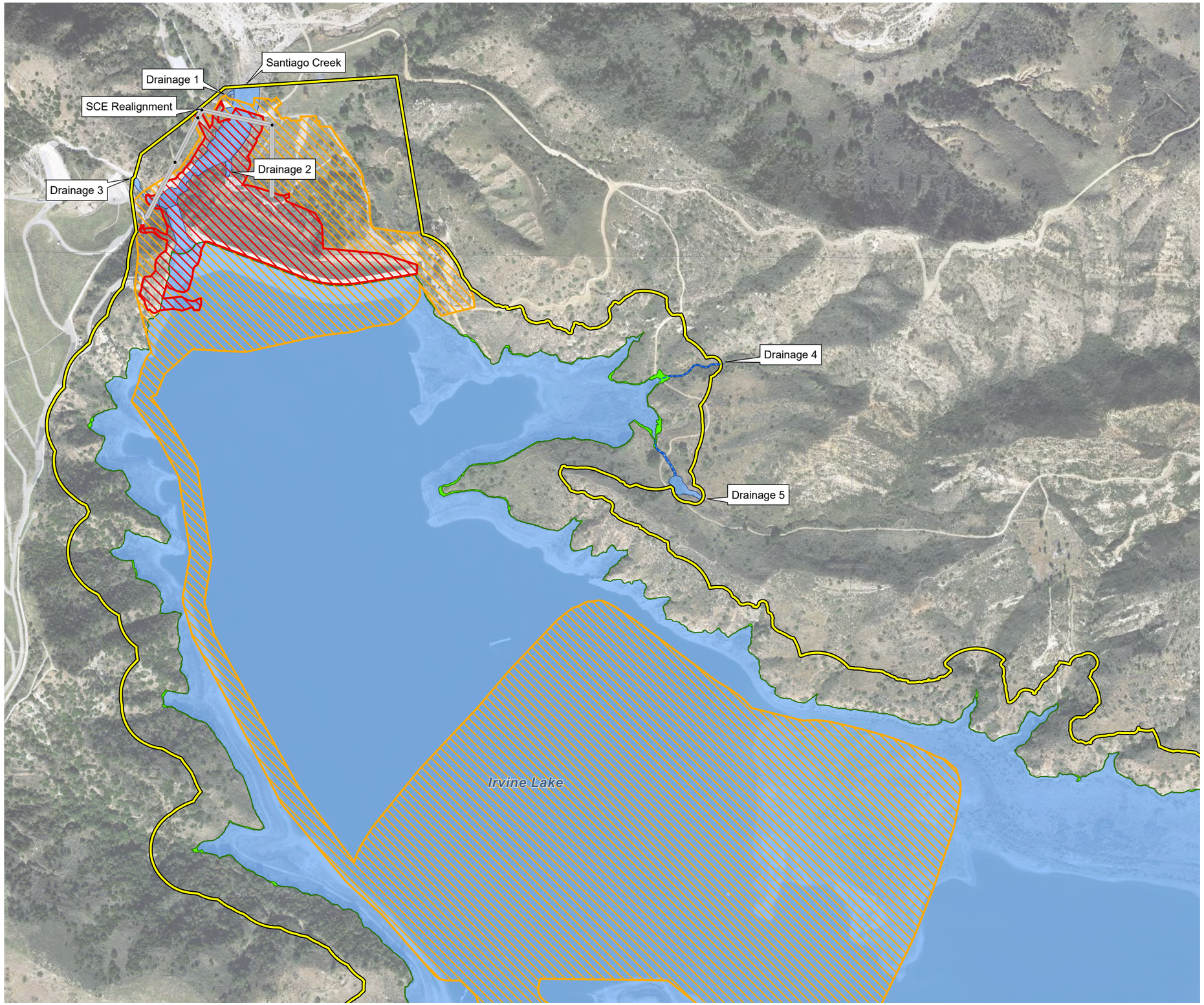
Exhibit 13c

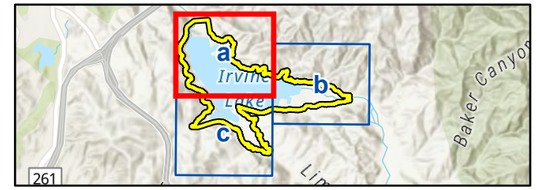
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW01020S\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project aprvlex_JD_RWQCB_Impacts





Biological Study Area

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

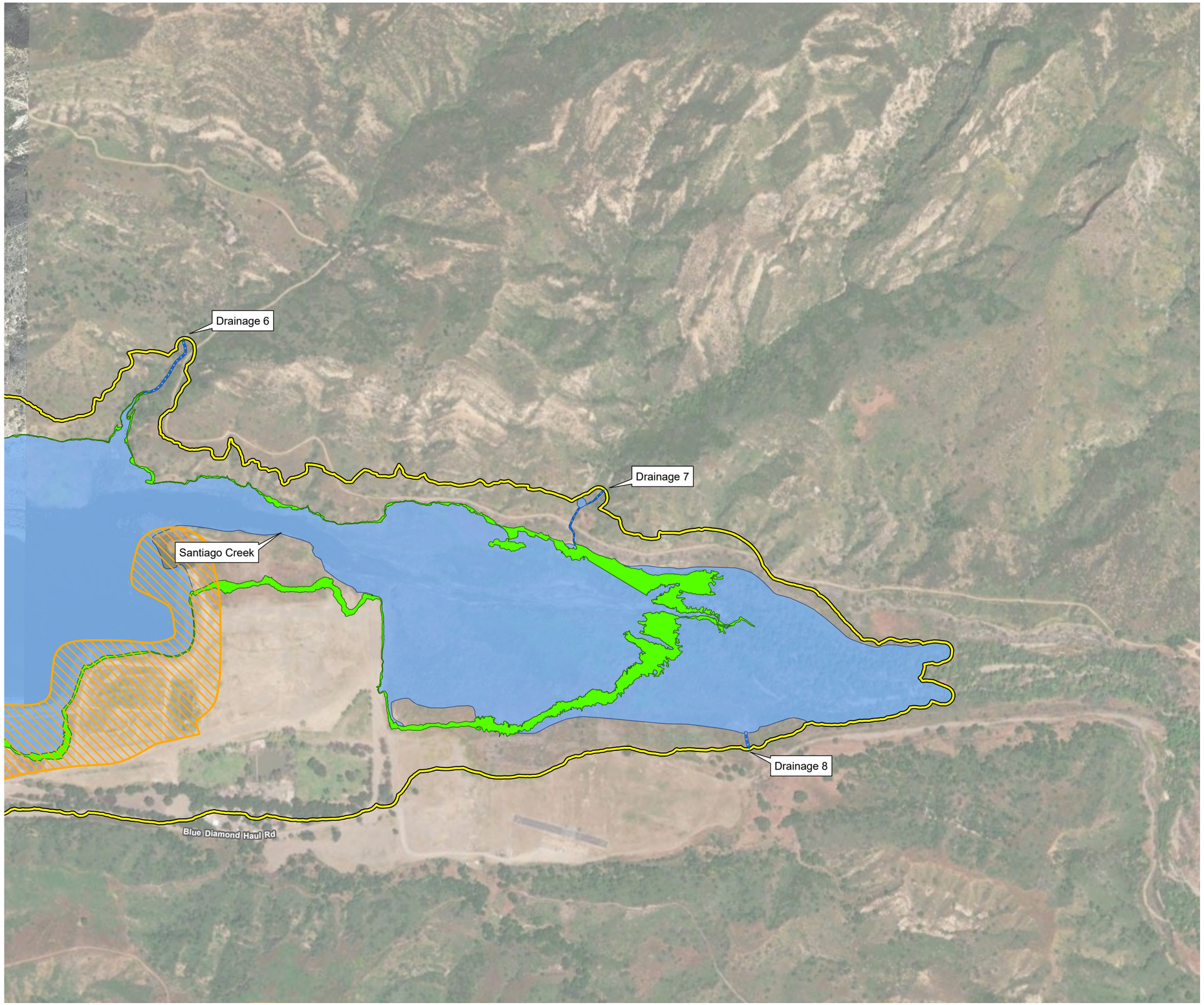
Exhibit 14a

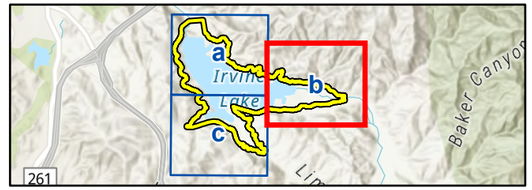
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

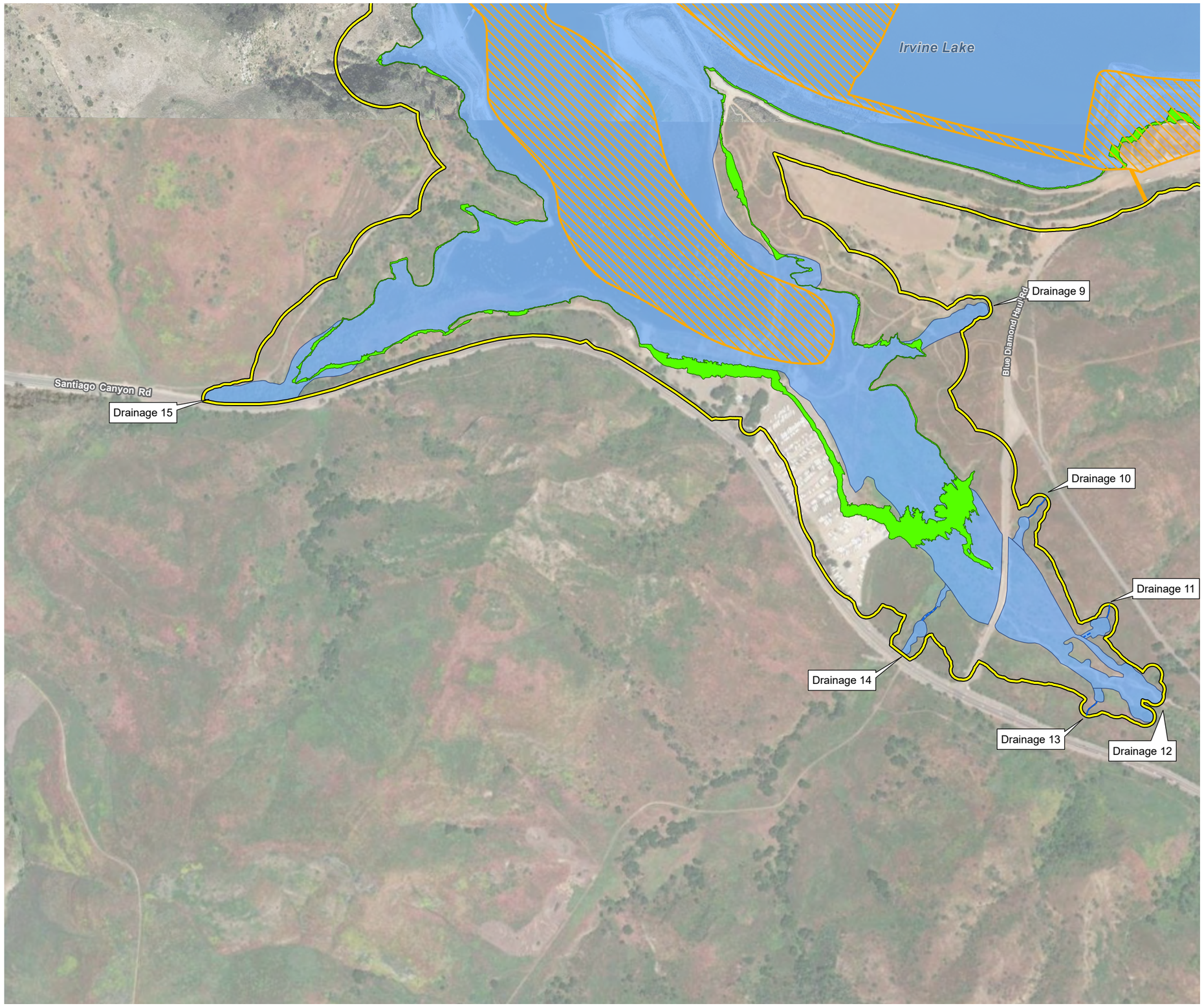
Exhibit 14b

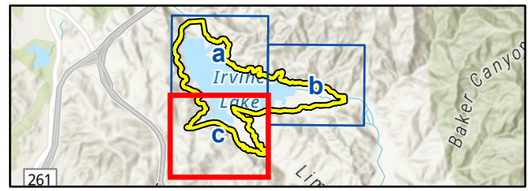
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW01020\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

Exhibit 14c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_JD.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts

TABLE 18
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)				
	Existing	**Permanent**	**Temporary**	**Total Permanent/ Temporary Impact**	**Additional Inundation Area[a]**
USACE WOTUS	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 326.770	Non-wetland: 1.798	Non-wetland: 137.857	Non-wetland: 139.655	Non-wetland: 0.000
	Total: 428.476	Total: 1.798	Total: 201.772	Total: 203.570	Total: 0.673
RWCQB Waters of the State	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 333.499	Non-wetland: 1.861	Non-wetland: 137.865	Non-wetland: 139.726	Non-wetland: 0.038
	Total: 435.20	Total: 1.861	Total: 201.780	Total: 203.641	Total: 0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

4.2.3 Wildlife

Native and non-native vegetation provide valuable nesting, foraging, roosting, and denning opportunities for a variety of wildlife species. A total of 98.05 acres (8.75 acres permanent; 89.17 acres temporary; 0.13 acre within the SCE realignment) of native vegetation types (including coastal sage scrub, chaparral, riparian, woodland, cliff, fluctuating shoreline, and vegetated fluctuating shoreline) would be removed to construct the Project (Table 17). Additionally, a total of 39.96 acres (5.98 acres permanent; 33.97 acres temporary; 0.01 acre within the SCE realignment) of non-native vegetation (including grasslands, ornamental, and disturbed) would be removed to construct the Project (Table 17). Removing or altering habitats would likely result in the loss of small mammals, reptiles, amphibians, and other slow-moving wildlife that live in the Project's direct impact area. More mobile wildlife species that are now using these areas would be forced to move into adjacent areas of open space, which would increase competition for available resources in those areas. This situation would result in the loss of individuals that cannot successfully compete. The loss of wildlife habitat relative to the availability of habitat in the Project region would be considered adverse; however, the loss would be limited in relation to the total amount of wildlife habitat available in the Project region. Therefore, it would not be expected to reduce populations of common wildlife species below self-sustaining levels in the Project region. Therefore, this impact would be considered adverse but less than significant, and no mitigation would be required. Additionally, the NCCP/HCP mitigated for loss of native habitat through the creation of a Reserve System that provides habitat for common wildlife as well as the Covered Species.

Dewatering Irvine Lake during construction would temporarily reduce the amount of open water available for wildlife species to forage and drink during Project construction; however, drinking water would continue to be available upstream/downstream of the lake along Santiago Creek. Following completion of the Project, open water would again be available for foraging and drinking water.

Several common bird species have the potential to nest in the vegetation, on the ground, or in structures in the BSA. The loss of an active migratory bird nest, including nests of common species, would be considered a violation of the MBTA and Sections 3503, 3503.5, and 3513 of *California Fish and Game Code*. The MBTA and *California Fish and Game Code* prohibit the taking of migratory birds, nests, and eggs. Standard pre-construction surveys and nesting bird protection would be implemented to ensure consistency with the MBTA and *California Fish and Game Code* (PDF-5). Therefore, impacts on nesting birds would be less than significant assuming compliance with regulatory requirements.

The Project would also temporarily impact up to 13.71 acres of native vegetation types and 4.53 acres of non-native vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). If an area was inundated, it is assumed that wildlife would move to higher ground, and once the water subsided, the habitat would again be available to wildlife. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on wildlife and no mitigation would be required.

The additional inundation areas would be expected to be inundated during the storm season, which is generally outside the peak bird breeding season. The inundation would be associated with natural storm events, which could lead to a natural loss of nests early in the spring. The potential inundation of nests is expected to be extremely limited because (1) it would only affect species nesting within two feet in elevation above the current maximum water line; (2) it would only affect species nesting in February and March; and (3) it would only occur approximately once every several years. Therefore, the effect on nesting birds would be expected to be less than significant and no mitigation would be required.

4.2.4 Wildlife Movement

Santiago Creek Dam presents an existing barrier to wildlife movement for fish and amphibians along the Creek. As such, existing wildlife movement in the BSA is expected to be restricted to movement along the creek upstream of Irvine Lake and movement along the creek downstream of the dam. Although wildlife may avoid the dry lakebed during construction, the Project would not be expected to interfere with movement upstream or downstream of construction area. Wildlife species (e.g., mountain lion) would be expected to move through upland areas or along the edge of the Project through habitat not impacted by the Project. The Project would include night construction, which could temporarily decrease wildlife movement in the vicinity of construction at the dam embankment, spillway, near the staging area, and along access roads that are used by medium to large-sized mammals for movement at night. However, medium to large-sized mammals and other wildlife would still able to use ridgelines that would not be affected by the Project. It is possible that wildlife may choose to move along the roads despite the construction, which

would increase the potential for wildlife strikes along the roadways at night. Speed limits and wildlife crossing signage would be posted along access roads (PDF-6). Therefore, the impact on wildlife movement would be less than significant.

The Project would permanently impact 14.73 acres of habitat downstream of the dam along Santiago Creek that wildlife currently moves through (Table 17); however, it would be in the same location as the existing dam structure; it would not create a new barrier to movement.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet); it would not create any new barriers to wildlife movement. Therefore, the effect of the additional inundation on wildlife movement would be less than significant and no mitigation would be required.

4.2.5 Special Status Biological Resource Impacts

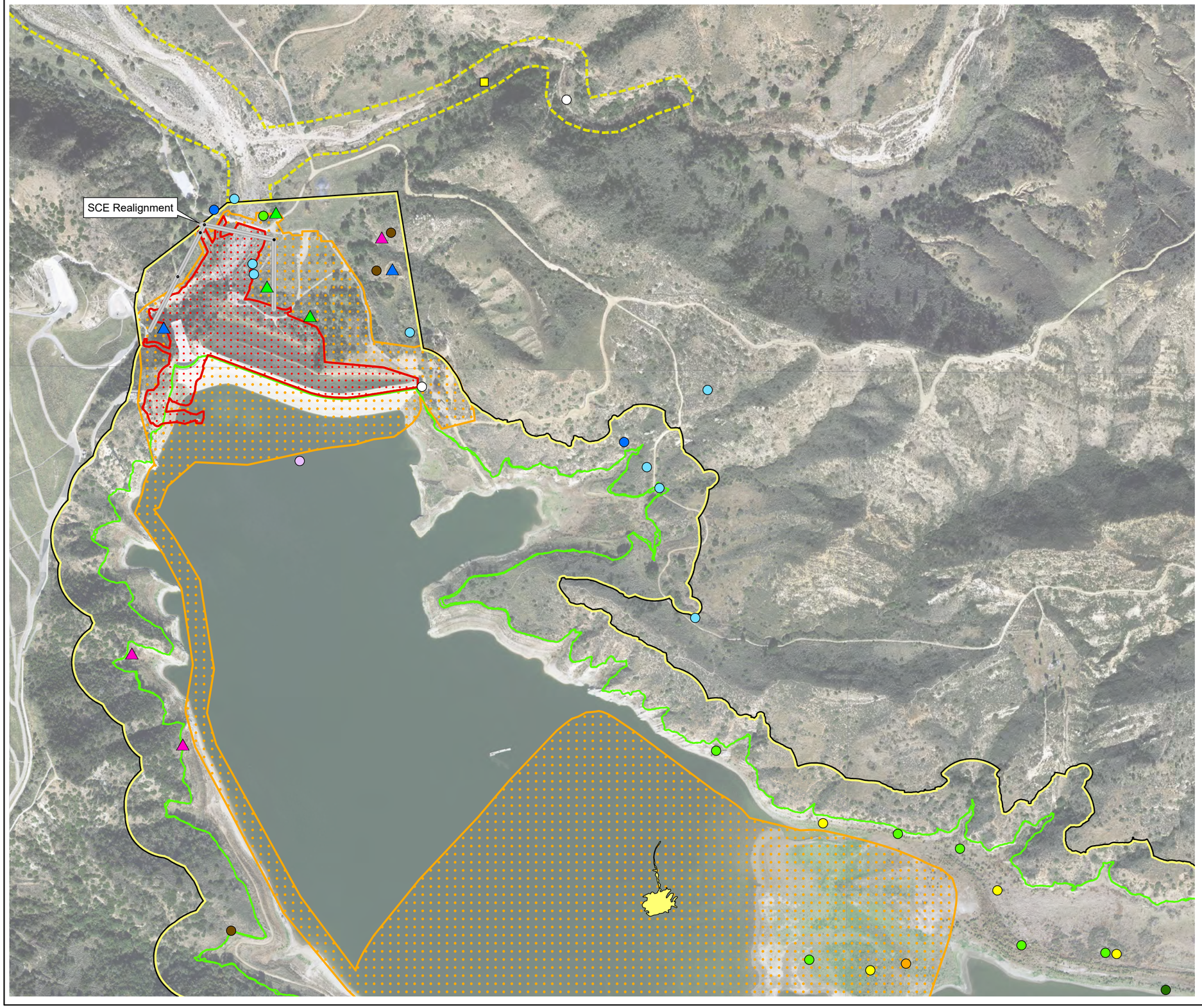
Special Status Plant Species

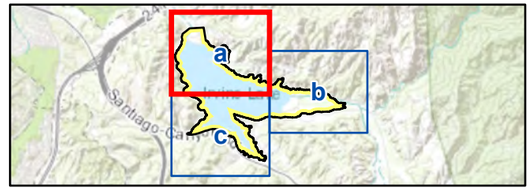
Focused plant surveys were conducted downstream of the dam in spring/summer 2020 and upstream of the dam in spring/summer 2022. Five species were observed: Braunton's milk-vetch (federally Endangered, CRPR 1B.1), intermediate mariposa lily (CRPR 1B.2), many-stemmed dudleya (CRPR 1B.2), mud nama (CRPR 2B.2), and Coulter's matilija poppy (CRPR 4.2).

One individual Braunton's milkvetch was observed in the sandy channel of Santiago Creek, upstream of the lake. This location is outside of the impact footprint for the Project (Exhibit 15). Therefore, there would be no impact on this species and no mitigation would be required.

One individual intermediate mariposa lily was observed downstream of the dam; this individual would be impacted by the Project (Exhibit 15). Five individual intermediate mariposa lilies were observed in three locations upstream of the dam. All of the intermediate mariposa lily locations observed upstream of the dam are located outside of the impact footprint of the Project (Exhibit 15). Intermediate mariposa lily is a Covered Species under the NCCP/HCP; impacts up to 20 individuals are covered. Therefore, no mitigation would be required. To further minimize the impact, intermediate mariposa lily has been included with Mitigation Measure #4.

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations downstream of the dam. Approximately 800 individuals were observed in the eastern portion of the plant survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the plant survey area. The larger population of dudleya (800 individuals) is located outside of the impact footprint of the Project, but the smaller population (10 individuals) is located within the impact area (Exhibit 15). Although not formally listed under the federal or State Endangered Species Acts, many-stemmed dudleya is considered rare, threatened, or endangered within its range, and is fairly threatened in California (20–80 percent of its populations are threatened). However, the loss of 10 individuals of the 810 observed downstream of the dam represents 1.2 percent of the





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Permanent Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Many-Stemmed Dudleya Population
Mud Nama Population (mapped polygon)

Special Status Species
American Peregrine Falcon
American White Pelican
Coastal Cactus Wren
Coastal California Gnatcatcher
Grasshopper Sparrow
Least Bell's Vireo
Southern California Rufous-Crowned Sparrow
White-Tailed Kite
Yellow-Breasted Chat
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

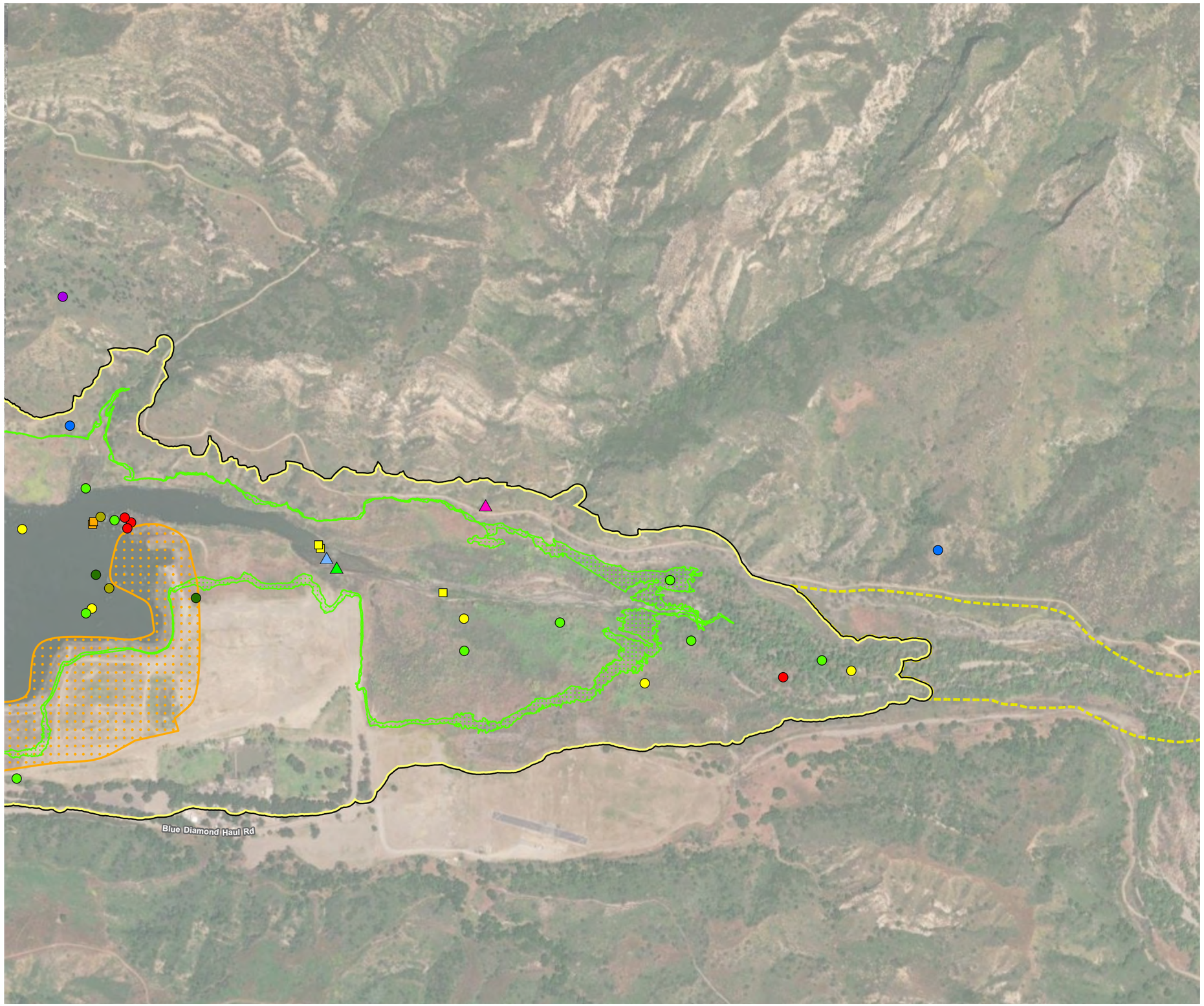
Exhibit 15a

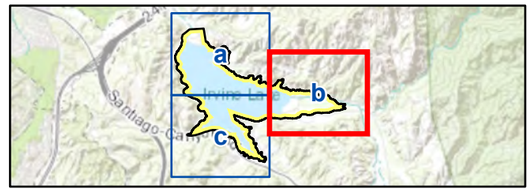
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\CD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area
Arroyo Toad Survey Area

Project Impacts
Temporary Impacts*
Additional Inundation Area

SCE Realignment
Permanent Impacts
Temporary Impacts**

Special Status Plants
Coulter's Matilija Poppy Population
Intermediate Mariposa Lily Population
Braunton's Milkvetch Population

Special Status Species
Bald Eagle (Nest)
Coastal Cactus Wren
Grasshopper Sparrow
Least Bell's Vireo
Willow Flycatcher (migrant)
Yellow Warbler
Yellow-Breasted Chat
Belding's Orange-Throated Whiptail
Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

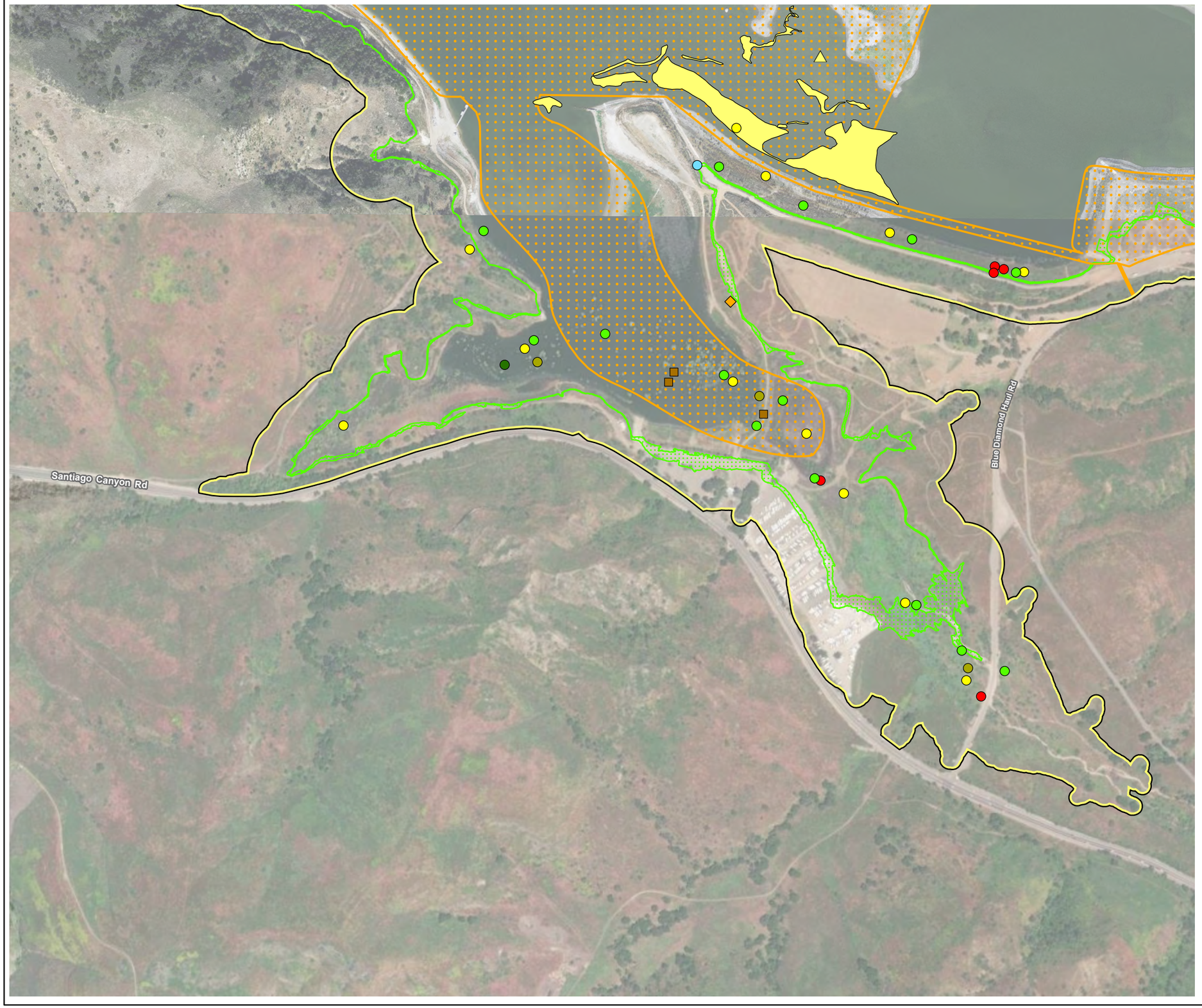
Exhibit 15b

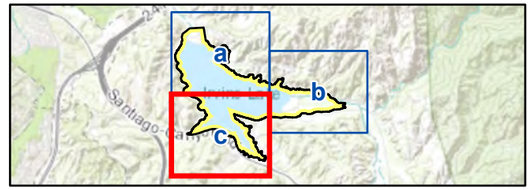
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_SS_Species_Impacts





Biological Study Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Special Status Plants

Mud Nama Population (point location)

Mud Nama Population (mapped polygon)

Special Status Species

Crotch's Bumble Bee

Coastal California Gnatcatcher

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

Yellow Warbler

Yellow-Breasted Chat

Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

Exhibit 15c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_SS_Species_Impacts

individuals observed; therefore, the loss of 10 individuals of many-stemmed dudleya downstream of the dam would be considered adverse but less than significant. To further minimize the impact, many-stemmed dudleya has been included with Mitigation Measure #4.

Multiple populations of mud nama were observed in the southern portion of Irvine Lake (Exhibit 15). This area experiences periodic inundation and was mapped as open water during vegetation mapping in 2020. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. Because the individuals covered a large area and the species is small in stature, the population size was estimated based on density and square footage of each mapped polygon. The total population was estimated to be between 3.5 and 5.5 million. Current Project design shows that the borrow areas would impact 7.08 acres (308,405 square feet) of the mapped mud nama, which is estimated to be 86 to 89 percent of the mud nama present in the BSA (Table 19). This impact would be significant under CEQA Guidelines Section 15380. Once IRWD receives the results of the 2025 geotechnical investigations, Project Engineers would further refine the impact boundary to avoid and minimize impacts on mud nama to the extent feasible; IRWD is committed to avoiding at least 50 percent of the mud nama population (as mapped in 2022). Implementation of Mitigation Measure #4 would require pre-construction surveys by a qualified Botanist to flag the boundary of the population and to make recommendations for avoiding impacts to the extent feasible. With implementation of Mitigation Measure #4, which requires the avoidance of at least 50 percent of the mud nama populations (as mapped in 2022) and compensatory mitigation, impacts on mud nama would be considered less than significant.

TABLE 19
MUD NAMA POPULATION INFORMATION

Population Number	Estimated Population Density	Population Area (square feet)	Estimated Existing Population Size (Number of Individuals)	Extent of Impact
1	High density	25,023	875,805 – 1,000,920	100% Impacted
2	Moderate density	15,709	314,180 – 392,725	100% Impacted
3*	n/a	n/a	100	100% Impacted
4*	n/a	n/a	1,000	100% Impacted
5	Low density	284,500	1,422,500 – 2,845,000	77% Impacted; 219,499 sq. ft. (1,095,325–2,190,650 individuals)
6	Low density	12,647	63,235 – 126,470	100% Impacted
7	Low density	1,121	5,605 – 11,210	100% Impacted
8	High density	1,036	36,260 – 41,440	100% Impacted
9	Low density	3,053	15,265 – 30,530	100% Impacted
10	Low density	9,367	46,835 – 93,670	100% Impacted
11	High density	17,305	605,675 – 692,200	100% Impacted
12	Low density	8,335	41,675 – 83,350	10% Impacted; 871 sq. ft. (4,168–8,335 individuals)
		Total	**3,428,135 – 5,318,615**	**86 –89% Impacted 3,063,453–4,589,250**

High Density: 35–40 individuals per square foot; Moderate Density: 20–25 individuals per square foot; Low Density: 5–10 individuals per square foot

*Populations 3 and 4 were small and population sizes were estimated directly.

Approximately 46 Coulter's matilija poppy clones were observed in 3 populations downstream of the dam and one individual was observed along Santiago Creek upstream of the lake. These populations are all located within the temporary impact footprint of the Project (Exhibit 15). Coulter's matilija poppy is a Covered Species in the NCCP/HCP; therefore, no mitigation would be required. To further minimize the impact, Coulter's matilija poppy has been included with Mitigation Measure #4.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation may temporarily affect two of the intermediate mariposa lily locations on the northwestern side of Irvine Lake and the mud nama located within the lakebed (Exhibit 15). The intermediate mariposa lily populations are already located at the outer edge of the existing inundation footprint of the lake. The additional inundation would be expected to be similar in duration to the current inundation of the lake edges; therefore, the effect of the additional inundation would be expected to be less than significant for the few intermediate mariposa lily locations affected. Suitable habitat for mud nama consists of areas that are intermittently inundated; the mud nama locations are in areas that are regularly inundated. Additional inundation would either have no effect or would be considered a

beneficial impact for this species. Overall, impacts on special status plant species as a result of the additional inundation would be considered less than significant and no mitigation would be required.

Special Status Wildlife Species

Invertebrates

Focused surveys for Quino checkerspot were conducted throughout the BSA in spring/summer 2022; no Quino checkerspot were observed (Psomas 2022b). Therefore, there would be no impact on this species and no mitigation would be required.

Focused surveys for Crotch's bumble bee were conducted throughout the BSA in summer 2024; one Crotch's bumble bee individual was observed (Psomas 2024a). Suitable habitat for this species is present throughout the BSA. A total of 52.66 acres (12.95 acres permanent; 39.58 acres temporary; 0.13 acre within the SCE realignment) of suitable habitat (i.e., coastal sage scrub, chaparral, grassland, woodland, and ornamental) for the Crotch's bumble bee would be removed to construct the Project (Table 17). This species is a Candidate for State listing; impacts on this species would be considered significant. Mitigation Measure #5 would require pre-construction surveys for Crotch's bumble bee, avoidance of active nest burrows during construction, and consultation with CDFW to obtain an Incidental Take Permit.

Monarch butterfly, a federally proposed Threatened species, was recorded as an incidental observation during the spring 2022 Quino checkerspot butterfly surveys and its hostplant, milkweed, was noted during spring botanical surveys. Monarch butterfly is not expected to overwinter in the BSA because the BSA is too far inland; therefore, the Project is not expected to impact an overwintering site and no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would temporarily impact 7.74 acres of suitable habitat for Crotch's bumble bee (i.e., coastal sage scrub, chaparral, grassland, woodland, and ornamental) (Table 17). If the area where Crotch's bumble bees forage was inundated, it is assumed that they would forage on higher ground, and once the water subsided, foraging habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on foraging and no mitigation would be required.

Fish

White sturgeon is stocked in Irvine Lake by OC Parks. The Project would dewater the lake prior to construction for a period of up to four years. Dewatering the lake would result in the loss of all non-native fish, including the white sturgeon. White sturgeon stocked in the lake are sterile individuals and isolated from naturally occurring populations; therefore, the loss of these individuals would not affect the viability of the species since these individuals are

not reproducing and were intended to be taken by angling. Therefore, the impact on white sturgeon would be considered less than significant and no mitigation would be required.

Santa Ana speckled dace does not currently occur in Santiago Creek and/or Irvine Lake. Therefore, there would be no impact on this species and no mitigation would be required.

If CDFW implements a translocation of Santa Ana speckled dace to an area along Santiago Creek upstream of Irvine Lake, the translocated individuals may or may not be successful (i.e., survive and reproduce). Following the translocation, CDFW would monitor the translocated individuals to determine whether they become an established self-sustaining population. If the translocated individuals are successful in maintaining their population, they could move downstream along Santiago Creek to the upstream (eastern) end of the BSA prior to the initiation of the Project. Santa Ana speckled dace would not be expected to enter Irvine Lake as their preferred habitat is streams; they do not occur in lakes (except at the confluence with the stream). However, while the lake is dewatered, a portion of the flow could act as a stream, which the dace could then occupy temporarily until the lake is refilled. Project intake pipelines for dewatering and bypass pipelines around the work area would all include fish screens. The potential that the Project would impact translocated Santa Ana speckled dace is considered low because: (1) the translocated dace may not survive until the Project begins; (2) the translocated dace may not move downstream into the lake area where the Project construction would be occurring; (3) the Project bypass pipelines and dewatering pipelines would include fish screens; and (4) the area where active construction would be occurring would be dry. Therefore, the potential impact on translocated Santa Ana speckled dace is considered less than significant, and no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would increase the amount of habitat available for fish species. Therefore, the additional inundation would be considered a beneficial effect, and no mitigation would be required.

Amphibians

Focused surveys for the arroyo toad were conducted downstream of the dam in spring 2020 and upstream of Irvine Lake in 2022; no arroyo toads were observed (Psomas 2020a, 2022c). Therefore, there would be no impact on this species and no mitigation would be required. Focused surveys for the western spadefoot toad were conducted throughout the BSA in spring 2025; no western spadefoot toads were observed (Psomas 2025 [in preparation]). Therefore, there would be no impact on this species and no mitigation would be required.

Coast Range newt has potential to occur in the BSA. The Project would not impact breeding habitat for this species (i.e., stream habitat with sufficient water). However, this species uses upland habitats for foraging and aestivation. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 17). Although not formally covered, Coast Range newt also benefits from habitats conserved in the Reserve System. Due to the limited amount

of habitat loss relative to the availability of habitat for Coast Range newt in the region, and because there would be no impact on breeding locations, impacts on this species would be considered adverse but less than significant; no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would temporarily impact 16.94 acres of suitable habitat for special status amphibian species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) (Table 17). Amphibians can occur in aquatic or upland habitat; therefore, the additional inundation is not expected to affect them. Therefore, the additional inundation would be considered less than significant, and no mitigation would be required.

Reptiles

Focused surveys for southwestern pond turtle were conducted throughout the BSA in summer 2024; no southwestern pond turtles were observed (Psomas 2024b). Therefore, there would be no impact on this species and no mitigation would be required.

Two-striped garter snake is known to occur in riparian and open water habitats along Santiago Creek both upstream and downstream of the dam (Psomas 2020a, 2022c). A total of 220.26 acres (1.78 acres permanent; 218.48 acres temporary) of suitable riparian, fluctuating shoreline, vegetated fluctuating shoreline, and open water habitat for this species would be removed to construct the Project (Table 17). Although not formally covered by the NCCP/HCP, two-striped garter snake benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on this species would be considered adverse but less than significant, and no mitigation would be required.

Orange-throated whiptail and coastal whiptail were incidentally observed along Santiago Creek during focused surveys (Psomas 2022c). Additionally, coast horned lizard, southern California legless lizard, California glossy snake, coast patch-nosed snake, and red diamond rattlesnake have potential to occur in habitats throughout the BSA. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 17). Of these species, coast horned lizard, orange-throated whiptail, coastal whiptail, and red diamond rattlesnake are Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, southern California legless lizard, California glossy snake, and coast patch-nosed snake also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would temporarily impact up to 16.94 acres of habitat for special status reptile species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) in the additional inundation area (Table 17). If the area were inundated, there would

be no effect on two-striped garter snake, which could use the open water habitat. It is assumed that the other special status reptiles would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status reptiles and no mitigation would be required.

Birds

Focused surveys for southwestern willow flycatcher and western yellow-billed cuckoo were conducted in spring/summer 2022; neither southwestern willow flycatcher nor western yellow-billed cuckoo were observed (Psomas 2022e, 2022f). Therefore, there would be no impact on these species and no mitigation would be required.

The federally Threatened coastal California gnatcatcher is known to occur throughout the coastal sage scrub habitats in the BSA. One pair of gnatcatchers successfully nested downstream of Santiago Creek Dam and multiple coastal California gnatcatchers were observed in habitat around Irvine Lake, upstream of the dam (Exhibit 15; Psomas 2020b, 2022d, 2024a). Therefore, coastal California gnatcatcher presence should be assumed throughout coastal sage scrub habitats in the BSA. A total of 8.41 acres (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub) would be removed to construct the Project (Table 17). Additionally, during construction, this species would be disturbed by construction noise for up to 20 hours per day (including night work) periodically during the breeding season for approximately four years. During construction, jackhammering and concrete crushing would occur during demolition of the existing spillway and drilling into bedrock would occur to construct the new spillway. In the absence of noise minimization measures, all coastal sage scrub within 500 feet of construction activities would be indirectly affected by construction noise[16], with the most noise-intensive effects on coastal sage scrub occurring downstream of the dam. Any impact on coastal California gnatcatcher would be considered significant. This species is a Covered Species under the NCCP/HCP; therefore, take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Additionally, the NCCP/HCP requires standard construction minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species (PDF-3). Implementation of Mitigation Measure #1 would ensure that IRWD's take is accounted for according to the NCCP/HCP.

The federally and state Endangered least Bell's vireo is known to occur in riparian habitats along Santiago Creek and the upstream edges of Irvine Lake (Exhibit 15; Psomas 2022e). Least Bell's vireo was absent downstream of the dam during the 2020 focused surveys (Psomas 2020c), but was incidentally observed downstream of the dam during the 2024 focused surveys for Crotch's bumble bee (Psomas 2024a); riparian habitat downstream of the dam is not as well-developed. Therefore, least Bell's vireo presence should be assumed throughout riparian habitats at the upper end of Irvine Lake and along Santiago Creek upstream of the lake; least Bell's vireo has potential to occur in riparian habitats downstream

[16] A detailed analysis of noise impacts on these sensitive habitat areas will be included in the Noise section of the Environmental Impact Report.

of the dam. A total of 36.73 acres (1.45 acres permanent, 35.28 acre temporary) of suitable riparian habitat for the least Bell's vireo would be removed to construct the Project (Table 17). Additionally, during construction, this species would be disturbed by construction noise for up to 20 hours per day (including night work) periodically during the breeding season for approximately four years. During construction, concrete crushing would occur in the staging area at the upstream end of Irvine Lake. If least Bell's vireo occurred downstream of the dam, they would also be subject to jackhammering, concrete crushing, and drilling into bedrock to demolish/construct the new spillway, as described above for coastal California gnatcatcher. In the absence of noise minimization measures, all riparian habitat within 500 feet of construction would be indirectly affected by construction noise[17]. Any impact on least Bell's vireo would be considered significant. The least Bell's vireo is a Conditionally Covered Species under the NCCP/HCP. Mitigation Measures #2 would ensure that riparian habitat impacted by the Project would be replaced at no less than a 1:1 ratio. Mitigation Measure #6 would require removal of riparian habitat outside the nesting season, implementation of appropriate noise minimization measures, and consultation with USFWS and CDFW.

The coastal cactus wren and Southern California rufous-crowned sparrow were observed in coastal sage scrub habitats and grasshopper sparrow was observed in grassland habitats in the BSA (Exhibit 15; Psomas 2020b, 2022d, 2022e). Additionally, loggerhead shrike and California horned lark have potential to occur in upland habitats throughout the BSA. A total of 47.85 acres (12.39 acres permanent; 35.38 acres temporary; 0.08 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, and grassland) would be removed to construct the Project (Table 17). Of these species, coastal cactus wren and Southern California rufous-crowned sparrow are Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, loggerhead shrike, California horned lark, and grasshopper sparrow also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

The yellow-breasted chat and yellow warbler were observed in riparian habitats in the BSA (Exhibit 15; Psomas 2022d, 2022e). A total of 36.73 acres (1.45 acres permanent; 35.28 acre temporary) of suitable habitat for these species (i.e., riparian) would be removed to construct the Project (Table 17). Although not formally covered by the NCCP/HCP, these species also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

A pair of bald eagles, State Endangered and Fully Protected, was incidentally observed nesting in a canyon adjacent to the BSA during focused surveys conducted around Irvine Lake in 2022 (Exhibit 15, Psomas 2022d, 2022e). CDFW included the location on a map of breeding territories (1990 to 2016); therefore, this location has been known since at least

[17] A detailed analysis of noise impacts on these sensitive habitat areas will be included in the Noise section of the Environmental Impact Report.

2016. The 2022 nesting location was over 1,200 feet (0.22 mile) from the borrow site/staging area, which is the closest Project activity[18] and approximately 1.25 miles from Santiago Creek Dam, where construction would be concentrated. Therefore, the nest would not be expected to be directly or indirectly impacted by the construction activities or noise. However, the entire lake would be temporarily dewatered (312.11 acres of open water) and construction would affect a total of 183.53 acres within the lake (0.33 acre permanent; 183.20 acres temporary) that provide suitable foraging habitat for this species (i.e., open water, fluctuating shoreline, and vegetated fluctuating shoreline) to construct the Project (Table 17). During construction, the lake would be dewatered and fish would no longer be an available food source for this breeding pair. Waterfowl may also be reduced in numbers once the lake is drained, although they may still be present upstream and downstream of the impact area. Throughout the winter storm season, when the lake is functioning for flood control, open water may be available for a limited time following storms but would be kept in a dewatered condition throughout the construction period and fish would not be stocked. When the lake holds limited water following storms, it could be used by waterfowl. The temporary loss of the lake habitat over four years of construction may cause the bald eagles to leave Irvine Lake for the duration of construction. However, they (or a new pair) would be expected to reoccupy the lake following completion of the Project once the lake is restocked with fish. This impact would be considered significant. Mitigation Measure #7 would require consultation with the USFWS and CDFW to determine the appropriate monitoring strategy during construction.

White-tailed kite and American peregrine falcon were observed in the BSA during surveys. In addition, Cooper's hawk, ferruginous hawk (during winter and migration), golden eagle, prairie falcon, long-eared owl, and burrowing owl have potential to occur in the BSA for foraging. A total of 137.98 acres (14.73 acres permanent; 123.11 acres temporary; 0.14 acre within the SCE realignment) of suitable foraging habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, cliff, fluctuating shoreline, vegetated fluctuating shoreline, ornamental, and disturbed) would be removed to construct the Project (Table 17). However, during construction, the lake would be dewatered and an additional 128.58 acres of lake bottom (areas currently mapped as open water outside of the impact areas) would be temporarily available as foraging habitat for these species, though these areas may provide limited prey since there would not be any vegetation cover. The permanent loss of 14.73 acres of foraging habitat for these raptors would cumulatively contribute to the ongoing regional loss of foraging habitat for these species. Of these species, American peregrine falcon is a Covered Species, while golden eagle and prairie falcon are Conditionally Covered, by the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, Cooper's hawk, ferruginous hawk, white-tailed kite, long-eared owl, and burrowing owl also benefit from habitats conserved in the Reserve System. Therefore, this impact would be considered adverse but less than significant because a substantial amount of foraging habitat for these species is available immediately adjacent to the Project in the Reserve System.

The Cooper's hawk, white-tailed kite, golden eagle, prairie falcon, American peregrine falcon, long-eared owl, and burrowing owl also have potential to nest within or adjacent to the BSA.

[18] The Federal Bald Eagle Act states that a permit to impact the nest would be needed if construction would be within 660 feet of an active nest.

Impacts on any active raptor nest (common or special status species) would be considered a violation of the MBTA and Sections 3503, 3503.5, and 3513 of the *California Fish and Game Code*. Additionally, these species could be disturbed by noise adjacent to construction areas. Standard pre-construction surveys and nesting bird protection would be implemented to ensure consistency with the MBTA and *California Fish and Game Code* (PDF-5). Therefore, impacts on nesting raptors would be less than significant assuming compliance with regulatory requirements.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would temporarily impact up to 17.41 acres of foraging and nesting habitat (i.e., coastal sage scrub, chaparral, grassland, woodland, cliff, and ornamental) for special status bird species in the additional inundation area (Table 17). If the area were inundated, it is assumed that special status birds would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status birds and no mitigation would be required.

The additional inundation areas would be expected to be inundated during the storm season, which is generally outside the peak bird breeding season (although there is some overlap in early spring). The inundation would be associated with natural storm events, which could lead to a natural loss of nests early in the spring. The potential inundation of nests is expected to be extremely limited because (1) it would only affect species nesting within two feet in elevation above the current maximum water line; (2) it would only affect species nesting in February and March; and (3) it would only occur approximately once every several years. Therefore, the effect on nesting birds would be expected to be less than significant and no mitigation would be required.

Mammals

Mountain lions are known to occur throughout the vicinity of the BSA and mountain lion sign (i.e., tracks) were observed downstream of Santiago Creek Dam during focused surveys. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 17). The mountain lion is proposed for State listing due to fragmentation of habitat that isolates populations. Although the Project would permanently impact 14.67 acres of habitat downstream of the dam along Santiago Creek, it would be in the same location as the existing dam structure; it would not create a new barrier to movement. Additionally, there is extensive habitat in the Reserve System immediately surrounding the Project site that would be available for use by mountain lion. Although mountain lion may avoid the dam area and borrow site/staging area during construction that occurs at night, it would be expected to move along the edge of the Project, using habitat not impacted by the Project, during construction. Therefore, the Project would not be expected to interfere with movement by mountain lions. It is possible that mountain lions may choose to move along the roads despite the construction, which would increase the potential for wildlife strikes along the roadways

at night. Speed limits and wildlife crossing signage would be posted along access roads (PDF-6). Therefore, the impact on wildlife movement would be less than significant.

Northwestern San Diego pocket mouse and San Diego desert woodrat may occur in the BSA. A total of 51.94 acres (13.22 acres permanent; 38.58 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, woodland, and cliff) would be removed to construct the Project (Table 17). Additionally, vibration from construction could cause the collapse of pocket mouse burrows in the adjacent habitat as well as cause woodrats to flee their middens. Individuals could also potentially move through the construction area and be hit by construction vehicles. San Diego desert woodrat is a Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, northwestern San Diego pocket mouse also benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

Six special status bat species have potential to forage in the BSA: pallid bat, pocketed free-tailed bat, big free-tailed bat, western red bat, western yellow bat, and western mastiff bat. A total of 137.98 acres (14.73 acres permanent; 123.11 acres temporary; 0.14 acre within the SCE realignment) of suitable foraging habitat for these species would be removed to construct the Project (Table 17). Many bat species prefer to forage over water. During construction, Irvine Lake (312.11 acres) would be dewatered and the creek would be routed around the construction area. Although this could create lower quality foraging habitat during construction, it is expected that open water (i.e., preferred foraging habitat) would be available upstream and/or downstream of the work areas during construction. These impacts would be considered adverse but less than significant because a substantial amount of foraging habitat for these species would continue to be available immediately adjacent to the Project in the Reserve System throughout the Project. Following completion of the Project, open water would again be available within Irvine Lake. Therefore, no mitigation would be required for the loss of bat foraging habitat.

Pallid bat, pocketed free-tailed bat, big free-tailed bat, western red bat, western yellow bat, and western mastiff bat also have potential to roost in the BSA. Bats may roost in the rocky outcroppings along Santiago Creek, in crevices of structures (e.g., dam structure, spillway and outlet tower, and dam keeper's house), or in large oak or sycamore trees in the BSA. A total of 3.57 acre (0.53 acre permanent; 2.99 acres temporary; 0.05 acre within the SCE realignment) of suitable tree roosting habitat would be removed to construct the Project (Table 17). This impact would be considered adverse but less than significant because a substantial amount of tree roosting habitat would continue to be available immediately adjacent to the Project in the Reserve System during the Project. A total of 0.52 acre (0.30 acre permanent; 0.21 acre temporary; 0.01 acre within the SCE realignment) of suitable cliff roosting habitat would be removed to construct the Project (Table 17). Additionally, during the project, a portion of the dam, spillway, outlet tower structure, and dam keeper's house that may be used by bats that roost in crevices would not be available for roosting. Construction activities could directly impact roosting individuals. Impacts on a maternal roost (i.e., where breeding occurs) or a communal roost would be considered to

meet the requirements of CEQA Guidelines Section 15380. Mitigation Measure #8 would require pre-construction surveys and bat exclusion.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would also temporarily impact up to 16.94 acres of habitat for special status mammals (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) in the additional inundation area (Table 17). This may increase the amount of preferred foraging habitat (i.e., open water) for bat species. If the area were inundated, it is assumed that terrestrial mammals would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status mammals and no mitigation would be required.

4.2.6 INDIRECT IMPACTS

Increased Inundation

Lake level depends on rainfall of the season, intensity of storm events, and rate of releases. Following the Project, dam operations would not substantially change; the way that water would be held in the reservoir throughout the year would be expected to be the same as the existing conditions. The Project would raise the spillway height by six feet, which is two feet above the current maximum water storage elevation with flashboards installed. Thus, the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as "additional inundation area") would be infrequently inundated for a period of up to approximately 45 days (Exhibit 11). In the last 20 years, Irvine Lake has been at the maximum capacity of 795.9-foot elevation four times. Approximately the same frequency would be expected following implementation of the Project, but it would depend on frequency and intensity of storms and operations of the lake.

When the lake is at the maximum elevation, a narrow strip of riparian vegetation would be inundated infrequently (9.66 acres of riparian; Exhibit 11; Table 17). These areas are dominated by mule fat and willows, which have a high to very high tolerance to inundation, assuming shoots (i.e., trunks, stems, leaves) are not fully submerged (Glentz et al. 2006, Tallent-Halsell and Walker 2002, Francis et al. 2005, Good et al. 1992). Glentz et al. (2006) found that willows can withstand a flooding duration for as much as 40% of the growing season (spring/summer); the BSA receives most rainfall outside the growing season in the winter and early spring when willows are dormant. Therefore, the infrequent additional inundation is not expected to affect the riparian vegetation that currently exists around the lake. While the OHWM may change after raising the spillway, creating some additional jurisdiction, riparian vegetation and hydric soils are not expected to be created where they do not currently occur based on the infrequency of the additional inundation. Jurisdictional areas within Irvine Lake, Santiago Creek, and Drainages 4, 5, 6, 7, 9, 12, and 15 fall within the additional inundation area (Exhibits 12, 13, and 14).

When the lake is at the maximum elevation, a narrow strip of upland vegetation would be inundated infrequently (3.36 acres coastal sage scrub, 0.18 acre chaparral, and 0.50 acre of

coast live oak woodland; Exhibit 11, Table 17). Species in these habitat types are not adapted to wet conditions and could be affected by extended inundation (i.e., longer than one week). Normally, shrub and tree roots get air from pore spaces in the soil, but when soils are inundated, air spaces are filled with water and roots experience anaerobic conditions. This can result in a delay in leafing out, branch dieback, smaller than normal leaves, or wilted leaves. Once the inundation has subsided, shrubs and trees should resume normal growth and their growth may catch up by spring or summer. However, if a flooded shrub/tree does not resume normal growth, the roots may have been damaged by the inundation (Cregg 2013). The infrequent additional inundation affects two feet in elevation, which may be several feet wide in flat areas, but less than a foot on steeper slopes. The upland habitat types within the additional inundation areas are mostly located on slopes, which means a narrower area of upland vegetation would be affected around most of the lake (Exhibit 11). Therefore, if a shrub/tree is affected, it would be expected to only affect a few shrubs or a small portion of the roots and associated canopy of trees. Potential effects on chaparral due to infrequent additional inundation would be considered adverse but less than significant in relation to the total amount of chaparral vegetation available in the Project region. Coastal sage scrub and oak woodlands are Covered Habitats under the NCCP/HCP; upland habitats have been conserved in the Reserve System. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Implementation of Mitigation Measure #1 would ensure that IRWD's take for its share of the impacts is accounted for according to the NCCP/HCP.

When the lake is at the maximum elevation, a narrow strip of nonnative vegetation would be inundated infrequently (3.23 acres grassland [annual grassland, ruderal] and 0.47 acres of ornamental; Exhibit 11, Table 17). Like the upland vegetation, these vegetation types may be adversely affected by the infrequent additional inundation, however, these vegetation types are considered of low biological value. Therefore, inundation effects on this vegetation would be considered less than significant and no mitigation would be required.

Although infrequent additional inundation would not directly remove vegetation from the BSA, habitat within the inundation area would be unavailable to most wildlife during the infrequent inundation. If infrequent additional inundation occurred during the breeding season, it could flood burrows and nests causing them to fail. However, it is anticipated that most inundation events would occur during the storm season (i.e., October 1 to April 15), which is outside the peak breeding season for most wildlife. Following each inundation event, the habitat would again be available for use with areas along the periphery becoming available most quickly. Although infrequent additional inundation effects would be considered adverse, they would affect a limited amount of habitat (17.41 acres) compared to the amount of habitat available in the Project region. Therefore, inundation effects would be considered adverse but less than significant.

Dewatering of the Lake

During the Project, the lake would be dewatered for a period of up to four years. When a lake is dewatered, water is not available to seep through the ground to recharge the underground aquifer and the water table under and around the edge of the lake may drop. If this occurs, it could affect the riparian vegetation around the edge of the lake. However, during the winter storm season, precipitation is expected to recharge or partially recharge the underground

aquifer/water table. The water table can also recharge through the areas surrounding the lake that are outside the dewatered area, including through several drainages flowing into the lake and sheet flow from the southeastern and eastern sides of the lake. The majority of riparian scrub/woodland vegetation occurs at the upstream end of the lake, upstream of the work area, where recharge would still be occurring naturally (since it is upstream of the area that would be dewatered). Considering both precipitation and recharge from surrounding areas, lowering of the water table is not expected to substantially affect riparian scrub/woodland vegetation around the edges of the lake. Therefore, this impact is considered adverse but less than significant, and no mitigation would be required.

Noise Impacts

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase substantially over present levels during construction of the Project due to construction vehicles, demolition of the existing spillway, concrete crushing, and drilling into bedrock to secure the new spillway and dam embankment. A detailed noise analysis has been prepared for the Project. During construction, temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. These impacts are considered adverse, but not significant for most wildlife species, because the Project would not impact a substantial population of these species. Noise from construction activities may cause birds adjacent to the work area to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Construction activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Noise impacts would be considered significant for the coastal California gnatcatcher, least Bell's vireo, and other nesting raptors. With the implementation of standard NCCP/HCP construction minimization measures and Mitigation Measure #6, indirect noise impacts on the coastal California gnatcatcher and least Bell's vireo would be considered less than significant. Additionally, implementation of standard pre-construction surveys and nesting bird protection would ensure consistency with the MBTA and *California Fish and Game Code* (PDF-5). Therefore, indirect noise impacts on nesting birds and raptors would be less than significant.

Increased Dust and Urban Pollutants

Grading activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of construction of the Project on the native vegetation in the immediate vicinity of the construction area is considered adverse but less than significant because it would not substantially reduce plant populations in the region. Additionally, it is assumed that a water truck would be used to reduce dust during construction as required for air quality requirements. Therefore, no mitigation would be required.

During construction, excess silt, petroleum, or chemicals on the soil surface within the construction area could be washed into drainages (including Santiago Creek) and Irvine Lake during storms and may affect areas downstream of the Project. Adverse effects on water

quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the Project will obtain a State Water Resources Control Board's General Permit for Storm Water Discharge Associated with Construction Activity (Construction Activities General NPDES Permit), which will include development of a Storm Water Pollution Prevention Plan and provisions for the implementation of Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant and no mitigation would be required.

No dust or urban pollutants would be expected during operation of the Project. Therefore, there would be no long-term impact and no mitigation would be required.

Invasive Exotic Plant Species

No landscaping is anticipated as part of the Project. Therefore, there would be no effect on adjacent habitats due to the planting of non-native, invasive plant species.

Construction activities create disturbance, which in turn provides a place for non-native weedy species to spread. Additionally, construction equipment can introduce non-native weed seeds to the area if equipment is not properly cleaned. Weeds from the construction may then spread to adjacent habitat areas (including adjacent Reserve areas), which would degrade habitat quality for native species. In addition to the negative effects on habitat quality, non-native weeds can also increase the potential for large fires to spread. Specifications for the Project will use BMPs to prevent the spread of weed seeds and requires the use of a native seed mix for hydroseeding areas disturbed by construction activities. Invasive species observed during construction would be treated during and following construction (PDF-9). Therefore, impacts as a results of invasive exotic plant species would be considered less than significant.

Night Lighting

Night lighting may impact the behavioral patterns of nocturnal and crepuscular (i.e., active at dawn and dusk) wildlife adjacent to night lighting. Of greatest concern is the effect on small, ground-dwelling animals that use the darkness to hide from predators and bats, owls, and mountain lion, which are specialized night foragers. Following the Project, the spillway and outlet tower would not include night lighting; therefore, there would be no impact due to night lighting during operation of the Project. However, construction activities would include regular night work; therefore, night lighting during construction could negatively impact nocturnal and crepuscular wildlife species within the BSA as well as in the surrounding adjacent open space. Specifications for the Project will be used to minimize night lighting on sensitive habitat areas (PDF-7).

Human Activity

The Project is not expected to increase human activity during operation. Therefore, there would be no long-term impact and no mitigation would be required.

During construction, there would be an increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to construction areas. Human disturbance could disrupt normal foraging and breeding behavior of wildlife adjacent to construction areas, diminishing the value of the habitat. Standard pre-construction surveys and nesting bird protection would ensure nesting birds and raptors would be protected from disturbance (PDF-5). Additionally, all construction personnel would be trained on the environmental sensitivity of the area prior to construction (PDF-1) and the Project limits would be clearly delineated (PDF-2). With implementation of these measures, the increased human activity would be less than significant.

Increased Wildfire Risk

Fires are a natural part of the landscape in California; however, with the changing weather patterns brought by climate change, the fire season is coming earlier and ending later than in the past (USFS 2018). In the last five years (October 2019 – October 2023), there have been 6,884 wildfires that have burned 1,570,571 acres in California (CalFire 2023). Drought or extended periods of low rainfall can dry out fuel, increasing its risk of burning. Periods of high rainfall decrease fire risk because there is more moisture in the vegetation; however, years of high rainfall increase the fuel load with growth of vegetation and weeds. In the Project region, Santa Ana wind conditions also increase the risk of fire with dry, gusty winds (CalFire 2023). According to the National Park Service, approximately 85 percent of wildfires are caused by humans. Human-caused wildfires are due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson (NPS 2022). The location of the Project is an important factor in understanding the extent of wildfire risk and how much potential for damage there is if a fire starts. Risk is higher when there are hot temperatures, low humidity, and high winds (i.e., "red flag warning" weather conditions). Risk is also higher near dry, ignitable vegetation (e.g., coastal sage scrub, chaparral, grassland, and ruderal), and hills or mountainous topography (Lordson 2020). Public Resources Code Sections 4427, 4428, 4431, and 4442 prohibit the use of combustion engines near forest, brush, or grass at any time of year when ground litter or vegetation would sustain the spread of fire. A detailed wildfire analysis has been prepared for the Project. During construction, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. If not contained quickly, the fire could spread through adjacent habitat areas, damaging the NCCP/HCP Reserve. The loss of habitat may affect listed species (e.g., coastal California gnatcatcher). All construction personnel would be trained on the environmental sensitivity of the area prior to construction (PDF-1) and the Biological Monitor would be present during vegetation clearing (PDF-3). Therefore, the increased fire risk would be considered less than significant.

5.0 MITIGATION MEASURES

This section focuses on the development of mitigation measures for those impacts of the Project found to be significant or potentially significant. Strategies to mitigate each impact to a less than significant level are identified and described in the following section. Consistency with the NCCP is discussed in Section 6.0.

5.1 MITIGATION MEASURE #1: COASTAL SAGE SCRUB AND COASTAL CALIFORNIA GNATCATCHER

Potential direct and indirect impacts on coastal sage scrub and coastal California gnatcatcher are fully mitigated through IRWD's participation and contribution in the NCCP/HCP Mitigation Program. This participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other Covered Species and Covered Habitats. IRWD will mitigate for impacts on coastal sage scrub and coastal California gnatcatcher through a combination of the following, as approved by USFWS and CDFW: (1) use of IRWD's NCCP/HCP take allocation at a 1:1 ratio for impacted coastal sage scrub; (2) restoration of coastal sage scrub habitat at a minimum 1:1 ratio in areas temporarily disturbed by construction including weeding and three years of restoration monitoring; and/or (3) restoration of coastal sage scrub habitat at an on-site or off-site location at a minimum 1:1 ratio, as described in a Habitat Mitigation and Monitoring Plan (HMMP) in order to preserve IRWD's remaining NCCP/HCP take allocation (if desired by IRWD).

If a coastal sage scrub habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will prepare a Coastal Sage Scrub HMMP and submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Coastal Sage Scrub HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Ecology to prepare the Coastal Sage Scrub HMMP and will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Coastal Sage Scrub HMMP and ensuring that the mitigation program achieves the approved performance criteria.

5.2 MITIGATION MEASURE #2: RIPARIAN VEGETATION AND JURISDICTIONAL PERMITTING

Before the start of construction, IRWD will obtain all necessary permits for impacts to USACE, CDFW, and/or RWQCB jurisdictional areas and will determine the compensatory mitigation needed for the loss of jurisdictional waters and wetlands. Potential compensatory mitigation options will include one or a combination of the following, as determined through consultation with the above-listed resource agencies: (1) establishment of riparian habitat (on site or off site) at a minimum 1:1 ratio for impacted jurisdictional areas; (2) payment to a resource agency-approved mitigation bank or regional riparian enhancement program (e.g., invasive species removal) at a minimum 1:1 ratio for impacted jurisdictional areas;

and/or (3) preservation of off-site riparian habitat on IRWD lands at a minimum 1:1 ratio for impacted jurisdictional areas.

If in-lieu mitigation fees are required, IRWD will pay the in-lieu mitigation fee before the start of construction to a mitigation bank/enhancement program for the replacement of impacted jurisdictional resources.

If a riparian habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will retain a qualified Restoration Ecologist to prepare a Riparian HMMP and submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Riparian HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Riparian HMMP and ensuring that the mitigation program achieves the approved performance criteria.

5.3 MITIGATION MEASURE #3: TREE SURVEY/REPLACEMENT

Before the start of construction, IRWD will retain a qualified Biologist or Certified Arborist to conduct a tree survey to identify the location and health of western sycamore trees within 100 feet of the Project impact area. To the extent practicable, temporary impact areas will be revised to avoid and minimize effects on western sycamore trees. Standard tree protection measures to fence western sycamores will be recommended for trees within or near the work area (PDF BIO-4).

Any western sycamores greater than four inches diameter at breast height that are removed by construction will be replaced at no less than a 1:1 ratio. Trees with a diameter at breast height (dbh) of greater than 4 up to 8 inches will replaced at a 1:1 ratio with a minimum container size of 15 gallons. Trees with a dbh of greater than 8 inches up to 16 inches will be replaced at a 1:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 16 inches up to 24 inches will be replaced at a 3:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 24 inches up to 36 inches will be replaced at a 5:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 36 inches will be replaced at a 10:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). The replacement trees will be replaced either on-site or off-site in a location with appropriate microclimate conditions. The replacement trees will be incorporated into the Coastal Sage Scrub HMMP or Riparian HMMP (described above).

5.4 MITIGATION MEASURE #4: SPECIAL STATUS PLANT SPECIES

A. Pre-construction Surveys

During the peak blooming season prior to the initiation of construction (within the same year or the spring/summer prior), IRWD will retain a qualified Botanist to conduct a pre-construction focused survey for mud nama. Although not required, the pre-construction survey will also include intermediate mariposa lily, many-stemmed dudleya, and Coulter's matilija poppy to minimize impacts on these species. The pre-construction survey will focus on these species in the general locations where they were previously observed within the impact area, including a 100-foot survey buffer. The Botanist will record special status plant locations within the impact area and within 100 feet of the impact area using GPS and will clearly mark locations with pin flags or lathe and flagging. The Botanist will meet in the field with IRWD to discuss whether avoidance of these locations would be feasible (e.g., whether they could be protected within the temporary impact areas).

No compensatory mitigation will be required if the locations of intermediate mariposa lily,[19] many-stemmed dudleya, and Coulter's matilija poppy cannot be avoided. However, IRWD will notify the Natural Communities Coalition (NCC) and allow the NCC to collect seed and/or salvage special status plants that will be impacted by the Project. Seed collection/salvage will be coordinated so that it does not delay the construction schedule.

Compensatory mitigation will be required if more than 10 percent of the mud nama locations mapped in 2022 will be impacted, as described below under Mitigation Measure #4B.

Following the pre-construction survey and field meeting with IRWD, the Botanist will prepare a Pre-construction Special Status Plant Survey Report to document the results of the pre-construction surveys and will document the special status plant locations that will be avoided during construction. The Botanist will calculate the percent of the mud nama population that will be impacted by comparing the amount of mud nama within the construction impact area to the mud nama locations mapped in 2022. The report will also document that the final engineering plans, coupled with construction avoidance areas, will impact less than 50 percent of the mud nama population mapped in 2022.

After the field meeting with IRWD, the Botanist will work with IRWD/Contractor to clearly mark the locations that will be avoided during construction with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing until the initiation of construction. During construction, the Biological Monitor will ensure that these areas are protected during construction as described below under Mitigation Measure #4C.

[19] The NCCP/HCP covers impacts on this species up to 20 individuals; if more than 20 individuals would be impacted, additional consultation with the resource agencies would be required. However, this is not anticipated to be necessary because only six individuals have been observed in the BSA during focused surveys and only one individual is located in the impact area.

B. Compensatory Mitigation for Mud Nama

As described under Mitigation Measure #4A, if compensatory mitigation is required for mud nama (i.e., more than 10 percent of the mud nama locations mapped in 2022 will be impacted by the Project), IRWD will retain a qualified Restoration Biologist to prepare a detailed Mud Nama Mitigation Plan. The Plan will describe collection of seed, salvage of individuals, salvage of soils (i.e., seed bank), and establishment of a new on-site location that will replace the area of mud nama impacted at a minimum 1:1 ratio (i.e., 1 acre impacted to 1 acre replaced). The on-site mitigation areas will provide similar microhabitat, including similar soils and elevation, to provide similar inundation frequency to current conditions. The Mud Nama Mitigation Plan will include the following topics: (1) responsibilities and qualifications of the personnel to implement and supervise the plan; (2) mitigation site selection criteria; (3) site preparation and planting implementation, including pilot studies (if needed); (4) implementation schedule; (5) maintenance plan/guidelines; (6) monitoring plan; (7) performance criteria and contingency planning; and (8) long-term preservation. IRWD will implement the Plan.

IRWD will retain a qualified Restoration Biologist/Seed Collector to collect seed, salvage individuals, and salvage soils (i.e., seed bank) from the mud nama during the spring/summer prior to impacts upon this plant. IRWD will ensure that the seed/salvaged individuals/soil will be stored by a qualified Seed Collector in appropriate conditions to maintain the viability of the seed to be used in the implementation of the Mud Nama Mitigation Plan.

C. Biological Monitoring

Before the start of construction, IRWD will retain a qualified Biological Monitor to confirm that the special status plant locations to be avoided are clearly marked with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing. The Biological Monitor will post signs to indicate each location as an "Environmentally Sensitive Area" and that no work activities may occur within the fencing. The Biological Monitor will conduct a WEAP training regarding the importance of Environmentally Sensitive Areas. Once Project activities begin, the Biological Monitor will check the fencing/signage weekly to ensure that it stays in place throughout construction activities and will notify IRWD and the construction contractor immediately if the fencing/signage needs to be repaired.

5.5 MITIGATION MEASURE #5: CROTCH'S BUMBLE BEE

If CDFW determines that listing of the Crotch's bumble bee as threatened or endangered under the California Endangered Species Act is not warranted prior to or during implementation of the Project, this measure will not be required.

Until CDFW makes a determination, or if CDFW determines that listing of the Crotch's bumble bee as threatened or endangered under the California Endangered Species Act is warranted, the following measures will be required.

A. Incidental Take Permit/Compensatory Mitigation

IRWD will obtain an Incidental Take Permit (2081) prior to removal of suitable habitat for Crotch's bumble bee. IRWD will consult with CDFW to determine the appropriate mitigation to compensate for loss of floral resources associated with the species at a minimum 1:1 ratio of suitable habitat impacted (i.e., 1 acre impacted to 1 acre compensated). Potential compensatory mitigation options include on-site revegetation of temporarily disturbed areas using a seed mix of species preferred by Crotch's bumble bee at a minimum 1:1 ratio of temporarily impacted areas; payment of an in-lieu mitigation fee to an approved mitigation bank at a minimum 1:1 ratio of permanently impacted areas; long-term preservation of on-site or off-site habitat at a minimum 1:1 ratio of permanently impacted areas; or another strategy as approved by CDFW. Mitigation provided for under Mitigation Measure #1 (Coastal Sage Scrub) may be used towards mitigation for Crotch's bumble bee.

B. Pre-construction Survey

Prior to vegetation clearing or other ground-disturbance during each year of Project construction, IRWD will retain a qualified Biologist to conduct pre-construction focused surveys for active nests of Crotch's bumble bee following the most current CDFW guidelines[20] within 100 feet of Project impact areas with suitable habitat for Crotch's bumble bee. According to current guidelines (CDFW 2023), the Biologist will conduct three visual surveys during the species' active period (i.e., April to August). The timing between each visual survey may be reduced to accommodate the construction schedule, as long as the first and last survey are conducted at least one week apart during the active period.

If no active nests of Crotch's bumble bee are observed, vegetation clearing, grading, and ground-disturbance may proceed.

If a ground nest is observed, it will be protected in place until it is no longer active as determined by the qualified Biologist retained by IRWD. IRWD will implement applicable protective measures from the Incidental Take Permit for the species (see Mitigation Measure 5A). Potential protective measures may include protective buffers coupled with biological monitoring to avoid take of an active ground nest. The protective buffer will be determined by the Biologist conducting the pre-construction survey, or as designated in conditions in the Incidental Take Permit.

IRWD will ensure that a Letter Report is prepared to document the results of the pre-construction survey and will provide the letter to CDFW within 30 days of the completion of the survey.

[20] The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

C. Biological Monitor

Biological monitoring for Crotch's bumble bee will follow the most current CDFW guidelines[21] at the time of construction. According to current guidelines (CDFW 2023), IRWD will retain a Biological Monitor to be present onsite during vegetation clearing and/or ground-disturbing activities that take place during the Crotch's bumble bee queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring will be required for vegetation clearing or ground-disturbance that occurs from November to January.

If a ground nest of Crotch's bumble bee is observed during the monitoring, it will be protected in place until it is no longer active, as determined by the qualified Biologist retained by IRWD. IRWD will also implement applicable protective measures from the Incidental Take Permit for the species (see Mitigation Measure 5A). If establishment of a protective and/or avoidance of the nest is not feasible, IRWD and its qualified Biologist will consult with CDFW regarding potential encroachment into the protective buffer that may result in take of Crotch's bumble bee pursuant to Mitigation Measure #5A.

5.6 MITIGATION MEASURE #6: LEAST BELL'S VIREO

IRWD will consult with USFWS and CDFW under Section 7 of FESA and Section 2080.1 of the California Fish and Game Code to approve the mitigation approach and whether NCCP/HCP Conditional Coverage would be extended to least Bell's vireo based on the measures below.

A. IRWD will obtain concurrence from USFWS and CDFW that the riparian mitigation described in Mitigation Measure #2 will provide appropriate compensatory mitigation for the loss of riparian habitat.

B. To the extent feasible, removal of riparian habitat will be conducted during the non-breeding season (i.e., September 16 to March 14) in order to minimize direct impacts on nests of least Bell's vireo. IRWD will retain a qualified Biologist to monitor vegetation clearing of riparian habitat.

C. Before starting construction each spring, IRWD will retain qualified Biologist to survey all habitat within 500 feet of the construction limits for the presence of least Bell's vireo. The Biologist will map any active nests/territories as Environmentally Sensitive Areas on an aerial photograph. IRWD will also ensure that the Biologist prepares a Letter Report and that it is submitted to USFWS and CDFW to document the results of the pre-construction survey within 30 days of completion of the survey.

D. IRWD will retain a qualified Biologist to conduct weekly focused surveys during construction to update the location of active least Bell's vireo territories. The Biologist will map new territories as Environmentally Sensitive Areas and will remove inactive Environmentally Sensitive Areas from the map. Once construction is in progress, IRWD will provide Weekly Reports to USFWS and CDFW.

[21] The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

E. IRWD will retain a qualified Biologist to establish a 500-foot protective buffer is around each least Bell's vireo territory identified during pre-construction or weekly surveys. The Biologist will verify that occupied riparian habitat is be protected with lathe and rope, orange snow fencing, or other suitable fencing to provide an adequate buffer from construction work. The Biologist will post signs to indicate that the area is an "Environmentally Sensitive Area" and that no work activities may occur within the fencing. The Biologist will conduct training to educate workers on the importance of Environmentally Sensitive Areas.

F. If construction activities need to occur within 500 feet of an active least Bell's vireo territory, IRWD will consult with USFWS and CDFW to determine an appropriate noise reduction strategy. Appropriate noise reduction measures may include, but are not limited to, specifications for equipment type, siting of equipment, and temporary noise barriers. IRWD will retain a qualified Biologist to monitor the installation of any noise reduction measures.

G. IRWD will retain a qualified Biologist to conduct daily monitoring when construction activities are conducted within 500 feet of an active least Bell's vireo territory or until the Biologist determines that the individuals are not being impacted by the noise (i.e., the noise measures are established and birds are acclimated to the activities).

5.7 MITIGATION MEASURE #7: BALD EAGLE

IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW.

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or April to confirm the nesting stage (i.e., eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing weekly until the young fledge or until May 15, whichever comes last. The Biologist conducting the surveys will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

5.8 MITIGATION MEASURE #8: PRE-CONSTRUCTION BAT SURVEYS

IRWD will retain a qualified Biologist to conduct a pre-construction roosting bat survey (including both day and evening efforts) before construction begins. The day survey will involve inspection of the structures within the impact area to look for signs of bat roosting. The evening survey will involve monitoring each potential roost site for evening emergence, conducting exit counts, and acoustic monitoring (from a half an hour before sunset to no greater than three hours after sunset) near potential roosts within the impact area. If the

Biologist determines that bats are actively roosting onsite, IRWD will retain a qualified Biologist to prepare a Project-specific Bat Roost Minimization Plan (BRMP) and will implement the plan. The BRMP will include relevant avoidance and minimization measures based on survey results. If tree roosting bat species are found to be both foraging and potentially roosting onsite, IRWD will conduct tree removal only during the non-maternity season (September 1 through March 31). When potentially-occupied roost trees are removed, IRWD will implement a phased tree removal method (i.e., leaving the felled tree on the ground for 24-48 hours after the felling to allow any tree-roosting bats to leave). IRWD will avoid all Project structures proposed for demolition that support an active day-roost until either the roost is no longer active, as determined by a qualified Biologist, or until the occupants can be humanely evicted as described in the BRMP. IRWD will retain a qualified Biologist to implement bat eviction during the fall months outside of the bat maternity season (i.e., September 1 through November 30).

6.0 CONSISTENCY WITH THE NCCP/HCP

6.1 CONSISTENCY WITH NON-RESERVE OPEN SPACE POLICIES

The Project site is in a Non-Reserve Open Space area as defined by the NCCP/HCP Implementation Agreement, which includes development of infrastructure within the Reserve System in accordance with the provisions of Chapter 5.3, 5.9, and 5.11 of the NCCP/HCP and 5.3.3 of the Implementation Agreement.

Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP will be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

Recommended Action

See Mitigation Measure #1.

6.2 CONSISTENCY WITH COASTAL SAGE SCRUB TAKE AUTHORIZATION

Under the NCCP/HCP, IRWD is allotted up to 87 acres of take (60 within the Reserve System and 27 outside the Reserve System); this Project may use credits from within the Reserve System. IRWD merged with the Santiago County Water District, which was allotted 9 acres within the Reserve System, bringing the total allotted for IRWD to 96 acres (69 acres within the Reserve System and 27 acres outside the Reserve System). As of March 2025, IRWD has approximately 44 acres within the Reserve remaining in their allocation.

Per Section 5.11 of the NCCP/HCP, infrastructure is an existing use that is allowed within the Reserve. The Project would remove 8.41 acres of coastal sage scrub habitat (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment). Coastal sage scrub vegetation types that would be impacted include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, and disturbed floodplain sage scrub. Raising the spillway would also temporarily impact 3.36 acres within the additional inundation area. Coastal sage scrub in the additional inundation area includes sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, southern cactus scrub, and disturbed southern cactus scrub. Take of coastal sage scrub is fully covered by IRWD's participation in the NCCP/HCP.

The NCCP/HCP requires avoidance and minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species.

Recommended Action

See Mitigation Measure #1 and standard NCCP/HCP construction minimization measures (PDF-3).

6.3 COVERED SPECIES

The following is a list of species that are covered by the Central Subarea of the Central/Coastal Subregion NCCP/HCP:

Arboreal salamander (*Aneides lugubris*)
Black-bellied slender salamander (*Batrachoseps nigriventris*)
California gnatcatcher (*Polioptila californica californica*)
Catalina mariposa lily (*Calochortus catalinae*)
Coast [San Diego] horned lizard (*Phrynosoma coronatum*)
Coastal cactus wren (*Camplorhychus brunneicapillus*)
Coastal rosy boa (*Lichanura trivirgata rosafusca*)
Coastal western whiptail lizard (*Aspidoscelis* [*Cnemidophorus*] *tigris multicutatus*)
Coronado skink (*Eumeces skiltonianus interparietalis*)
Coulter matilija poppy (*Romneya coulteri*)
Coyote (*Canis latrans*)
Gray fox (*Urocyon cinereoargenteus*)
Heart-leaved pitcher sage (*Lepichinia cardiophylla*)
Northern harrier (*Circus cyaneus*)
Orange-throated whiptail lizard (Cnemidophorus *hyperythrus beldingi)*
Peregrine falcon *(Falco peregrinus)*
Red diamondback rattlesnake *(Crotalis ruber ruber)*
Red-shouldered hawk (*Buteo lineatus*)
Rough-legged hawk (*Buteo lagopus*)
San Bernardino ringneck snake (*Diadophis punctatus modestus*)
Bryant's [San Diego desert] woodrat (*Neotoma bryanti* [*lepida*] *intermedia*)
Santa Monica Mountains dudleya (*Dudle138uckneosa* spp. *ovatifolia*)
Sharp-shinned hawk (*Accipiter striatus*)
Small-flowered mountain mahogany (*Cercoccrpus minutifolio*)
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)
Southwestern arroyo toad (*Bufo microseaphus californicus*)
Tecate cypress (*Cupressus forbesii*)

The Catalina mariposa lily, heart-leaved pitcher sage, Santa Monica mountains dudleya, small-flowered mountain mahogany, and Tecate cypress are not expected to occur in the BSA. The remaining species have either been observed or may occur in the BSA and could be impacted by the Project. However, the NCCP mitigates for all impacts on these species.

Recommended Action

See Mitigation Measure #1 and standard construction minimization measures (PDF-3). No additional mitigation measures would be required.

6.4 CONDITIONALLY COVERED SPECIES

The following is a list of species that are conditionally covered species with a brief explanation of the status of this species in the BSA:

Pacific Pocket Mouse (*Perognathus longimembris pacificus*)

The Pacific pocket mouse is not expected to occur in the BSA because it is outside of its current known range.

[Southwestern] Arroyo Toad (*Bufo microscaphus californicus*)

Potential habitat for the arroyo toad is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020 and upstream of Irvine Lake in 2022; no arroyo toad were observed. Therefore, this species is not expected to occur.

Least Bell's Vireo (*Vireo bellii pusillus*)

Potential habitat for the least Bell's vireo is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020; no vireo were observed. Focused surveys for this species were conducted upstream of Santiago Creek Dam in 2022; least Bell's vireo were observed throughout riparian scrub/woodland habitat at the upper end of Irvine Lake, along Santiago Creek, and in the southern portion of Irvine Lake. Least Bell's vireo was incidentally observed in the riparian habitat downstream of the dam during focused surveys conducted in summer 2024.

Recommended Action

See Mitigation Measure #6.

Southwestern Willow Flycatcher (*Empidonax trailii extimus*)

Potential habitat for the southwestern willow flycatcher is present in the BSA upstream of Santiago Creek Dam. Focused surveys for this species were conducted in 2022; no southwestern willow flycatchers were observed. Therefore, this species is not expected to occur in the BSA.

Quino Checkerspot Butterfly (*Euphidryucknetha quino*)

Potential habitat for the quino checkerspot butterfly is present in the BSA. Focused surveys were conducted for this species in 2022; no quino checkerspot were conducted. Therefore, this species is not expected occur in the BSA.

Riverside Fairy Shrimp (*Streptocephalus woottoni*)

This species is not expected to occur in the BSA due to lack of suitable habitat.

San Diego Fairy Shrimp (*Branchinecta sandeigonensis*)

This species is not expected to occur in the BSA due to lack of suitable habitat.

Golden Eagle (*Aquila chrysaetos*)

This species may forage and nest in the BSA due to the presence of suitable foraging habitat and nesting habitat adjacent to the BSA.

Recommended Action

With implementation of standard pre-construction surveys and nesting bird protection (PDF-5), no mitigation would be required.

Prairie Falcon (*Falco mexicanus*)

This species may forage and nest in the BSA due to the presence of suitable foraging habitat and nesting habitat adjacent to the BSA.

Recommended Action

With implementation of standard pre-construction surveys and nesting bird protection (PDF-5), no mitigation would be required.

Intermediate [Foothill] Mariposa Lily (*Calochortus weedii* var. *intermedius*)

Potential habitat for the Intermediate mariposa lily is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020, and one individual mariposa lily was observed. Focused surveys for this species were conducted upstream of Santiago Creek Dam in 2022, and five individual intermediate mariposa lilies were observed in three locations. The intermediate mariposa lily location downstream of the dam is within the temporary impact area and would be impacted if it cannot be avoided during construction. The remaining intermediate mariposa lily locations observed are outside the permanent and temporary impact areas for the Project. Two of the intermediate mariposa lily locations (consisting of four individuals) are located within the additional inundation area; however, they are already located at the edge of the existing inundation area and would not be expected to be significantly impacted. Additionally, the NCCP/HCP covers the loss of up to 20 intermediate mariposa lily individuals; therefore, the loss of one individual within the temporary impact area plus the potential loss of four individuals within the additional inundation area would be covered by the NCCP/HCP.

Recommended Action

See Mitigation Measure # 4. No mitigation would be required.

6.5 COVERED HABITATS

The following is a list of habitats that are covered by the Central Subarea of the Central/Coastal Subregion NCCP/HCP:

Oak woodlands
Tecate cypress forest
Cliff and Rock

Tecate cypress forest does not occur in the BSA.

Oak woodland occurs in the BSA as coast live oak woodland. The Project would impact 3.31 acres of coast live oak woodland habitat (0.48 acre permanent; 2.78 acres temporary; and 0.05 acre within the SCE realignment). Raising the spillway would also temporarily impact 0.50 acre of coast live oak woodland within the additional inundation area.

Cliff and rock occur in the BSA as cliff. A total of 0.52 acre (0.30 acre permanent, 0.21 acre temporary; 0.01 acre within the SCE realignment) of cliff would be impacted to construct the Project. Raising the spillway would also temporarily impact 0.01 acre of cliff within the additional inundation area.

The NCCP/HCP fully mitigates for all impacts on these habitat types.

Recommended Action

See Mitigation Measure #3 regarding replacement of coast live oak trees. No mitigation measures would be required for the loss of oak woodland habitat.

6.6 MIGRATORY BIRD TREATY ACT

The original Migratory Bird Treaty Act of 1918 implemented the 1916 Convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Specific provisions of the statute include the establishment of a Federal prohibition, unless permitted, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of the Convention … for the protection of migratory birds … or any part, nest, or egg of any such bird."

Bird species protected under the provisions of the Migratory Bird Treaty Act are identified by the List of Migratory Birds (Title 50 of the Code of Federal Regulations, Section 10.13 as updated by 1983 AOU Check-list and published supplements through 1995, U.S. Fish and Wildlife Service).

Section 8.3.7 of the NCCP/HCP Implementation Agreement authorizes the participating landowners who possess a 10(a) permit under this program to take species covered by the permit in the amount and/or number and subject to the same terms and conditions as

specified in the permit. Any such take will not be in violation of the Migratory Bird Treaty Act of 1918 as amended (16 U.S.C. §§ 703-12).

Recommended Action

With implementation of standard pre-construction surveys and nesting bird protection (PDF-5), no mitigation would be required.

7.0 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Assuming impacts to mud nama can be reduced to less than 50 percent of the population mapped in 2022 through refinement of Project design, the impact will be reduced to less than significant with the incorporation of recommended mitigation. For all other impacts, implementation of the recommended mitigation measures will mitigate biological impacts to a level that is considered less than significant.

8.0 REFERENCES

American Ornithological Society (AOS). 2024 (July). *Check-list of North and Middle American Birds (7th ed., as revised through 65th Supplement)*. *Ornithology* 141(ukae019). Washington, D.C.: AOU. https://checklist.americanornithology.org/taxa/

Atwood, J.L. 1992. *Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look.* Birding 25: 228-233.

Atwood, J.L. 1990. Status Review of the California Gnatcatcher (*Polioptila californica*). Manomet Bird Observatory, Manomet, MA.

Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.

Bennett, A.F. 1990. Habitat Corridors and the Conservation of Small Mammals in the Fragmented Forest Environment. *Landscape Ecology* 4(2–3):109–122. New York, NY: International Association for Landscape Ecology.

California Department of Fish and Wildlife (CDFW). 2025a (March 12, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

———. 2025b (February 27). *California Natural Communities List*. Natural Communities List Arranged Alphabetically by Life Form (PDF). Sacramento, CA: CDFW Biogeographic Data Branch. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

———. 2025c (January). *Special Vascular Plants, Bryophytes, and Lichens List.* Sacramento, CA: CDFW, Natural Heritage Division. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline.

———. 2025d (January). *Special Animals List.* Sacramento, CA: CDFW, Natural Heritage Division. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline.

———.2024a (January 19, date accessed). *Bald Eagles in California.* California Department of Fish and Wildlife. http://wildlife.ca.gov/Conservation/Birds/Bald-Eagle

———.2024b (December 18, date accessed). *Petitions to List Species Under the California Endangered Species Act, Petitions, Notices and Documents, Mountain Lion.* California Fish and Game Commission. https://fgc.ca.gov/cesa#ml.

———.2024c (March). *Report to the Fish and Game Commission. Evaluation of the petition from San Francisco Baykeeper, The Bay Institute, Restore the Delta, and California Sportfishing Protection Alliance to list White Sturgeon (Acipenser transmontanus) as threatened under the California Endangered Species Act.* California Department of Fish and Wildlife.

———.2023. (June 6). *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species*. Sacramento, CA: CDFW.

———. 2021 (May 18). Office of Administrative ’aw's Notice ID #Z2019-0716-03 and Z2020-0421-01 Petition to List Mountain Lion (Puma concolor) as a Threatened or Endangered Species. https://fgc.ca.gov/CESA#ml.

———. 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.

———. 2014. California Wildlife Habitat Relationships System (version 9.0 personal computer program). Life History Accounts for Species in Table 8. Sacramento, CA: CDFW, California Interagency Wildlife Task Group. https://www.wildlife.ca.gov/Data/CWHR.

———. 2000. Biogeographic Data Branch (CDFW BDB). California Wildlife Habitat Relationships System (CWHR). Western Pond Turtle (*Actinemys marmorata*). By: S. Morey. California Interagency Wildlife Task Group. Sacramento, CA: CDFW BDB. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2657&inline=1.

California Department of Forestry and Fire Protection (CAL FIRE). 2020 (December 17, Accessed March 26, 2021). Incident information: Bond Fire. https://www.fire.ca.gov/incidents/2020/12/2/bond-fire/.

CalFire. 2023 (October 23). Statistics. https://www.fire.ca.gov/our-impact/statistics.

California Native Plant Society (CNPS). 2025 (March 12, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. http://www.rareplants.cnps.org/.

———. 2024 (January 19, date accessed). A Manual of California Vegetation, Online Edition. Sacramento, CA: CNPS. https://vegetation.cnps.org.

California Irrigation Management Information System (CIMIS). 2020. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. http://www.cimis.water.ca.gov.

Center for Biological Diversity. 2019 (June 25). A Petition to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act (CESA). Oakland, CA: Center for Biological Diversity. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=171208&inline.

Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.

Collins, Paul W. 1999b. Rufous-crowned Sparrow (Aimophila ruficeps), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/472.

Consortium of California Herbaria (CCH). 2023. Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. http://ucjeps.berkeley.edu/consortium/.

Cregg, Bert. 2013 (April 25). *Trees and flooding FAQs.* East Lansing, Michigan: Michigan State University Extension, Department of Horticulture and Department of Forestry. https://www.canr.msu.edu/news/trees_and_flooding_faqs.

Crother, B.I. (Ed.). 2017 (September). Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding. *Society for the Study of Amphibians and Reptiles Herpetological Circular* 43:1–102. https://ssarherps.org/wp-content/uploads/2017/10/8th-Ed-2017-Scientific-and-Standard-English-Names.pdf

Curtis, K.E. and R.W. Lichvar. 2010 (July). *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1). Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

Faber-Langendoen, D., L. Master, J. Nichols, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, and B. Young. 2012 (June). *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks* (Revised Edition). Arlington, VA: NatureServe.
http://www.natureserve.org/sites/default/files/publications/files/natureserve conservationstatusmethodology_jun12_0.pdf.

Fahrig, L. and G. Merriam. 1985. Habitat Patch Connectivity and Population Survival. *Ecology* 66(6): 1762–1768. Tempe, AZ: Ecological Society of America.

Francis, Robert A. et al. 2005. Survival and Growth Responses of *Populus nigra, Salix elaeagnos and Alnus incana* cuttings to varying levels of hydric stress. *Forest Ecology and Management* 210:291–301. Cambridge, MA: Elsevier.Goodman, R.H. 1999. *Relocation Project of the Southwestern Pond Turtle (Clemmys marmorata pallida) from the San Gabriel Dam to the Upper West Fork of the San Gabriel River*. Irvine, CA: Chambers Group, Inc.

Germano, D.J., and R.B. Bury. 2001. Western Pond Turtles (*Clemmys marmorata*) in the Central Valley of California: Status and Population Structure. *2001 Transactions of the*

Western Section of the Wildlife Society. 37:22–36. Rancho Cordova, CA: The Wildlife Society, Western Section.

Glenz, C. et al. 2006. Flooding Tolerance of Central European Tree and Scrub Species. *Forest Ecology and Management* 235:1–13. Cambridge, MA: Elsevier.

Good, J.E.G. et al. 1992. Species and Clonal Variation in Growth Responses to Waterlogging and Submersion in the Genus *Salix.Proceedings of the Royal Society of Edinburgh* 98:21–48. Cambridge, England: Cambridge University Press.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

Harris, L.D. and P.B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors (pp. 11–34). *Preserving Communities and Corridors* (G. Mackintosh, Ed.). Washington, D.C.: Defenders of Wildlife.

Hayes, Erin. 2023 (May 4). Personal communication. Email between Erin Hayes (OC Parks) and Jacob Moeder (IRWD) regarding the type and amount of fish that are stocked in Irvine Lake by OC Parks.

Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.

Irvine Ranch Water District (IRWD). 2020 (April 16, date accessed). About Irvine Lake. Irvine, CA: IRWD. https://www.irwd.com/construction/irvine-lake.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 255 pp.

Jepson Flora Project. 2024 (January 19). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. http://ucjeps.berkeley.edu/eflora/.

Lichvar, R.W. and S.M. McColley. 2008 (August). *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Lordson, Brian. 2020 (February 25). Sounding the alarm: Wildfire exposure and prevention in construction. https://axaxl.com/fast-fast-forward/articles/sounding-the-alarm_wildfire-exposure-and-prevention-in-construction.

MacArthur, R.H. and E.O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton, NJ: Princeton University Press.

Munz, P.A. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

National Park Service. 2022 (March). Wildfire Causes and Evaluations. https://www.nps.gov/articles/wildfire-causes-and-evaluation.htm.

Noss, R.F. 1983. A Regional Landscape Approach to Maintain Diversity. *BioScience.* 33(11): 700–706. Washington, D.C.: American Institute of Biological Sciences.

Orange, County of. 1996a (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.

———. 1996b (July). *Implementation Agreement Regarding the Natural Community Conservation Plan for the Central/coastal Orange County Subregion of the Coastal Sage Scrub Natural Community Conservation Program.* Santa Ana, CA.

Pareti, Jennifer. 2024 (October 23). Personal communication. Email between Jennifer Pareti (CDFW) and Amber Heredia (Psomas) and Andy Uk (IRWD) regarding the release site for the possible translocation of Santa Ana speckled dace by CDFW.

Proudfoot, G.A., Sherry, D.A., and Johnson, S. 2000. Cactus Wren (*Campylorynchus brunneicapillus*) in the Birds of North America (A. Poole and F. Gill, eds.) no. 558. Birds of North America. Philadelphia.

Psomas. 2024a (September 19) *Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

———. 2024b (October 21) *Results of Visual Survey and Trapping Program for Southwestern Pond Turtle for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California*. Santa Ana, CA: Psomas.

———. 2022a (September 27). *Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

———. 2022b (May 2). *Results of Focused Presence/Absence Surveys for the Quino Checkerspot Butterfly for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. 2022c (August 23). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. 2022d (July 25). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. 2022e (September 27). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. 2022f (September 27). *Results of Focused Presence/Absence Surveys for the Western Yellow-billed Cuckoo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———.2020a (August 18). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas

———. 2020b (August 24). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. 2020c (August 26). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. 2020d (September 3). *Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.

Ruben, J.A. and W.J. Hillenius. 2005 (May). Cold Blooded. *Natural History*. New York, NY: American Museum of Natural History.

Shuford, W.D. and T. Gardali (Eds.). 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. *Studies of Western Birds 1*. Camarillo, CA and Sacramento, CA: Western Field Ornithologists and CDFG (respectively).

Simberloff, D. and J. Cox. 1987. Consequences and Costs of Conservation Corridors. *Conservation Biology* 1(1): 63–71. Boston, MA: Blackwell Scientific Publications.

Smithsonian National Museum of Natural History (SNMNH). 2011. Mammal Species of the World (3rd ed.) (a database based on Wilson, D.E., and D.M. Reeder's 2005 publication entitled Mammal Species of the World, A Taxonomic and Geographic Reference, 3rd ed.). Washington, D.C.: SNMNH. https://www.departments.bucknell.edu/biology/resources/msw3/.

Soule, M.E. 1987. *Viable Populations for Conservation*. New York, NY: Cambridge University Press.

Spinks, P.Q., G.B. Pauly, J.J. Crayon, and H.B. Shaffer. 2003. "Survival of the western pond turtle (*Emys marmorata*) in an urban California environment." US Geological Survey Sta– -- Published Research. University of Nebraska: USGS. 526. http://digitalcommons.unl.edu/usgsstaffpub/526.

State Water Resources Control Board (SWRCB). 2019 (April 2). *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf.

Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians* (3rd ed.). Boston, MA: Houghton-Mifflin Company.

Tallent-Halsell, N.G. and L.R. Walker. 2002 (December). Responses of *Salix Goodhingii* and *Tamarix Ramosissima* to Flooding. *Wetlands* 22(4):776–785. Fargo, ND: The Society of Wetland Scientists.

Tietje et al. 2005. Oak Woodlands as Wildlife Habitat. *A Planner's Guide for Oak Woodlands, Second Edition*. Davis, CA: University of California. https://anrcatalog.ucanr.edu/pdf/3491E.pdf.

Unitt, P. 1984. *The Birds of San Diego County.* San Diego Society of Natural History, Memoir 13, San Diego, CA.

URS Corporation (URS). 2015 (July). *Santiago Creek Dam Outlet Tower Seismic Evaluation Structural Engineering Services*. Oakland, CA: URS.

U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0). (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2020 (April 16, date accessed). State Soil Data Access Hydric Soils List. Washington, D.C.: USDA, NRCS. http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

U.S. Department of Agriculture, U.S. Forest Service (USDA USFS). 2023 (June 17, date accessed). Put on Your Eagle Eyes! It's Time to Count Eagles! San Bernardino National Forest. San Bernardino, CA. https://www.fs.usda.gov/detail/sbnf/news-events/?cid=STELPRDB5408473.

U.S. Environmental Protection Agency (USEPA). 2017 (January 17, last update). Climate Change. Washington, D.C.: USEPA. https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html.

U.S. Fish and Wildlife Service. 2024a (August 13). Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for the Santa Ana Speckled Dace. Federal Register Vol. 89, No. 156.

———. 2024b (December 12). Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Monarch Butterfly and Designation of Critical Habitat. Federal Register Vol. 89, No. 239.

———. 2023 (June 17, date accessed). Monarch butterfly (*Danaus plexippus*). Environmental Conservation Online System. https://ecos.fws.gov/ecp/species/9743#lifeHistory.

———.2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.

———.2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.

———. 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf.

———. 1997a (February 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines.* Washington, D.C.: USFWS.

———. 1997b (July 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Protocol.* Washington, D.C.: USFWS.

———. 1992. Endangered and threatened wildlife and plants; 90-day finding and commencement of status reviews for a petition to list the western pond turtle and California red-legged frog. *Federal Register.* 57:45761–45762. Washington, D.C.: USFWS.

United States Forest Service. 2018. Pacific Southwest Region, Climate Change. https://www.fs.usda.gov/main/r5/climatechange

U.S. Department of the Interior, U.S. Geological Survey (USGS). 2006a. Draft USGS Western Pond Turtle (*Emys marmorata*) Visual Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.

———. 2006b. Draft USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.

Williams, P.H., Thorp, R.W., Richardson, L.L. and Colla, S.R. 2014. *The Bumble bees of North America: An Identification guide*. Princeton University Press, Princeton.

Xeres Society. 2023 (June 12, date accessed). Western Monarch Count. Xeres Society for Invertebrate Conservation. https://www.westernmonarchcount.org.

———. 2016 (June). State of the Monarch Butterfly Overwintering Sites in California. Prepared for the U.S. Fish and Wildlife Service by the Xeres Society for Invertebrate Conservation. https://www.xerces.org/sites/default/files/2018-05/16-015_01_XercesSoc_State-of-Monarch-Overwintering-Sites-in-California_web.pdf.

Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, M. White (Eds). 1990. *California's Wildlife Vol. 3: Mammals.* Sacramento, CA: CDFG, The Resources Agency.

———. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

APPENDIX A

GEOTECHNICAL INVESTIGATION MEMORANDUMS

SANTIAGO DAM GEOTECHNICAL INVESTIGATIONS
BIOLOGICAL RESOURCES MEMORANDUM

December 14, 2023

To: Andy Uk
IRWD

From: Amber Heredia
Psomas

As part of a larger Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Project), Irvine Ranch Water District (IRWD) and Serrano Water District (SWD) propose to conduct additional geotechnical investigations (hereinafter referred to as the "geotechnical investigations") to provide necessary geologic and geotechnical data to inform the Project's design engineering of a new spillway. The geotechnical investigations include geotechnical exploratory test pits and geophysical seismic refraction lines. The geotechnical investigation would be entirely within the Project's permanent or temporary impact footprint. The purpose of this Memorandum is to evaluate the proposed impact of the geotechnical investigation program on Biological and Jurisdictional Resources.

No cultural resources are known to occur within the limits of the proposed geotechnical investigation.

Project Background

IRWD and SWD jointly own and operate Irvine Lake and the Santiago Creek Dam that serves as a critical water supply for both districts. Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD). Santiago Creek Dam impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River. A seismic assessment requested by the DSOD found that the spillway is nearing the end of its useful life, and the design does not meet current standards. To meet current DSOD regulatory requirements and improve water supply reliability, IRWD and SWD propose to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway structure by implementing the Project. The area of the proposed new spillway is critical to the overall design of the Project, however there is limited historical subsurface information of the area. There is the potential for significant cost implications without reliable soil characterizations in advance of finalizing the design.

In 2020, the DSOD downgraded the condition of the dam to the second to the lowest possible rating due to the two known deficiencies (issues with the spillway and outlet tower). DSOD further restricted the operating levels of the reservoir, which limits the ability to store local runoff water supplies for the benefit of the region. DSOD, IRWD, and SWD agreed to repair the known deficiencies by 2029. Because the existing dam must remain in place and operational throughout the course of construction of the spillway structure, the bulk of the construction must occur in the summer dry seasons. Milestones at the end of each dry season have been established so that the contractor will be able to winterize the Project and be ready for the next dry season. The Project is scheduled to begin construction in the first dry season of 2025 and to be completed by 2029. The proposed geotechnical investigations are needed to inform the final design so that the project construction can start in the dry season of 2025.

Project Location

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon

Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located east of SR-241.

The Project is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle. Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level.

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space". IRWD is a participating jurisdiction; Santiago Dam is a permitted existing use under the NCCP/HCP.

The geotechnical investigation sites are on the downstream side of the dam within the disturbance footprint of the proposed new spillway, which runs partly along Santiago Creek and partly in the adjacent uplands. The area is along the chute of the new spillway structure at the stilling basin (Exhibit 1).

Description of Geotechnical Investigation Work:

To inform the design of the spillway structure, the proposed geotechnical investigations are needed to provide necessary geologic and geotechnical information to fully characterize the existing soil and subsurface conditions at the site of the new spillway structure.

IRWD/SWD propose to conduct 10 geotechnical exploratory test pits and 4 geophysical survey transects downstream of the existing dam where the new spillway would be constructed. Each geotechnical test pit would be approximately 10 feet deep and would be 3 feet in diameter; the work area around each test pit is assumed to be 20 feet by 20 feet. At the test pit locations, contractors will utilize a small rubber-tracked mounted excavator with an excavation bucket for digging and tracking over brush. This work is expected to require six to seven days to complete. Test pit locations as shown on Exhibit 1 were selected based on the location of the proposed spillway and information needed. These locations may be modified by IRWD and SWD as needed in the field to avoid trees, sensitive vegetation, or jurisdictional areas, if needed. Samples of subsurface materials would be collected from the test pits for examination and laboratory testing. Following the completion of the test pit, each hole would be backfilled using the dirt spoils that came from the hole.

The four geophysical seismic refraction lines would be conducted at the site of the new spillway structure to evaluate bedrock and seismic conditions. The geophysical refraction lines would not require digging/trenching, but may require removal of minimal vegetation if it cannot be avoided to allow the laying of the cable. A minimum 10-inch width area is needed for the cable. The cable can be snaked around shrubs as needed. If any vegetation removal is needed, it would be performed using hand tools (e.g., loppers, pruners, shovels, and picks). Although only 10 inches would be needed in some locations, , this analysis assumes an average disturbance width of 3 feet because some areas may require removal of a limited amount of shrubs. Removal of trees would be avoided. No surface soil would be removed. This work is expected to require six to seven days to complete.

The geotechnical investigations will be accessed using existing dirt roads adjacent to existing downstream control structure and storage shed. One test pit will be accessed from the dam crest and spillway overlook. Temporary access routes from the existing dirt roads to each test pit would be needed. Where feasible,

temporary access would be established by the "drive and crush" method to limit vegetation disturbance. The drive and crush method involves substantially less disturbance than blading of the surface material; some vegetation would be crushed, but would not be cut or removed, allowing it to retain the root structure and resprout in place.

Each individual geotechnical investigation activity is anticipated to be completed within one working day and would not result in open pits beyond working hours. A limited number of workers (typically about five) would be required to perform the work. Workers would commute individually and would park in a designated existing staging area (e.g., along established dirt roads). There would be no nighttime work conducted as part of the geotechnical investigations.

Access roads in Santiago Creek and within native vegetation would be needed to access all the geotechnical testing sites. The access roads in jurisdictional waters and coastal sage scrub would be limited to a width of 8 feet 6 inches, which is the width of the proposed backhoe (i.e., CASE CX-1450 backhoe with rubber treads). Some minor grading may be needed along the temporary access roads, but wherever possible, the backhoe would be walked up to each test pit site to minimize disturbance to the streambed and sensitive vegetation. The backhoe would be walked in following a Biological Monitor who would help to find a path to minimize impacts to native vegetation to the extent possible.

Prior to the geotechnical work, the Biological Monitor will conduct a Worker Environmental Awareness Program (WEAP) training with the contractor to inform the workers of the environmental sensitivity of the area. The Biological Monitor will walk the proposed work areas and access routes with the Geotechnical Contractor. The Biological Monitor will make suggestions by slightly shifting or narrowing the access road and/or proposed work areas to site the geotechnical disturbance in previously disturbed areas and to avoid or minimize impacts to sensitive shrubs (i.e., coastal sage scrub or riparian) and jurisdictional resources. The Biological Monitor will flag the shrubs to be avoided along the access route prior to work activities and will monitor the work to ensure that impacts are minimized to the extent practicable. In addition, to reduce the potential for the spread of weed seeds, all heavy equipment will be cleaned (including wheels, tracks, undercarriages, and bumpers as applicable) before delivery to the site.

If needed, depending on project timing, a pre-construction nesting bird survey will be conducted by the Biological Monitor prior to any work activities. The Biological Monitor will establish a protective buffer around any active nests, and work may be redirected, as needed, to avoid these areas. The geotechnical work is currently proposed to occur during the non-breeding season (i.e., September 1 to February 14) of the federally Threatened coastal California gnatcatcher (*Polioptila californica californica*).

Because the geotechnical investigations would impact the same areas as the future Project, IRWD and SWD propose to use mitigation proposed for the Project to offset impacts associated with the geotechnical investigations.

Methods

In support of the Project and its Environmental Impact Report (EIR) (Psomas [in preparation]), Psomas conducted a literature review that included the following: (1) a database search of the California Natural Diversity Database (California Department of Fish and Wildlife [CDFW] 2023); (2) a database search of the Electronic Inventory of the California Native Plant Society (CNPS 2023); (3) the Information for Planning and Consultation Database (U.S. Fish and Wildlife Service [USFWS] 2023); and (4) Central-Coastal NCCP/HCP (County of Orange 1996) requirements applicable to the Project.

Psomas Senior Biologist Allison Rudalevige conducted vegetation mapping and general plant and wildlife surveys downstream of the dam on February 25, 2020. Ms. Rudalevige conducted a jurisdictional delineation downstream of the dam on March 24, 2020. Psomas Senior Biologist Jonathan Aguayo conducted focused surveys for arroyo toad downstream of the dam in spring/summer 2020. Psomas Senior Biologist Lindsay Messett conducted focused surveys for coastal California gnatcatcher and least Bell's vireo (*Vireo bellii pusillus*) downstream of the dam in spring/summer 2020. Ms. Rudalevige conducted focused surveys for special status plants in spring/summer 2020. Ms. Messett conducted focused surveys for Quino checkerspot (*Euphydryas editha quino*) in spring 2022. Detailed methods for these biological surveys are provided in the Biological Technical Report and Jurisdictional Delineation Report (Psomas 2023a, 2023b).

Existing Conditions

Vegetation Types

Existing conditions are described in detail in the Biological Technical Report for the Project (Psomas 2023a). The following vegetation types and other areas occur within or adjacent to the geotechnical investigations area downstream of the dam: sagebrush scrub (2.3.6)[1], disturbed sagebrush scrub (2.3.6), disturbed floodplain sage scrub (2.6), toyon–sumac chaparral (3.12), annual grassland (4.1), southern willow scrub (7.2), mulefat scrub (7.3), coast live oak woodland (8.1), western sycamore (8.x[2]), cliff (10.0), open water (12.1), developed (15.6), and disturbed (16.1).

Wildlife

No fish are expected to occur in the geotechnical investigations area because Santiago Creek is ephemeral downstream of the dam.

Amphibian species that may occur in the geotechnical investigations area include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

Common reptile species that may occur in the geotechnical investigations area include common side-blotched lizard (*Uta stansburiana*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

The following resident bird species may occur in the geotechnical investigations area: California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), California scrub jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Polioptila caerulea*), northern

1 Number codes for each vegetation type correspond to Gray and Bramlet (1992).
2 8.x indicates that this vegetation type is within the woodland category; however, there is no specific number code for western sycamore woodland.

mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melozone crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*). Migratory bird species that may occur in the geotechnical investigations area include black-chinned hummingbird (*Archilochus alexandri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), phainopepla (*Phainopepla nitens*), hooded oriole (*Icterus cucullatus*), and Bullock's oriole (*Icterus bullockii*). Wintering bird species that may occur in the geotechnical investigations area include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Raptors (birds of prey) that may occur in the geotechnical investigations area include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and American kestrel (*Falco sparverius*). The turkey vulture (*Cathartes aura*), a scavenger, was observed.

Small mammals that may occur in the geotechnical investigations area include California ground squirrel (*Otospermophilus beecheyi*) and desert cottontail (*Sylvilagus audubonii*). Medium to large-sized mammals that may occur in the geotechnical investigations area include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern mule deer (*Odocoileus hemionus*). Bat species that may occur in the geotechnical investigations area for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

Wildlife Movement

Wildlife movement in the geotechnical investigations area would primarily occur along Santiago Creek or along surrounding ridgelines; local wildlife movement could occur through all habitat types. The geotechnical investigations area is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the area, wildlife movement is generally unconstrained in and around the geotechnical investigations area. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream. The existing dam structure and associated reservoir (i.e., Irvine Lake) may be a barrier to movement for amphibians, reptiles, and small mammals moving upstream along the drainage; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes.

<u>Geotechnical Investigation Impacts</u>

Vegetation Types

The proposed geotechnical activities would temporarily impact native vegetation types. The geotechnical investigations are located almost entirely within the Project's permanent impact footprint for the new spillway; the remainder are located within the Project's temporary impact footprint for construction of the new spillway. No restoration is currently planned following the geotechnical investigations because the work activities are within the footprint of the Project. Project impacts would be fully mitigated as described in the Project EIR (Psomas [in preparation]). Applicable mitigation measures from the Project EIR are included below. Following completion of the geotechnical investigations, there would be no

paved roads or permanent structures. Though not expected, if the Project does not occur, the area could be restored to natural conditions.

The following vegetation types and other areas would be temporarily impacted by proposed geotechnical investigations: sagebrush scrub, disturbed floodplain sage scrub, toyon–sumac chaparral, annual grassland, mulefat scrub, and developed (Table 1, Exhibit 1).

TABLE 1
GEOTECHNICAL INVESTIGATION VEGETATION IMPACTS

Vegetation Types (Gray and Bramlet Code)	Temporary Impact (acre)
Sagebrush Scrub (2.3.6)	0.132
Disturbed Sagebrush Scrub (2.3.6)	0.001
Disturbed Floodplain Sage Scrub (2.6)	0.017
Toyon–Sumac Chaparral (3.12).	0.154
Annual Grassland (4.1)	0.053
Southern Willow Scrub (7.2)	0.004
Mulefat Scrub (7.3)	0.068
Coast Live Oak Woodland (8.1)	—
Sycamore Woodland (8.x)	—
Cliff (10.0)	—
Open Water (12.1)	—
Developed (15.6)	0.012
Disturbed (16.1)	—
Total	**0.441**

A total of 0.338 acre of coastal sage scrub (0.132 acre of sagebrush scrub, 0.001 acre of disturbed sagebrush scrub, and 0.017 acre of floodplain sage scrub) would be impacted by the proposed geotechnical investigations. Impacts on these vegetation types would be considered significant as these vegetation types provide habitat for the coastal California gnatcatcher, which is known to occur in the geotechnical investigations area. Additionally, disturbed floodplain sage scrub is considered a sensitive natural community by CDFW. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. SWD is not a participating jurisdiction in the NCCP/HCP; however, the NCCP/HCP coverage could still be used with payment of the per-acre mitigation fee or alternative mitigation for the loss of coastal sage scrub. IRWD's take for its share of the impacts will be accounted for according to the NCCP/HCP and that SWD will provide compensatory mitigation for its loss of coastal sage scrub as part of the Project's mitigation.

A total of 0.154 acre of toyon–sumac chaparral would be impacted by the proposed geotechnical investigations. While the loss of chaparral would be considered adverse, the loss would be limited in relation to the total amount of chaparral vegetation available in the Project region. Toyon–sumac chaparral is not considered a sensitive natural community by CDFW. Impacts on toyon–sumac chaparral would be considered less than significant; therefore, no mitigation would be required.

A total of 0.053 acre of annual grassland would be impacted by the proposed geotechnical investigations. This vegetation type is generally considered of low biological value, is relatively common in the Project

region, and is not considered a sensitive natural community by CDFW. Impacts on grassland would be considered less than significant; therefore, no mitigation would be required.

A total of 0.0.072 acre of riparian vegetation (0.004 southern willow scrub and 0.068 acre mulefat scrub) would be impacted by the proposed geotechnical investigations. Impacts on riparian vegetation types are considered significant because federal and State resource agencies (i.e., U.S. Army Corps of Engineers [USACE], CDFW, and Regional Water Quality Control Board [RWQCB]) have given these vegetation types special status due to their high biological value; jurisdictional areas are discussed below under Jurisdictional Resources. IRWD and SWD will provide compensatory mitigation for the loss of mule fat scrub as part of the Project's mitigation.

A total of 0.012 acre of developed areas (i.e., existing road) would be impacted by the proposed geotechnical investigations. Developed areas are considered of low biological value. Impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

Jurisdictional Resources

A detailed description of each drainage is provided in the Project's Jurisdictional Delineation Report (Psomas 2023b).

USACE

A total of 0.077 acre of waters of the U.S. (WOTUS) under the regulatory authority of the USACE would be impacted by the proposed geotechnical investigations (Table 2; Exhibit 2). This represents impacts to WOTUS along Santiago Creek downstream of the dam. Nationwide Permit (NWP) 6 allows for the loss of less than 0.10 acre of WOTUS for the purpose of geotechnical investigations. IRWD/SWD will obtain a NWP 6 prior to initiating geotechnical investigations.

RWQCB

A total of 0.078 acre of waters of the State under the regulatory authority of the RWQCB would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 3). This represents impacts to waters of the State along Santiago Creek and Drainage 2. IRWD/SWD will obtain a Section 401 Water Quality Certification, consistent with NWP 6, prior to initiating geotechnical investigations.

CDFW

A total of 0.107 acre of waters under the regulatory authority of CDFW would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 4). This represents impacts to waters under the authority of CDFW along Santiago Creek and Drainage 2. A Streambed Alteration Agreement will be obtained to allow for the loss of CDFW jurisdiction prior to initiating geotechnical investigations.

TABLE 2
GEOTECHNICAL IMPACTS ON
JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)
	Temporary
USACE WOTUS	Wetland: 0.000
	Non-wetland: 0.077
	Total: 0.077
RWCQB Waters of the State	Wetland: 0.000
	Non-wetland: 0.078
	Total: 0.078
CDFW Jurisdictional Resources	0.107

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.

Wildlife Habitat

Geotechnical investigations would result in a limited loss of native vegetation types. While these vegetation types provide potential nesting, roosting, foraging, and denning opportunities for wildlife species, there would be a limited amount of habitat loss (0.429 acre) and many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the Project's Biological Study Area [BSA]). Any wildlife disturbed by the proposed activities could move to areas of habitat immediately adjacent to the areas disturbed. The work would be temporary in nature (approximately two weeks total, with work at each location occurring for one or two days). Wildlife may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. Therefore, the impact of the proposed geotechnical investigations would be considered adverse but less than significant on wildlife because they would not reduce wildlife populations in the region.

Work would occur only during daylight hours; wildlife would be expected to continue to use all areas of the Project site for wildlife movement at night, including areas within the proposed geotechnical investigation area.

It is expected that work at each test pit would be completed within one day. If the work extended over multiple days, the test pits would be covered at the completion of work each day. This would ensure that no wildlife fall into the trench and become entrapped when work is not occurring. While the loss of a few individuals of common wildlife species (e.g., western fence lizard) would not be considered significant, the loss of individuals would be avoided and minimized during the geotechnical investigation activities.

<u>Nesting Birds</u>

The Migratory Bird Treaty Act (MBTA) protects the taking of migratory birds and their nests and eggs. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds

(*Code of Federal Regulations*, Title 50, §10.13). Section 3503 of the *California Fish and Game Code* makes it unlawful to take, possess, or destroy any bird's nest or any bird's eggs. Section 3513 of the *California Fish and Game Code* prohibits the take and possession of any migratory nongame bird, as designated in the MBTA. Birds have potential to nest throughout geotechnical investigations area in vegetation and on bare ground. Geotechnical activities are planned to occur prior to the nesting season (i.e., February 15 to August 31); therefore, no impact on nesting birds is expected. As discussed previously, the Biological Monitor will conduct a pre-construction nesting bird/raptor survey prior to the initiation of geotechnical activities to ensure that no nests are present within the proposed impact area. If an active nest is present, activities would be restricted as needed in the immediate vicinity of the nest until nesting is complete.

Trees in the BSA have potential to be used for nesting by raptors such as the American kestrel, red-tailed hawk, and Cooper's hawk. The raptor nesting season is generally from February 1 to June 30. Regulations prohibit activities that "take, possess, or destroy" any raptor nest or egg (*California Fish and Game Code* §3503, 3503.5, and 3513). Additionally, the noise and disturbance associated with construction may disturb a nesting raptor adjacent to the proposed geotechnical activities. Geotechnical activities may be conducted during the raptor nesting season (i.e., February 1 to June 30). As discussed previously, the Biological Monitor will conduct a pre-construction nesting bird/raptor survey prior to the initiation of geotechnical activities to ensure that no nests are present within the proposed impact area. If an active nest is present, activities would be restricted as needed in the immediate vicinity of the nest until nesting is complete.

Special Status Plant Species

Focused surveys were conducted for special status plant species; details of the results are included in the Biological Technical Report (Psomas 2023a). No special status plant species are located in the geotechnical investigations area. Therefore, there would be no impact on these species, and no mitigation would be required.

Special Status Wildlife Species

Focused surveys for the following special status wildlife were conducted downstream of the dam: Quino checkerspot, arroyo toad, coastal California gnatcatcher, and least Bell's vireo. Details on the methods and results of the focused surveys are included in the Biological Technical Report for the Project (Psomas 2023a). This section focuses on high status species (i.e., Threatened, Endangered, or Candidate species) because those species would be the ones that could trigger a significant impact.

Quino checkerspot and arroyo toad would not be expected to occur in the geotechnical investigations area because they were not observed during focused surveys.

Crotch bumble bee (*Bombus crotchii*) has potential to occur in the geotechnical investigations area. While there would be a limited amount of foraging habitat loss (0.429 acre), many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). The proposed geotechnical activities would occur outside the breeding season of the Crotch bumble bee (i.e., March to July); therefore, if there are bees present, the geotechnical activities would not affect nesting.

Coastal California gnatcatcher is known to occur in coastal sage scrub habitats in the geotechnical investigations area. As discussed above, geotechnical activities would impact 0.338 acre of sagebrush

scrub and floodplain sage scrub occupied by the coastal California gnatcatcher. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. SWD is not a participating jurisdiction in the NCCP/HCP; however, the NCCP/HCP coverage could still be used with payment of the per-acre mitigation fee or alternative mitigation for the loss of coastal sage scrub. NCCP/HCP avoidance and minimization measures require that a biological monitor be present during clearing of coastal sage scrub.

Least Bell's vireo would not be expected within the area of proposed geotechnical investigations because it was not observed during focused surveys in spring/summer 2020. Additionally, geotechnical investigations would occur outside the breeding season for this species (i.e., March 15 to September 15) when it would be on its wintering grounds. Therefore, the noise from geotechnical investigations would not affect least Bell's vireo since it would not be present when the geotechnical investigations are planned to occur and because riparian habitat downstream of the dam was not occupied during previous surveys.

The bald eagle may occur as a flyover occurrence; it is expected to forage over Irvine Lake. The bald eagle is not expected to nest within the area of proposed geotechnical investigations due to lack of suitable nesting habitat (large trees). Geotechnical activities may be conducted during the raptor nesting season (i.e., February 1 to June 30). As discussed previously, the Biological Monitor will conduct a pre-construction nesting bird/raptor survey prior to the initiation of geotechnical activities to ensure that no nests are present within the proposed impact area. If an active nest is present, activities would be restricted as needed in the immediate vicinity of the nest until nesting is complete.

Mountain lion may occur in the BSA and may forage in the area where geotechnical activities would occur. As mentioned above under wildlife movement, the proposed geotechnical activities would occur during daylight hours and would not interfere with foraging by this nocturnal species. The mountain lion would be expected to continue to use the proposed work area for foraging and wildlife movement at night throughout the duration of the proposed geotechnical activities.

Several other special status amphibians, reptiles, birds, and mammals have potential to occur within the impact area for the geotechnical investigations. No roosting habitat for bat species is present in the geotechnical investigations area (e.g., structures, large trees); roosting habitat is present in the vicinity and special status bats may forage in the geotechnical investigations area. The geotechnical investigations would be located entirely within the Project's impact footprint for the new spillway. While there would be a limited temporary loss of habitat (0.429 acre) following the geotechnical investigations, many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). Therefore, the impact on other special status amphibians, reptiles, birds, and mammals would be less than significant and no mitigation would be required.

Indirect Impacts

Noise Impacts

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase over present levels during geotechnical investigations due to construction vehicles. Temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. Temporary noise from geotechnical activities may cause birds adjacent to the work area to temporarily leave the area or may discourage individuals from selecting habitat adjacent to the work area due to construction vehicle noise and human activity. These impacts are considered adverse, but not

significant for most wildlife species, because the Project would not impact a substantial population of these species and because work is planned to occur outside the breeding season for most species.

Geotechnical activities would create noise and human activity adjacent to areas of coastal sage scrub occupied by the coastal California gnatcatcher; however, work is planned to occur outside the breeding season for this species (i.e., September 1 to February 14). Coastal California gnatcatchers may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. Therefore, indirect impacts would be considered adverse, but less than significant, for work conducted outside the breeding season. If work were to be conducted during the breeding season (i.e., February 15 to August 31), it could affect nesting activities (e.g., vocalizations between the pair, or flushing birds from their nests, leaving the eggs exposed to predation). This indirect impact would be considered potentially significant. If geotechnical activities were to occur during the breeding season, the pre-construction nesting bird survey will ensure that no work would occur in the immediate vicinity of the nest.

Increased Dust

Geotechnical activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of dust as a result of geotechnical activities is considered less than significant because it would only affect a limited area and would not substantially reduce plant populations in the region. Therefore, no mitigation would be required.

Water Quality

During geotechnical activities, excess silt, petroleum, or chemicals on the soil surface within the geotechnical investigations area could be washed into drainages (including Santiago Creek) and may affect areas downstream of the geotechnical activities. Adverse effects on water quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the geotechnical investigations would implement Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant, and no mitigation would be required.

Invasive Exotic Plant Species

Geotechnical activities create disturbance, which in turn provides a place for non-native weedy species to spread. As discussed previously, construction equipment would be washed prior to arrival on the site to ensure equipment would not introduce non-native weed seeds to the area. The use of Best Management Practices associated with prevention of the spread of weed seeds would result in an impact that is less than significant. Additionally, a native seed mix will be used for hydroseeding areas temporarily disturbed by construction activities (following the Project's construction).

Night Lighting

Geotechnical activities would occur during the day. Therefore, there would be no impact due to night lighting, and no mitigation would be required.

Human Activity

During geotechnical investigations, there would be a small increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to the geotechnical investigations area. Human disturbance could disrupt normal foraging and breeding behavior of wildlife adjacent to the geotechnical investigation area. As described above for noise, this disturbance would be considered potentially significant. As discussed previously, a WEAP training would be conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Increased Wildfire Risk

During geotechnical investigations, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. Additionally, construction personnel may dispose of cigarettes inappropriately in the geotechnical investigations area and could ignite dry vegetation. If not contained quickly, the fire could spread through adjacent habitat areas. As discussed previously, a WEAP training will be conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Mitigation

The Project Draft EIR (Psomas [in preparation]) includes compensatory mitigation for the loss of coastal sage scrub and riparian vegetation, and jurisdictional resources. These habitats would be mitigated at a minimum 1:1 ratio through use of one of the following options: (1) NCCP take credits (for coastal sage scrub); (2) preservation, restoration, and/or enhancement of on-site habitats; or (3) preservation, restoration, or enhancement of off-site habitats. IRWD/SWD have initiated consultation with the resource agencies to negotiate appropriate mitigation for the loss of these resources as a result of the Project, as consistent with the Clean Water Act, California Fish and Game Code, and the federal and State Endangered Species Acts.

Attachments – Exhibits 1–5

R:\Projects\IRW_IRWD\3IRW010201\Documentation\Geotech_Memo\SantiagoDam-Geotech-Bio Memo-121423.docx

REFERENCES:

California Department of Fish and Wildlife (CDFW). 2023a (June 12, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

California Native Plant Society (CNPS). 2023 (June 12, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. http://www.rareplants.cnps.org/.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

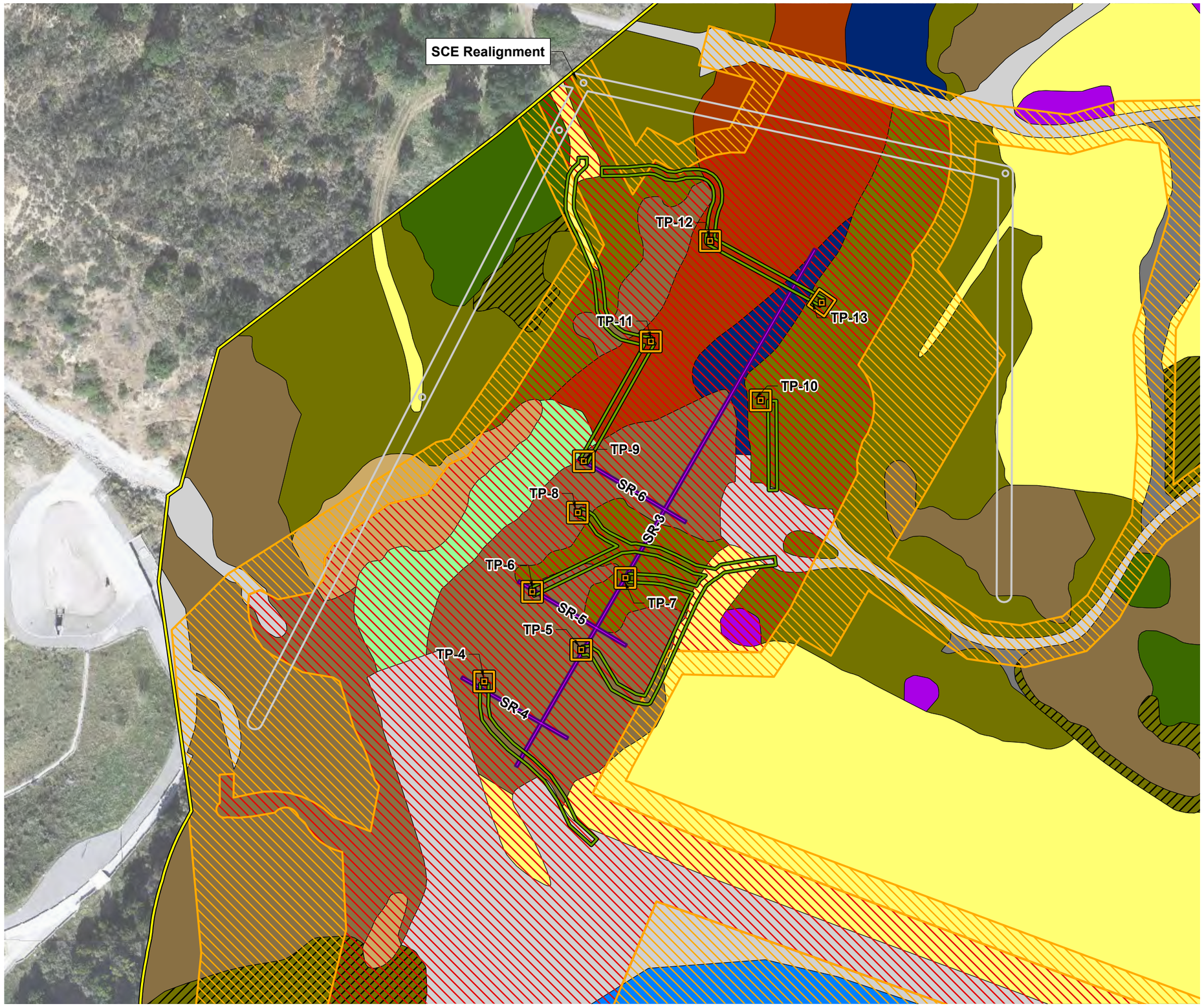
Orange, County of. 1996 (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.

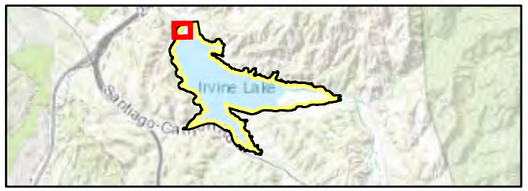
Psomas. 2023a (November 3). *Biological Technical Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

_____. 2023b (November 2). *Jurisdictional Delineation Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

_____.[in preparation]. *Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

U.S. Fish and Wildlife Service (USFWS). 2023. (October 11). List of Threatened and Endangered Species That May Occur in Your Proposed Project Location or May Be Affected By Your Proposed Project; Santiago Creek Dam Outlet Tower and Spillway Improvements Project; 2023-0055398. Carlsbad, CA: USFWS.





- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area

Project Impacts

- Permanent Impacts
- Temporary Impacts

SCE Realignment

- Permanent Impacts
- Temporary Impacts

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

100 50 0 100 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts – Vegetation Types

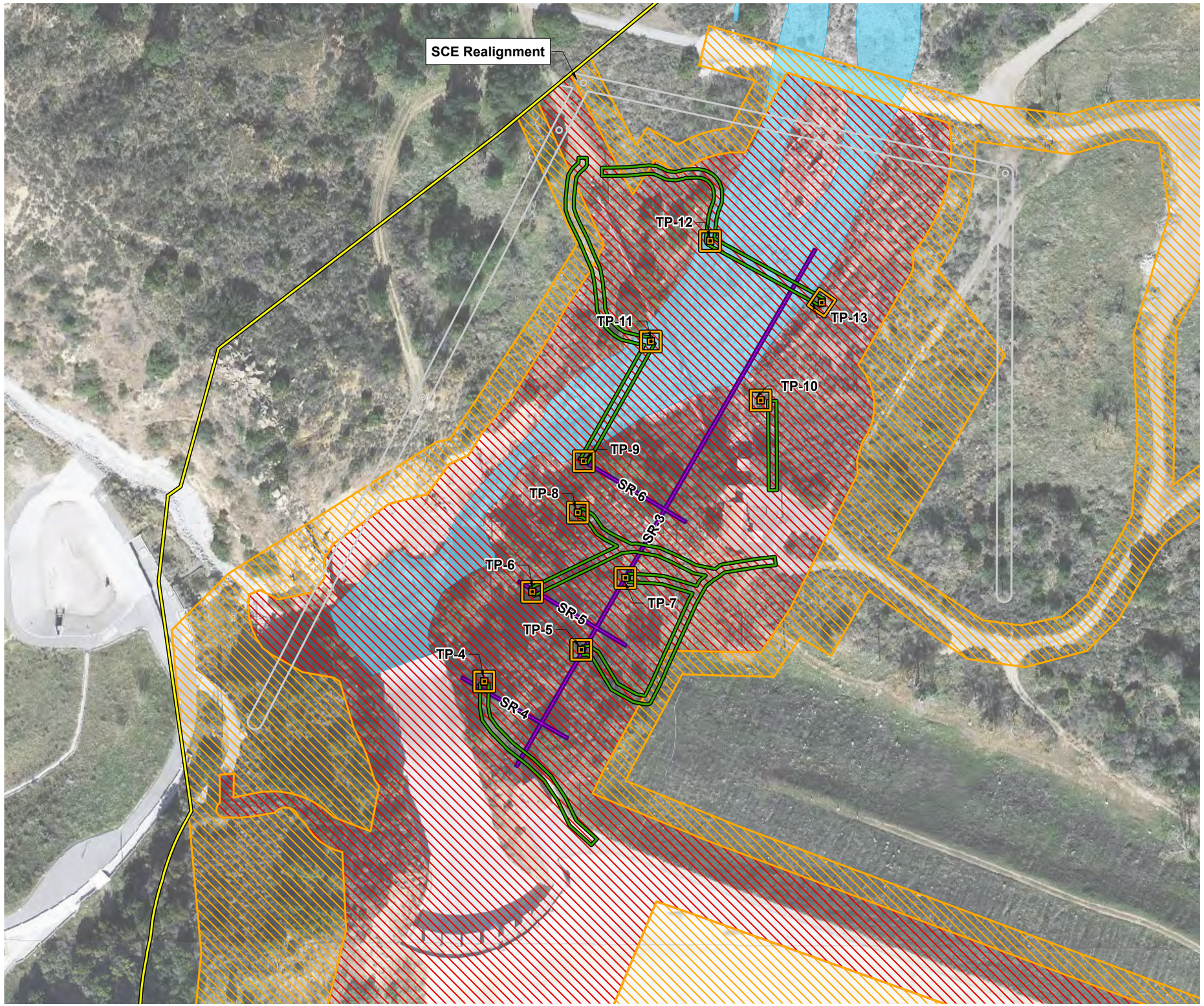
Exhibit 1

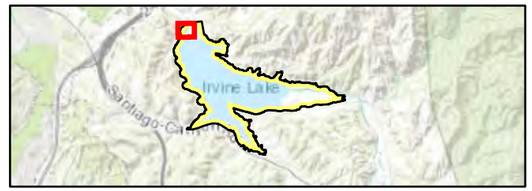
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 12/13/2023 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_GeoTech_VegImpacts





Survey Area
Test Pit
Test Pit 20ft x 20ft Work Area
Access Road
Geophysical Survey
Geophysical Survey Work Area

Project Impacts
Permanent Impacts
Temporary Impacts

SCE Realignment
Permanent Impacts
Temporary Impacts

Waters of the United States
Non-Wetland

N
W E
S

100 50 0 100
Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts – USACE Jurisdiction

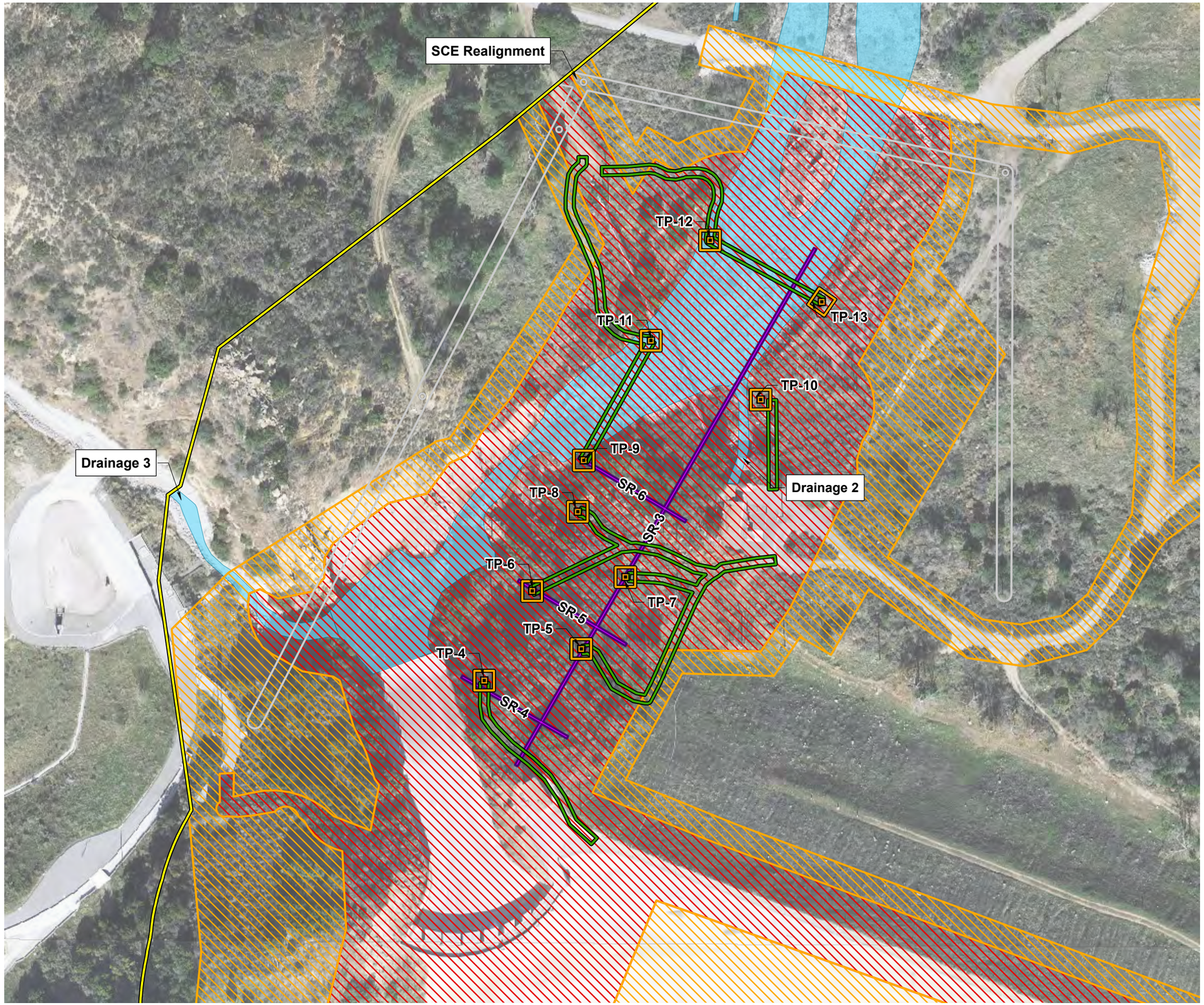
Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 12/13/2023 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_GeoTech_USACE_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area

Project Impacts
- Permanent Impacts
- Temporary Impacts

SCE Realignment
- Permanent Impacts
- Temporary Impacts

Waters of the State
- Non-Wetland

N
W E
S

100 50 0 100 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts – RWQCB Jurisdiction

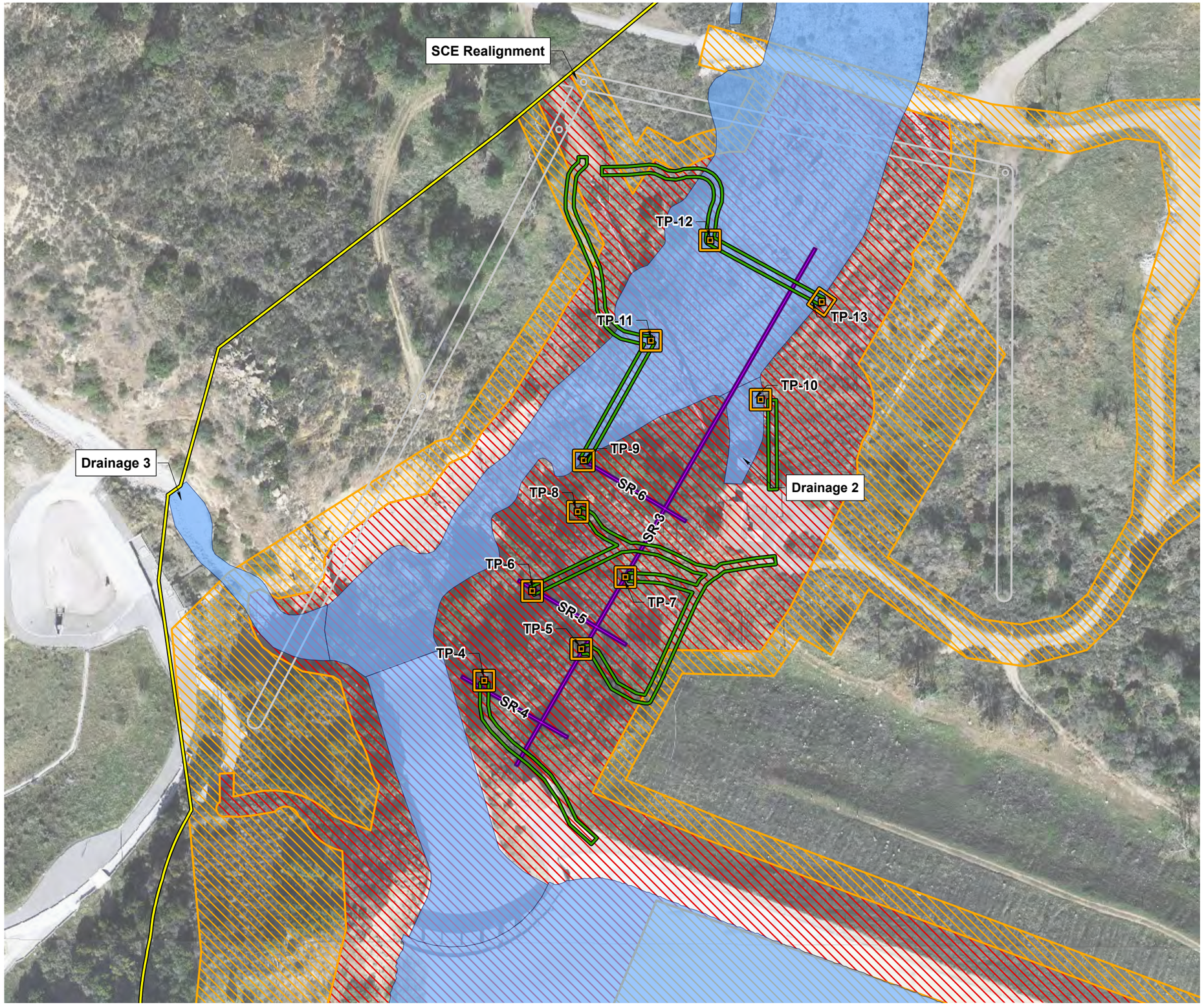
Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 12/13/2023 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_GeoTech_RWQCB_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area

Project Impacts
- Permanent Impacts
- Temporary Impacts

SCE Realignment
- Permanent Impacts
- Temporary Impacts

CDFW Jurisdictional Waters
- CDFW

N
W E
S

100 50 0 100 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts – CDFW Jurisdiction

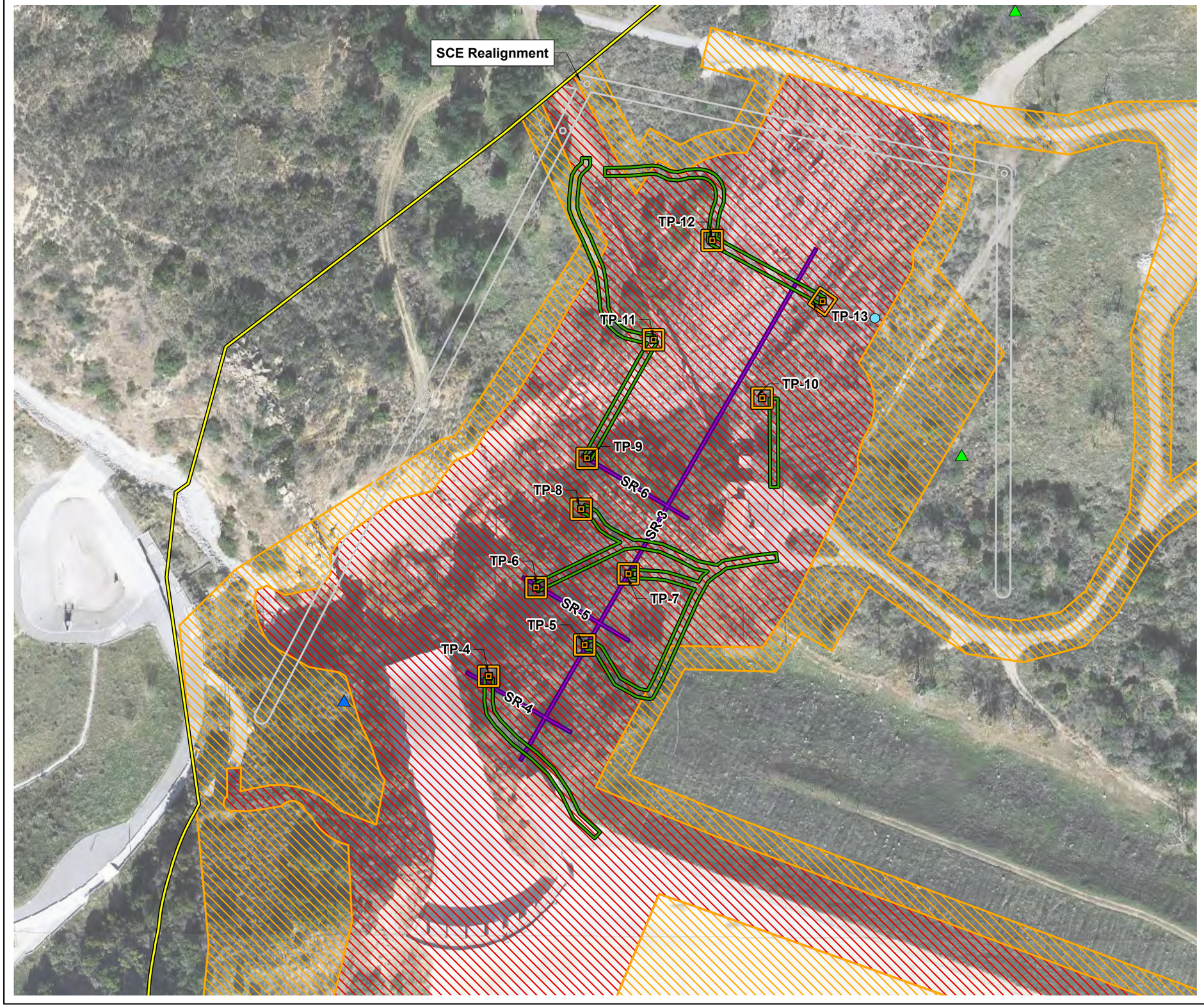
Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 12/13/2023 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_GeoTech_CDFW_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area

SCE Realignment

- Permanent Impacts
- Temporary Impacts

Project Impacts

- Permanent Impacts
- Temporary Impacts

Special Status Plants

- Coulter's Matilija Poppy Population
- Many-Stemmed Dudleya Population

Special Status Species

- Coastal California Gnatcatcher

N
W E
S

100 50 0 100 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts – Special Status Species

Exhibit 5

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 12/13/2023 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_GeoTech_SSpecies_Impacts

SANTIAGO DAM GEOTECHNICAL INVESTIGATIONS
BIOLOGICAL RESOURCES MEMORANDUM

September 5, 2024

To: Andy Uk
IRWD

From: Amber Heredia
Psomas

As part of a larger Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Project), Irvine Ranch Water District (IRWD) proposes to conduct an additional round of geotechnical investigations (hereinafter referred to as the "geotechnical investigations") to provide necessary geologic and geotechnical data to inform the Project's design engineering. The current geotechnical investigations include subsurface investigations of Irvine Lake to characterize soil material for use as borrow material to construct an earthen diversion berm adjacent to Santiago Creek Dam and a potential dam embankment improvement. The proposed geotechnical investigations include vibracores, geotechnical exploratory test pits, and hollow stem auger borings. The purpose of this Memorandum is to evaluate the proposed impact of the geotechnical investigation program on Biological and Jurisdictional Resources.

No cultural resources are known to occur within the limits of the proposed geotechnical investigation.

Project Background

IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serves as a critical water supply for both IRWD and Serrano Water District. Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources, Division of Safety of Dams (DSOD). Santiago Creek Dam impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River. A seismic assessment requested by the DSOD found that the spillway is nearing the end of its useful life, and the design does not meet current standards. To meet current DSOD regulatory requirements and improve water supply reliability, IRWD proposes to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway structure by implementing the Project. The area of the proposed boring location is important to the overall design of the Project; however, there is limited historical subsurface information of the area. There is potential for significant cost implications without reliable soil characterizations in advance of finalizing the design.

In 2020, the DSOD downgraded the condition of the dam to the second to the lowest possible rating due to the two known deficiencies (issues with the spillway and outlet tower). DSOD further restricted the operating levels of the reservoir, which limits the ability to store local runoff water supplies for the benefit of the region. DSOD and IRWD agreed to repair the known deficiencies by 2029. Because the existing dam must remain in place and operational throughout the course of construction of the spillway structure, the bulk of the construction must occur in the summer dry seasons. Milestones at the end of each dry season have been established so that the contractor will be able to winterize the Project and be ready for the next dry season. The Project is scheduled to begin construction in the first dry season of 2025 and to be completed by 2029. The proposed geotechnical investigations are needed to inform the final design so that the Project construction can start in the dry season of 2025.

Project Location

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located east of SR-241.

The Project is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle. Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level.

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space". IRWD is a participating jurisdiction; Santiago Dam is a permitted existing use under the NCCP/HCP.

The geotechnical investigation sites are located on the upstream side of the dam on the southeastern side of the lake where Santiago Creek enters the lake. Many of the geotechnical investigation sites are located in the lakebed or on the fluctuating shoreline (Exhibit 1).

Description of Geotechnical Investigation Work

To inform the location of the borrow site, the proposed geotechnical investigations are needed to provide necessary geologic and geotechnical information to fully characterize the existing soil and subsurface conditions of the potential borrow site material that would be used to construct an earthen berm and to reinforce the dam structure.

IRWD proposes to conduct 14 geotechnical vibracores, 7–9 exploratory test pits, and 2 hollow stem auger borings on the southeast side of the lake (Exhibit 1). Geotechnical locations were selected based on the location of the proposed borrow sites. These locations may be modified by IRWD as needed in the field to avoid trees, sensitive vegetation, or jurisdictional areas, to the extent possible. This work is expected to require 7 to 10 workdays to complete.

Vibracore samples would be taken from a barge; each vibracore sample would be approximately 4 inches in diameter and 15 feet deep. The vibracore samples are expected to take two to three workdays, with one additional day to mobilize and demobilize the barge from the boat ramp.

At the test pit locations, contractors will use a small rubber-tracked mounted excavator with an excavation bucket for digging and tracking over brush. Each geotechnical test pit would be approximately 3 feet wide, 10 feet long, and 10 feet deep; the work area around each test pit is assumed to be approximately 20 feet by 20 feet. Approximately 300 to 500 cubic yards of soil will be excavated from, and temporarily stockpiled adjacent to, the test pit. Samples of

subsurface materials would be collected from the test pits for examination and laboratory testing. Following the completion of the test pit, each hole would be backfilled using the dirt spoils that came from the hole. Two alternative test pits are included (i.e., TP-2a, TP-3a) and will be used if lake levels are low enough to allow them; the impact analysis assumes a worst-case scenario that both sites will be sampled, but in implementation, the field crew will select one set of sites to conduct sampling of soils. The test pits are expected to take three to four workdays.

At the hollow stem auger locations, a truck mounted drill rig will be used. Each geotechnical hollow stem auger would be approximately 8 inches wide and 30 feet deep; the work area around the hollow stem auger is assumed to be approximately 20 feet by 20 feet. Each hollow stem auger will generate one to three 55-gallon drums of soil cuttings; these drums filled with soil cuttings will be disposed of at an appropriate landfill. A two-inch polyvinyl chloride (PVC) standpipe piezometer will be installed in each boring to allow for the monitoring of ground water elevations in proposed borrow areas BA-3 and BA-4. The drilling of the hollow stem augers and installation of the piezometers is expected to take two to three workdays.

The geotechnical investigations will be accessed using existing dirt roads around the southeast portion of the lake. Temporary access routes from the existing dirt roads to each test pit and hollow stem auger would be needed. Where feasible, temporary access would be established by the “drive and crush” method to limit vegetation disturbance. The drive and crush method involves substantially less disturbance than blading of the surface material; some vegetation would be crushed, but would not be cut or removed, allowing it to retain the root structure and resprout in place.

Each individual geotechnical investigation activity is anticipated to be completed within one working day and would not result in open pits beyond working hours. A limited number of workers (typically about five) would be required to perform the work. Workers would commute individually and would park along established dirt roads. There would be no nighttime work conducted as part of the geotechnical investigations.

Access roads in jurisdictional waters and native vegetation would be limited to a width of approximately 8 feet 6 inches, which is the width of the proposed backhoe (i.e., CASE CX-1450 backhoe with rubber treads). Some minor grading may be needed along the temporary access roads, but wherever possible, the backhoe would be walked up to each test pit site to minimize disturbance to the streambed and sensitive vegetation. The backhoe would be walked in following a Biological Monitor who would help to find a path to minimize impacts to native vegetation to the extent possible.

Prior to the geotechnical work, the Biological Monitor will conduct a Worker Environmental Awareness Program (WEAP) training with the contractor to inform the workers of the environmental sensitivity of the area. The Biological Monitor will walk the proposed work areas and access routes with the Geotechnical Contractor. The Biological Monitor will make suggestions by slightly shifting or narrowing the access road and/or proposed work areas to site the geotechnical disturbance in previously disturbed areas and to avoid or minimize impacts to sensitive shrubs/trees (i.e., riparian) and jurisdictional resources. The Biological Monitor will flag the shrubs/trees to be avoided along the access route prior to work activities and will monitor the work to ensure that impacts are minimized to the extent practicable. In addition, to reduce

the potential for the spread of weed seeds, all heavy equipment will be cleaned (including wheels, tracks, undercarriages, and bumpers as applicable) before delivery to the site.

Work would be conducted outside the nesting bird season (i.e., September 16 to February 14). Therefore, no pre-construction nesting bird survey will be needed.

Geotechnical investigations within the selected borrow site would impact the same areas as the future Project. Geotechnical investigations within the borrow sites that are not selected would be minimal. IRWD proposes to use mitigation proposed for the Project to offset impacts associated with the geotechnical investigations.

Methods

In support of the Project and its Environmental Impact Report (EIR) (Psomas [in preparation]), Psomas conducted a literature review that included the following: (1) a database search of the California Natural Diversity Database (California Department of Fish and Wildlife [CDFW] 2024); (2) a database search of the Electronic Inventory of the California Native Plant Society (CNPS 2024); (3) the Information for Planning and Consultation Database (U.S. Fish and Wildlife Service [USFWS] 2024); and (4) Central-Coastal NCCP/HCP (County of Orange 1996) requirements applicable to the Project.

Psomas Senior Biologists Allison Rudalevige and Lindsay Messett conducted vegetation mapping and general plant and wildlife surveys upstream of the dam on September 16 and 17, 2020. Ms. Rudalevige conducted a jurisdictional delineation upstream of the dam on October 14, 20, and 21, 2020; she was accompanied by Psomas Senior Biologist Jonathan Aguayo or Ms. Messett. Protocol focused surveys were conducted upstream of the dam in spring/summer 2022. Ms. Rudalevige conducted focused surveys for special status plants. Mr. Aguayo conducted focused surveys for arroyo toad (*Anaxyrus californicus*), least Bell's vireo (*Vireo bellii pusillus*), and southwestern willow flycatcher (*Empidonax traillii extimus*). Ms. Messett conducted focused surveys for Quino checkerspot (*Euphydryas editha quino*), coastal California gnatcatcher (*Polioptila californica californica*), and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). In summer 2024, Ms. Messett conducted protocol focused surveys for Crotch's bumble bee (*Bombus crotchii*) and Mr. Aguayo and Ms. Messett conducted protocol focused trapping and visual surveys for southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]) [in progress]. Detailed methods for these biological surveys are included in the respective focused survey reports, which are summarized in the Biological Technical Report and Jurisdictional Delineation Report (Psomas 2024a, 2024b).

Existing Conditions

Vegetation Types

Existing conditions are described in detail in the Biological Technical Report for the Project (Psomas 2024a). The following vegetation types and other areas occur within or adjacent to the geotechnical investigations area downstream of the dam: sagebrush scrub (2.3.6)[1], disturbed sagebrush scrub (2.3.6), sagebrush-coyote bush scrub (2.3.12), southern cactus scrub (2.4), disturbed southern cactus scrub (2.4), toyon-sumac chaparral (3.12), annual grassland (4.1),

[1] Number codes for each vegetation type correspond to Gray and Bramlet (1992).

ruderal (4.6), riparian herb (7.1), disturbed mulefat scrub (7.3), southern black willow forest (7.7), disturbed southern black willow forest (7.7), southern black willow forest/riparian herb (7.7/7.1), coast live oak woodland (8.1), and vegetated fluctuating shoreline (12.2). Other landcover includes cliff (10.0), open water (12.1), fluctuating shoreline (12.2), perennial stream (13.1), ornamental (15.5), developed (15.6), and disturbed areas (16.1) (Exhibit 1).

Wildlife

Irvine Lake is stocked with fish, including rainbow trout (*Oncorhynchus mykiss*), bass (*Morone* sp.), catfish (*Ictalurus* sp.), common carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis* sp.). Non-native fish are predators on native species; no native fish (with the exception of the stocked rainbow trout) are expected to occur in Irvine Lake.

Amphibian species that may occur in the geotechnical investigations area include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

Common reptile species that may occur in the geotechnical investigations area include common side-blotched lizard (*Uta stansburiana*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

The following resident bird species may occur in the geotechnical investigations area: California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), Bewick's wren (*Thryomanes bewickii*), northern mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melozone crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*). Wintering bird species that may occur in the geotechnical investigations area include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), and white-crowned sparrow (*Zonotrichia leucophrys*). Migratory species that occur during the breeding season would not be expected during the geotechnical investigations since they would occur during the non-breeding season.

Raptors (birds of prey) that may occur in the geotechnical investigations area include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), American kestrel (*Falco sparverius*), and turkey vulture (*Cathartes aura*).

Small mammals that may occur in the geotechnical investigations area include California ground squirrel (*Otospermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), North American deermouse (*Peromyscus maniculatus*), and Bryant's woodrat (*Neotoma bryanti*). Medium to large-sized mammals that may occur in the geotechnical investigations area include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern

mule deer (*Odocoileus hemionus*). Bat species that may occur in the geotechnical investigations area for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

Wildlife Movement

Wildlife movement in the geotechnical investigations area would primarily occur along Santiago Creek or along surrounding ridgelines; local wildlife movement could occur through all habitat types. The geotechnical investigations area is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the area, wildlife movement is generally unconstrained in and around the lake and geotechnical investigations area. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream. The existing dam structure and associated reservoir (i.e., Irvine Lake) may be a barrier to movement for amphibians, reptiles, and small mammals; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes.

Geotechnical Investigation Impacts

Vegetation Types

The proposed geotechnical activities would temporarily impact native vegetation types. No restoration is currently planned following the geotechnical investigations because the work activities are primarily in ruderal areas and/or within the impact footprint of the Project's permanent or temporary impacts. Project impacts would be fully mitigated as described in the Project EIR (Psomas [in preparation]). Following completion of the geotechnical investigations, there would be no paved roads or permanent structures; although there would be two new piezometers. Though not expected, if the Project does not occur, the area could be restored to natural conditions.

The following vegetation types and other areas would be temporarily impacted by proposed geotechnical investigations: (Table 1, Exhibit 1).

TABLE 1
GEOTECHNICAL INVESTIGATION VEGETATION IMPACTS

Vegetation Types (Gray and Bramlet Code)	Temporary Impact (acre)
Sagebrush Scrub (2.3.6)	—
Disturbed Sagebrush Scrub (2.3.6)	—
Sagebrush-Coyote Bush Scrub (2.3.12)	—
Southern Cactus Scrub (2.4)	—
Disturbed Southern Cactus Scrub (2.4)	—
Toyon–Sumac Chaparral (3.12)	—
Annual Grassland (4.1)	—
Ruderal (4.6)	0.50
Riparian Herb (7.1)	—
Disturbed Mulefat Scrub (7.3)	—
Southern Black Willow Forest (7.7)	—
Disturbed Southern Black Willow Forest (7.7)	—
Southern Black Willow Forest/Riparian Herb (7.7/7.1)	—
Coast Live Oak Woodland (8.1)	—
Cliff (10.0)	—
Open Water (12.1)	—
Vegetated Fluctuating Shoreline (12.2)	0.50
Perennial Stream (12.3)	—
Ornamental (15.5)	—
Developed (15.6)	0.20
Disturbed (16.1)	1.29
Total	**2.49**

No native vegetation types would be impacted by the proposed geotechnical investigations. However, the geotechnical investigations would be adjacent to several native vegetation types.

A total of 0.50 acre of ruderal would be impacted by the proposed geotechnical investigations. This vegetation type is generally considered of low biological value, is relatively common in the Project region, and is not considered a sensitive natural community by CDFW. Impacts on ruderal would be considered less than significant; therefore, no mitigation would be required.

A total of 0.50 acre of vegetated fluctuating shoreline would be impacted by the proposed geotechnical investigations. This vegetation type is not considered a sensitive natural community by CDFW. However, it is within the jurisdiction of the regulatory agencies discussed below under Jurisdictional Resources. Impacts to jurisdictional resources would be mitigated as part of the Project.

A total of 0.20 acre of developed areas and 1.29 acre of disturbed areas (i.e., existing roads) would be impacted by the proposed geotechnical investigations. Developed and disturbed areas are considered of low biological value. Impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

Jurisdictional Resources

A detailed description of each drainage is provided in the Project's Jurisdictional Delineation Report (Psomas 2024b).

U.S. Army Corps of Engineers (USACE)

A total of 0.149 acre of wetland waters of the U.S. (WOTUS), including 742 linear feet (717 feet along access roads and 25 feet total for all geotechnical locations), under the regulatory authority of the USACE would be impacted by the proposed geotechnical investigations (Table 2; Exhibit 2). This represents impacts to WOTUS within Irvine Lake. One test pit (i.e., TP-3a) and all 14 vibracore samples are located within Irvine Lake; this totals 15 locations within USACE jurisdiction. Nationwide Permit (NWP) 6 allows for the loss[2] of less than 0.10 acre of WOTUS for the purpose of geotechnical investigations. IRWD will obtain a NWP 6 prior to initiating geotechnical investigations.

Regional Water Quality Control Board (RWQCB)

A total of 0.149 acre of wetland waters of the State, including 742 linear feet (717 feet along access roads and 25 feet total for all geotechnical locations), under the regulatory authority of the RWQCB would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 3). This represents impacts to waters of the State within Irvine Lake. One test pit (i.e., TP-3a) and all 14 vibracore samples are located within Irvine Lake; this totals 15 locations within RWQCB jurisdiction. IRWD will obtain a Section 401 Water Quality Certification, consistent with NWP 6, prior to initiating geotechnical investigations.

CDFW

A total of 0.635 acre of waters, including 3,048 linear feet (2,883 feet along access roads and 165 feet total for all geotechnical locations), under the regulatory authority of CDFW would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 4). This represents impacts to waters under the authority of CDFW within and adjacent to Irvine Lake. Both hollow stem augers (i.e., HSA-1, HAS-2), 6 test pits (i.e., TP-1, TP-2, TP-2a, TP-3, TP-3a, and TP-4), and all 14 vibracore samples are located within Irvine Lake; this totals 22 locations within CDFW jurisdiction. A Streambed Alteration Agreement will be obtained to allow for the loss of CDFW jurisdiction prior to initiating geotechnical investigations.

[2] Refers to permanent impacts.

TABLE 2
GEOTECHNICAL IMPACTS ON
JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)	Length of Jurisdictional Resource Impacted (linear feet)
	Temporary	Temporary
USACE WOTUS	Wetland: 0.149	Access Road: 717
	Non-wetland: 0.000	Geotech Locations: 25
	Total: 0.149	Total: 742
RWCQB Waters of the State	Wetland: 0.149	Access Road: 717
	Non-wetland: 0.000	Geotech Locations: 25
	Total: 0.149	Total: 742
CDFW Jurisdictional Resources	0.635	Access Road: 2,883
		Geotech Locations: 165
		Total: 3,048

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.

Wildlife Habitat

The geotechnical investigations locations were adjusted to avoid native vegetation types; they would only impact ruderal vegetation and vegetated fluctuating shoreline. There would be limited disturbance to these habitat types while many acres of native habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the Project's Biological Study Area [BSA]). Any wildlife disturbed by the proposed activities could move to areas of habitat immediately adjacent to the areas of disturbance. The work would be temporary in nature (approximately two weeks total, with work at each location occurring for one or two days). Wildlife may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. Therefore, the impact of the proposed geotechnical investigations would be considered less than significant on wildlife.

Work would occur only during daylight hours; wildlife would be expected to continue to use all areas of the Project site for wildlife movement at night, including areas within the proposed geotechnical investigation area.

It is expected that work at each test pit would be completed within one day. If the work extended over multiple days, the test pits would be covered at the completion of work each day. This would ensure that no wildlife fall into the trench and become entrapped when work is not occurring. While the loss of a few individuals of common wildlife species (e.g., western fence lizard) would not be considered significant, the loss of individuals would be avoided and minimized during the geotechnical investigation activities.

Nesting Birds

The geotechnical investigations would occur outside the nesting season (i.e., September 16 to February 14); therefore, there would be no impact on nesting birds.

Special Status Plant Species

Focused surveys were conducted for special status plant species; details of the results are included in the Biological Technical Report (Psomas 2024a). Mud nama (*Nama stenocarpa*) was observed in the southern portion of the lake during the 2022 focused surveys. Mud nama has a California Rare Plant Rank of 2B.2; it is not a Covered species in the Central Coastal NCCP/HCP. The area where mud nama was observed experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. Individuals covered a large area, and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama. This resulted in an average of 37.7 individuals per square foot and the total population was estimated to be between 3.5 and 5.5 million (Psomas 2024a). The proposed geotechnical investigations would impact only 0.09 square foot of mud nama, which equates to 3 individuals. Given the amount of mud nama present in the BSA, the loss of three individuals would be considered less than significant. Therefore, no mitigation would be required.

Special Status Wildlife Species

Focused surveys for the following special status wildlife were conducted upstream of the dam: Quino checkerspot, Crotch's bumble bee, arroyo toad, southwestern pond turtle, coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo. Details on the methods and results of the focused surveys are included in the Biological Technical Report for the Project (Psomas 2024a). This section focuses on high status species (i.e., Threatened, Endangered, or Candidate species) because those species would be the ones that could trigger a significant impact.

Quino checkerspot, arroyo toad, southwestern willow flycatcher, and western yellow-billed cuckoo would not be expected to occur in the geotechnical investigation areas because they were not observed during focused surveys.

Crotch bumble bee was observed foraging in coastal sage scrub habitat on the southern side of the lake and has potential to occur in the geotechnical investigation areas. While there would be a limited amount of foraging habitat loss (0.50 acre of ruderal), many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). The proposed geotechnical activities would occur outside the breeding season of the Crotch bumble bee; therefore, if there are bees present in the immediate area, the geotechnical activities would not affect nesting.

Coastal California gnatcatcher is known to occur in coastal sage scrub habitats in the BSA and could occur adjacent to the geotechnical investigation areas. No coastal sage scrub would be

directly impacted by the geotechnical investigations. As an avoidance and minimization measure, a Biological Monitor will be present throughout the geotechnical work.

Least Bell's vireo is known to occur in riparian habitats in the BSA adjacent to the geotechnical investigations area. No riparian habitat would be directly impacted by the geotechnical investigations. Additionally, the geotechnical investigations would occur outside the breeding season (i.e., September 16 to February 14) when least Bell's vireo would be on its wintering grounds. Therefore, the noise from geotechnical investigations would not affect least Bell's vireo since it would not be present when the geotechnical investigations are planned to occur.

Mountain lion may occur in the BSA and may forage in the area where geotechnical activities would occur. As mentioned above under wildlife movement, the proposed geotechnical activities would occur during daylight hours and would not interfere with foraging by this nocturnal species. The mountain lion would be expected to continue to use the proposed work area for foraging and wildlife movement at night throughout the duration of the proposed geotechnical activities.

Several other special status amphibians, reptiles, birds, and mammals have potential to occur within the impact area for the geotechnical investigations. No roosting habitat for bat species is present in the geotechnical investigations area (e.g., structures, large trees); roosting habitat is present in the vicinity and special status bats may forage in the geotechnical investigations area. While there would be a limited temporary loss of low-quality habitat (0.50 acre ruderal and 0.50 acre vegetated fluctuating shoreline) following the geotechnical investigations, many acres of similar or higher-quality habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). Therefore, the impact on other special status amphibians, reptiles, birds, and mammals would be less than significant, and no mitigation would be required.

Indirect Impacts

Noise Impacts

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase over present levels during geotechnical investigations due to construction vehicles. Temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. Temporary noise from geotechnical activities may cause birds adjacent to the work area to temporarily leave the area or may discourage individuals from selecting habitat adjacent to the work area due to construction vehicle noise and human activity. These impacts are considered adverse, but not significant for most wildlife species, because the Project would not impact a substantial population of these species and because work is planned to occur outside the breeding season.

Geotechnical activities would create noise and human activity adjacent to areas of coastal sage scrub occupied by the coastal California gnatcatcher and open water used for foraging by the bald eagle; however, work is planned to occur outside the breeding season (i.e., September 16 to February 14). Coastal California gnatcatchers and bald eagles may move away from the disturbance and human activity temporarily but would be expected to return following

completion of the geotechnical investigations. Therefore, indirect impacts would be considered adverse, but less than significant, for work conducted outside the breeding season.

Increased Dust

Geotechnical activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of dust as a result of geotechnical activities is considered less than significant because it would only affect a limited area and would not substantially reduce plant populations in the region. Therefore, no mitigation would be required.

Water Quality

During geotechnical activities, excess silt, petroleum, or chemicals on the soil surface within the geotechnical investigations area could be washed into drainages and may affect areas downstream of the geotechnical activities (i.e., Irvine Lake). Adverse effects on water quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the geotechnical investigations would implement Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant, and no mitigation would be required.

Invasive Exotic Plant Species

Geotechnical activities create disturbance, which in turn provides a place for non-native weedy species to spread. As discussed previously, construction equipment would be washed prior to arrival on the site to ensure equipment would not introduce non-native weed seeds to the area. The use of Best Management Practices associated with prevention of the spread of weed seeds would result in an impact that is less than significant. Additionally, a native seed mix will be used for hydroseeding areas temporarily disturbed by construction activities (following the Project's construction).

Night Lighting

Geotechnical activities would occur during the day. Therefore, there would be no impact due to night lighting, and no mitigation would be required.

Human Activity

During geotechnical investigations, there would be a small increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to the geotechnical investigations area. Human disturbance could disrupt normal foraging behavior of wildlife adjacent to the geotechnical investigation area. However, as discussed above, wildlife may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. A WEAP training would be

conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Increased Wildfire Risk

During geotechnical investigations, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. Additionally, construction personnel may dispose of cigarettes inappropriately in the geotechnical investigations area and could ignite dry vegetation. If not contained quickly, the fire could spread through adjacent habitat areas. As discussed previously, a WEAP training will be conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Mitigation

The Project Draft EIR (Psomas [in preparation]) includes compensatory mitigation for the loss of jurisdictional resources. These habitats would be mitigated at a minimum 1:1 ratio through use of one of the following options: (1) preservation, restoration, and/or enhancement of on-site habitats; or (2) preservation, restoration, or enhancement of off-site habitats. IRWD have initiated consultation with the resource agencies to negotiate appropriate mitigation for the loss of these resources as a result of the Project, as consistent with the Clean Water Act, California Fish and Game Code, and the federal and State Endangered Species Acts.

Attachments – Exhibits 1–5

R:\Projects\IRW_IRWD\3IRW010205\Documentation\Geotech 2 Memo\SantiagoDam-Geotech2-Bio Memo-090524.docx

REFERENCES:

California Department of Fish and Wildlife (CDFW). 2024 (August 26, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

California Native Plant Society (CNPS). 2024 (August 26, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. http://www.rareplants.cnps.org/.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

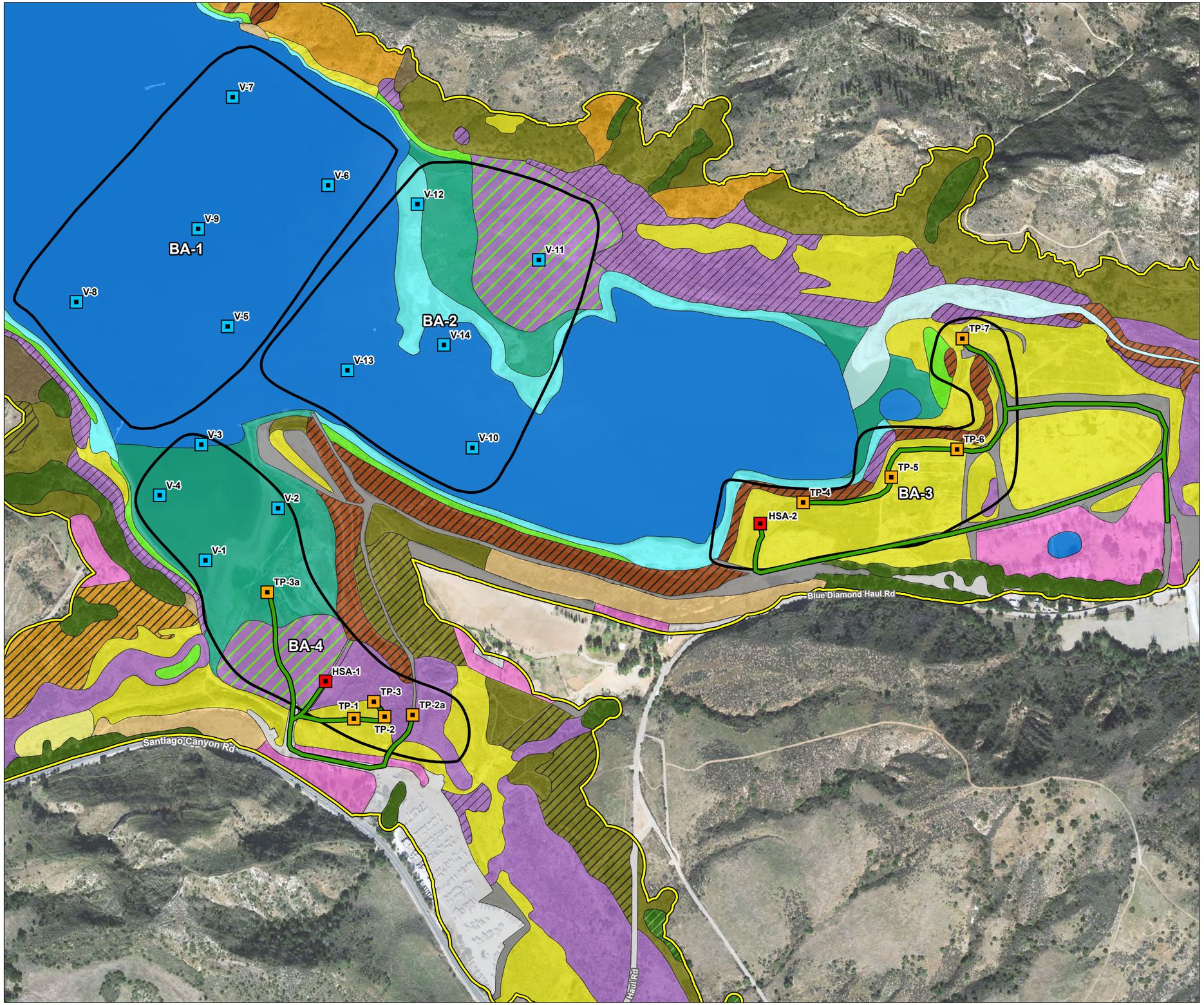
Orange, County of. 1996 (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.

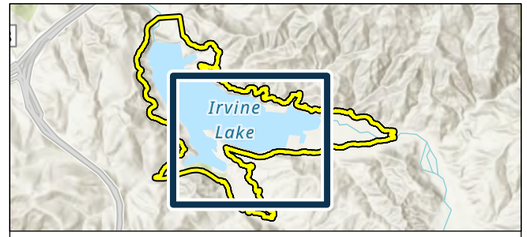
Psomas. 2024a (March 4). *Biological Technical Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

———. 2024b (March 4). *Jurisdictional Delineation Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

———. [in preparation]. *Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

U.S. Fish and Wildlife Service (USFWS). 2024. (August 26). List of Threatened and Endangered Species That May Occur in Your Proposed Project Location or May Be Affected By Your Proposed Project; Santiago Creek Dam Outlet Tower and Spillway Improvements Project; 2023-0055398. Carlsbad, CA: USFWS.





Survey Area
Borrow Areas
Access Routes

Borrow Sites

- Hollow Stem Auger Boring
- Test Pit
- Vibracore

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Southern Cactus Scrub (2.4)
- Disturbed Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

0 310 620
Feet

Aerial Source: Esri, Maxar 2022

Geotechnical Impacts – Vegetation Types

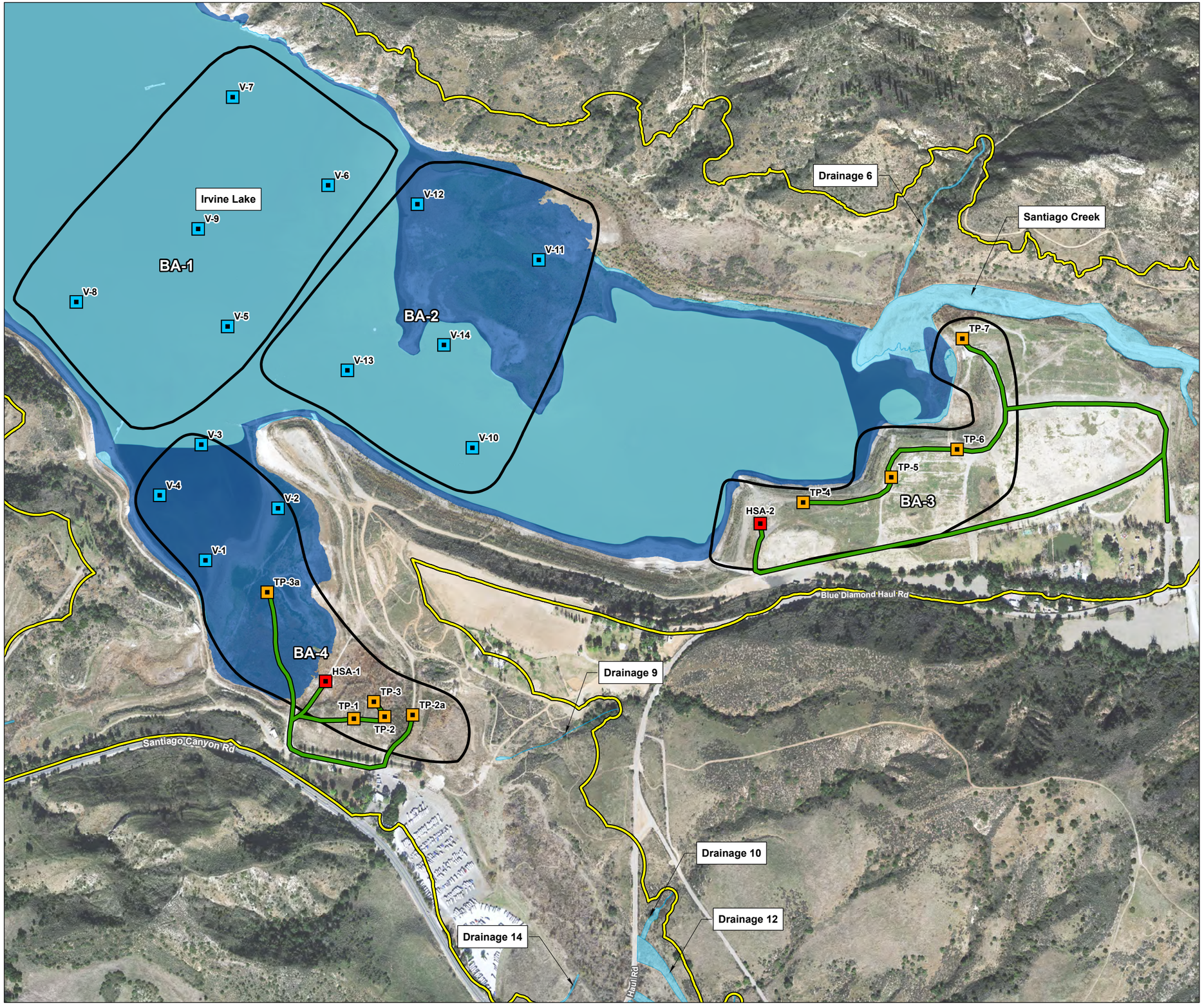
Exhibit 1

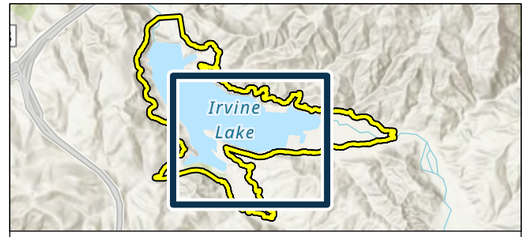
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Geotech_Memo2\ex_Geotech_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROSCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx\ex_Geotech_Vegetation_Impacts





Survey Area

Borrow Areas

Access Routes

Borrow Sites

Hollow Stem Auger Boring

Test Pit

Vibracore

Waters of the United States

Non-Wetland

Wetland

N

W E

S

0 310 620

Feet

Aerial Source: Hexagon Geosystems 2017

Geotechnical Impacts – USACE Jurisdiction

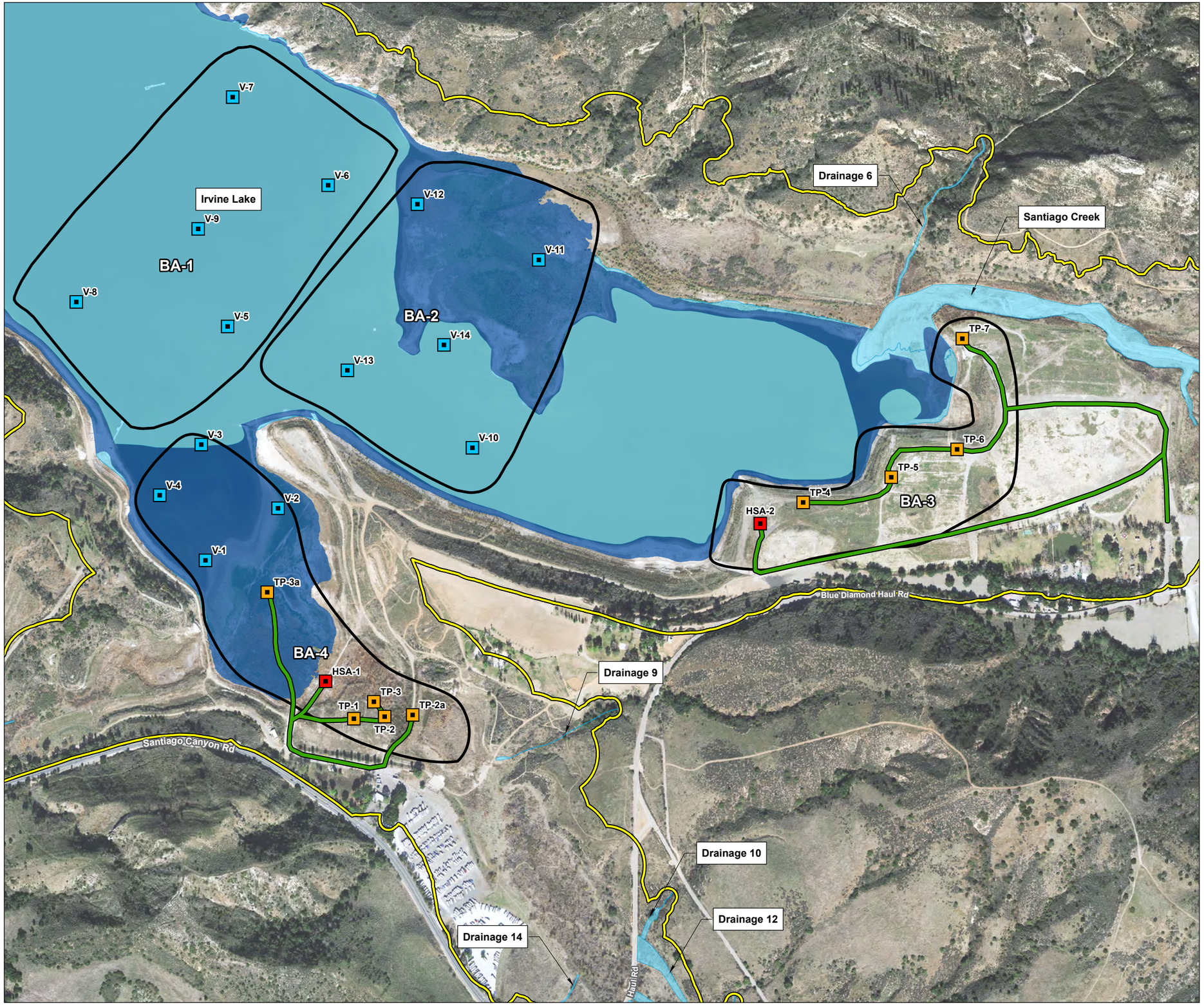
Exhibit 2

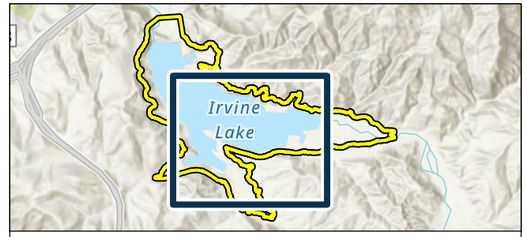
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Geotech_Memo2\ex_Geotech_USACE_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx\ex_Geotech_USACE_Impacts





Survey Area

Borrow Areas

Access Routes

Borrow Sites

Hollow Stem Auger Boring

Test Pit

Vibracore

Waters of the State

Non-Wetland

Wetland

N

W E

S

0 310 620

Feet

Aerial Source: Hexagon Geosystems 2017

Geotechnical Impacts – RWQCB Jurisdiction

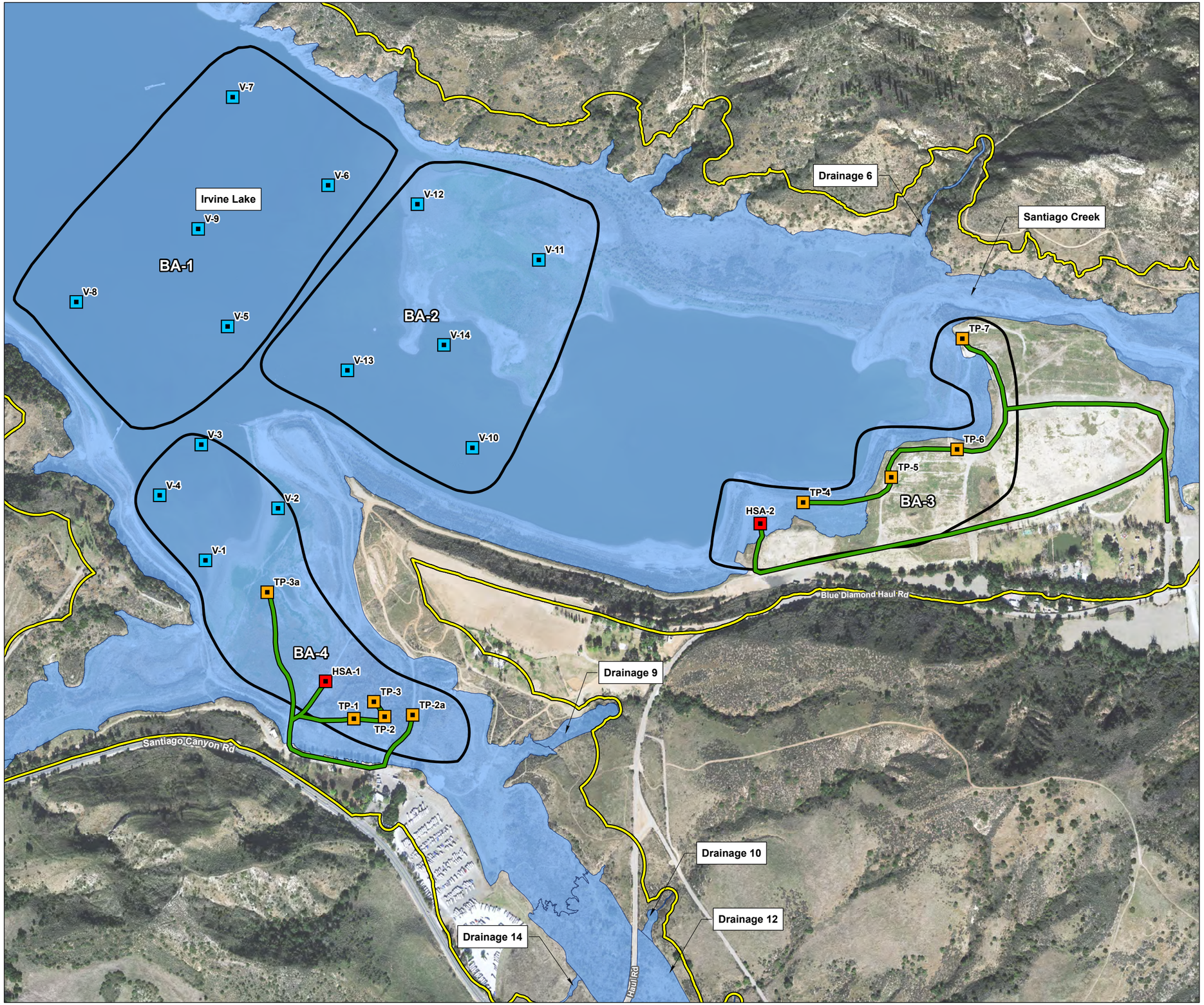
Exhibit 3

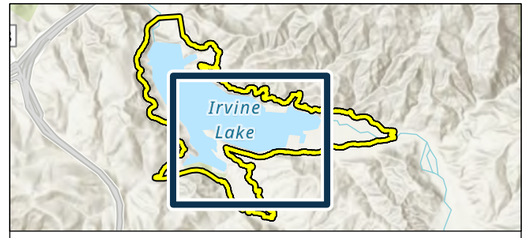
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Geotech_Memo2\ex_Geotech_RWQCB_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx\ex_Geotech_RWQCB_Impacts





Survey Area

Borrow Areas

Access Routes

Borrow Sites

Hollow Stem Auger Boring

Test Pit

Vibracore

CDFW Jurisdictional Waters

CDFW

N

W E

S

0 310 620

Feet

Aerial Source: Hexagon Geosystems 2017

Geotechnical Impacts – CDFW Jurisdiction

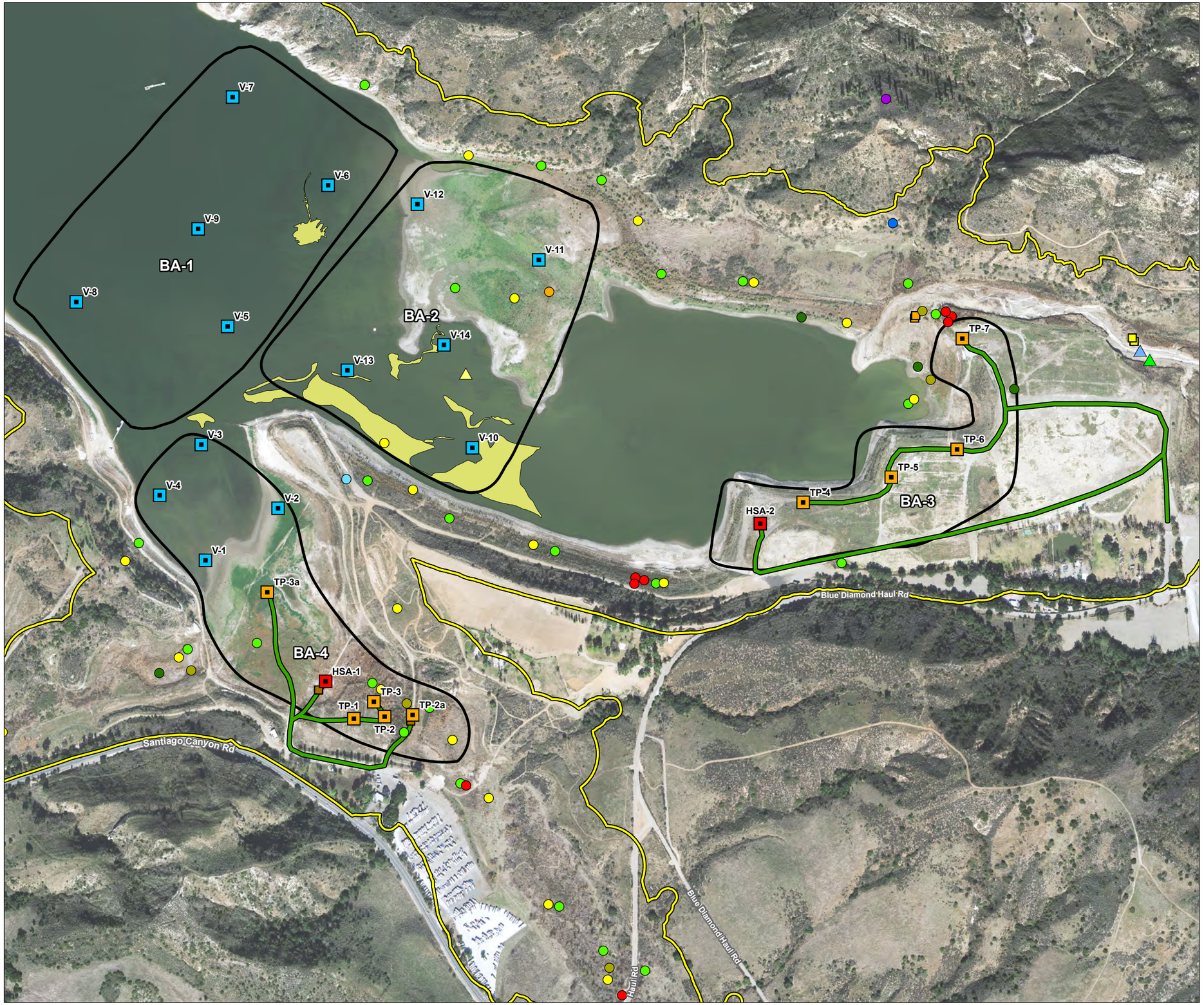
Exhibit 4

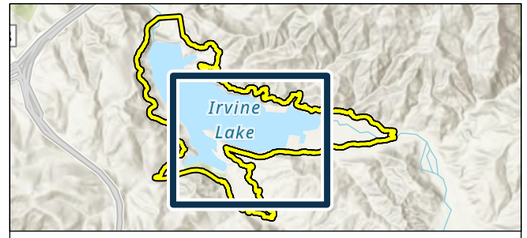
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Geotech_Memo2\ex_Geotech_CDFW_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx\ex_Geotech_CDFW_Impacts





- Survey Area
- Borrow Areas
- Access Routes

Borrow Sites

- Hollow Stem Auger Boring
- Test Pit
- Vibracore

Special Status Plants

- Braunton's Milkvetch Population
- Coulter's Matilija Poppy Population
- Mud Nama Population (point location)
- Mud Nama Population (mapped polygon)

Special Status Species

- Bald Eagle (Nest)
- Belding's Orange-Throated Whiptail
- Coastal Cactus Wren
- Coastal California Gnatcatcher
- Coastal Whiptail
- Grasshopper Sparrow
- Least Bell's Vireo
- Two-Striped Gartersnake
- White-Tailed Kite
- Willow Flycatcher (migrant)
- Yellow Warbler
- Yellow-Breasted Chat

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017

Geotechnical Impacts – Special Status Species

Exhibit 5

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Geotech_Memo2\ex_Geotech_SS_Species_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx\ex_Geotech_SS_Species_Impacts

APPENDIX B

USFWS OFFICIAL SPECIES LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Carlsbad Fish And Wildlife Office
2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385
Phone: (760) 431-9440 Fax: (760) 431-5901

In Reply Refer To: 03/19/2025 20:30:17 UTC
Project Code: 2023-0055398
Project Name: Santiago Creek Dam Improvements Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A biological assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a biological assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a biological assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found at the Fish and Wildlife Service's Endangered Species Consultation website at:

https://www.fws.gov/service/esa-section-7-consultation

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Carlsbad Fish And Wildlife Office
2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385
(760) 431-9440

PROJECT SUMMARY

Project Code: 2023-0055398

Project Name: Santiago Creek Dam Improvements Project

Project Type: Dam - Maintenance/Modification

Project Description: The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County. Irvine Ranch Water District (IRWD) operates Irvine Lake (and the Santiago Creek Dam) to serve as a critical water supply reservoir. Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD).

The primary objective of the Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities, as well as to modify the dam embankment to permit operation of the facilities for a long-term water resource benefit. The Project would also raise the spillway two feet, which would result in a small increase in maximum inundation area of the reservoir. In implementing the Project, the Districts would: (1) create new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements; (2) satisfy IRWD's operational requirements in the present and future; (3) extend the useful life of the facilities; (4) improve water supply reliability; and (5) minimize impacts to local environmental resources and surrounding property owners.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@33.775968,-117.7096687758396,14z

Counties: Orange County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Coastal California Gnatcatcher *Polioptila californica californica* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8178	Threatened
Least Bell's Vireo *Vireo bellii pusillus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5945	Endangered
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered

REPTILES

NAME	STATUS
Southwestern Pond Turtle *Actinemys pallida* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4768	Proposed Threatened

AMPHIBIANS

NAME	STATUS
Arroyo (=arroyo Southwestern) Toad *Anaxyrus californicus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3762	Endangered
Western Spadefoot *Spea hammondii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5425	Proposed Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Quino Checkerspot Butterfly *Euphydryas editha quino (=E. e. wrighti)* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5900	Endangered

CRUSTACEANS

NAME	STATUS
San Diego Fairy Shrimp *Branchinecta sandiegonensis*	Endangered

NAME STATUS

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6945

FLOWERING PLANTS

NAME STATUS

Braunton's Milk-vetch *Astragalus brauntonii* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/5674

Nevin's Barberry *Berberis nevinii* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8025

Santa Monica Mountains Dudleyea *Dudleya cymosa ssp. ovatifolia* Threatened
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2538

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency:	Irvine Ranch Water District
Name:	Amber Heredia
Address:	5 Hutton Centre Drive
Address Line 2:	Suite 300
City:	Santa Ana
State:	CA
Zip:	92707
Email	amber.heredia@psomas.com
Phone:	7144818049

LEAD AGENCY CONTACT INFORMATION

Lead Agency:	U.S. Fish and Wildlife Service
Name:	Eric Sweeney
Email:	Eric.R.Sweeney@usace.army.mil
Phone:	7606024837

APPENDIX C

REPRESENTATIVE PHOTOGRAPHS

View of the spillway from Irvine Lake, looking north.

Overview of the northern portion of the survey area, looking south.

D:\Projects\3IRW\SantiagoCreek\Graphics\BTR\AttC-1_RepresentativePhotographs.ai

Representative Photographs

Attachment C-1

Santiago Creek Dam Improvement Project

PSOMAS

(04/16/2025 SAK) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\Att_Representative_Photographs.pdf

From the waterline to the upland, the following vegetation types are visible: fluctuating shoreline, vegetated fluctuating shoreline, disturbed mulefat scrub, and sagebrush scrub. Northern portion of the survey area, looking south.

Ruderal vegetation is in the foreground with southern black willow forest along the lake edge in the eastern portion of the survey area, looking south.

D:\Projects\3IRW\SantiagoCreek\Graphics\BTR\AttC-2_RepresentativePhotographs.ai

Representative Photographs

Attachment C-2

Santiago Creek Dam Improvement Project

PSOMAS

Disturbed mulefat scrub and riparian herb along Santiago Creek in the eastern portion of the survey area, looking west.

Ruderal vegetation and disturbed areas in the foreground with southern black willow forest in the distant background in the eastern portion of the survey area, looking east.

D:\Projects\3IRW\SantiagoCreek\Graphics\BTR\AttC-3_RepresentativePhotographs.ai

Representative Photographs

Attachment C-3

Santiago Creek Dam Improvement Project

PSOMAS

Disturbed sagebrush scrub in the southern portion of the survey area, looking northwest.

Sagebrush scrub where a coastal California gnatcatcher was observed in the southern portion of the survey area.

Representative Photographs

Attachment C-4

Santiago Creek Dam Improvement Project

PSOMAS

D:\Projects\3IRW\SantiagoCreek\Graphics\BTR\AttC-4_RepresentativePhotographs.ai

Vegetated fluctuating shoreline in the foreground and southern black willow forest/riparian herb in the background in the southern portion of the survey area.

Overview of the southern portion of the survey area, looking north. From the foreground to the background, the following vegetation types are visible: sagebrush-coyote brush scrub (green in lower right), ruderal (brown), southern black willow forest (green), and disturbed southern cactus scrub (on hill in background).

D:\Projects\3IRW\SantiagoCreek\Graphics\BTR\AttC-5_RepresentativePhotographs.ai

Overview of the western portion of the survey area.

Toyon – sumac chaparral on slope with riparian herb and fluctuating shoreline in the foreground along the waterline in the northern portion of the survey area.

D:\Projects\3IRW\SantiagoCreek\Graphics\BTR\AttC-6_RepresentativePhotographs.ai

APPENDIX D

PLANT AND WILDLIFE COMPENDIA

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
FERNS	
POLYPODIACEAE – POLYPODY FAMILY	
Polypodium californicum	California polypody
PTERIDACEAE – BRAKE FAMILY	
Pellaea andromedifolia	coffee fern
Pentagramma triangularis	goldback fern
SELAGINELLACEAE – SPIKE–MOSS FAMILY	
Selaginella bigelovii	Bigelow's spike-moss
GYMNOSPERMS	
PINACEAE – PINE FAMILY	
*Pinus sp.**	pine
EUDICOTS	
ADOXACEAE – MUSKROOT FAMILY	
Sambucus mexicana	blue elderberry
AIZOACEAE – FIG–MARIGOLD FAMILY	
*Carpobrotus edulis**	freeway iceplant
AMARANTHACEAE – AMARANTH FAMILY	
*Amaranthus albus**	tumbleweed
ANACARDIACEAE – SUMAC FAMILY	
Malosma laurina	laurel sumac
Rhus integrifolia	lemonade berry
Rhus ovata	sugar bush
*Schinus molle**	pepper tree
Toxicodendron diversilobum	western poison oak
APIACEAE – CARROT FAMILY	
Daucus pusillus	small daucus
*Foeniculum vulgare**	fennel
*Torilis nodosa**	short sock-destroyer
APOCYNACEAE – DOGBANE FAMILY	
Asclepias fascicularis	narrow-leaf milkweed
ASTERACEAE – SUNFLOWER FAMILY	
Acourtia microcephala	small-headed acourtia
Ambrosia acanthicarpa	annual bur-sage
Ambrosia psilostachya	western ragweed
Artemisia californica	California sagebrush
Baccharis pilularis ssp. *consanguinea*	coyote brush
Baccharis salicifolia ssp. *salicifolia*	mule fat
Baccharis sarothroides	broom baccharis
Bebbia juncea var. aspera	rough rush-like sweetbush
Brickellia californica	California brickellbush

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
Carduus pycnocephalus ssp. *pycnocephalus**	Italian thistle
*Centaurea melitensis**	tocalote
Chaenactis artemisiifolia	white pincushion
Chaenactis glabriuscula	yellow pincushion
Cirsium occidentale	cobwebby thistle
*Cirsium vulgare**	bull thistle
Corethrogyne filaginifolia	filago-leaved sand-aster
*Cotula australis**	Australian cotula
Cynara cardunculus ssp. *cardunculus**	artichoke
Deinandra fasciculata	fascicled tarplant
Eclipta prostrata	false daisy
Encelia californica	California encelia
Encelia farinosa	brittlebush
Ericameria palmeri var. pachylepis	thickbracted goldenbush
*Erigeron bonariensis**	flax-leaved horseweed
Erigeron canadensis	horseweed
Erigeron foliosus	leafy fleabane
Eriophyllum confertiflorum var. confertiflorum	golden-yarrow
Filago gallica	Daggerleaf cottonrose
*Gazania linearis**	parallel-sided treasure flower
Grindelia camporum	field gumplant
Hazardia squarrosa	saw-toothed goldenbush
*Hedypnois rhagadioloides**	Crete weed
Helianthus annuus	annual sunflower
Helianthus gracilentus	slender sunflower
*Helminthotheca echioides**	bristly ox-tongue
Heterotheca grandiflora	telegraph weed
Heterotheca sessiliflora ssp. *echioides*	Viper's sessileflower goldenaster
*Hypochaeris glabra**	smooth cat's-ear
Isocoma menziesii	coastal goldenbush
*Lactuca serriola**	prickly lettuce
Lasthenia gracilis	common goldfields
Lepidospartum squamatum	scaly scale-broom
Logfia filaginoides	California cottonrose
*Logfia gallica**	daggerleaf cottonrose
Madia exigua	small tarweed
Madia gracilis	gumweed
Malacothrix saxatilis	rocky malacothrix
*Matricaria discoidea**	pineapple weed
*Oncosiphon piluliferum**	stinknet

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
Osmadenia tenella	osmadenia
Pluchea sericea	arrow-weed
Pseudognaphalium biolettii	Bioletti's cudweed
Pseudognaphalium californicum	California cudweed
Pseudognaphalium canescens	hairy everlasting
*Pseudognaphalium luteoalbum**	white lamb cudweed
Pseudognaphalium stramineum	straw-colored cudweed
Psilocarphus brevissimus var. brevissimus	dwarf woollyheads
*Pulicaria paludosa**	marsh pulicaria
Rafinesquia californica	California chicory
*Senecio vulgaris**	common groundsel
*Silybum marianum**	milk thistle
Sonchus asper ssp. *asper**	prickly sow thistle
*Sonchus oleraceus**	common sow thistle
Stephanomeria diegensis	San Diego stephanomeria
Stephanomeria virgata	wand-like stephanomeria
Stylocline gnaphaloides	everlasting neststraw
*Taraxacum officinale**	common dandelion
Uropappus lindleyi	Lindley's silverpuffs
Xanthium strumarium	cocklebur
BETULACEAE – BIRCH FAMILY	
Alnus rhombifolia	white alder
BORAGINACEAE – BORAGE FAMILY	
Amsinckia intermedia	common fiddleneck
Amsinckia menziesii	common fiddleneck
Cryptantha intermedia	intermediate cryptantha
Cryptantha sp.	cryptantha
Emmenanthe penduliflora	whispering bells
Eriodictyon crassifolium var. *crassifolium*	thick-leaved yerba santa
Eucrypta chrysanthemifolia	chrysanthemum-leaved eucrypta
Heliotropium curassavicum var. *oculatum*	seaside heliotrope
Nama stenocarpa	mud nama
Pectocarya linearis ssp. *ferocula*	narrow-toothed pectocarya
Phacelia cicutaria	cicuta-leaved phacelia
Phacelia parryi	Parry's phacelia
Pholistoma auritum var. *auritum*	fiesta flower
Plagiobothrys canescens	valley popcornflower
BRASSICACEAE – MUSTARD FAMILY	
*Brassica nigra**	black mustard
*Hirschfeldia incana**	grayish shortpod mustard

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
*Lepidium didymum**	lesser swine grass
*Lepidium latifolium**	perennial pepperweed
Nasturtium officinale	water cress
*Raphanus sativus**	radish
Rorippa sp.	yellow cress
*Sisymbrium irio**	London rocket
*Sisymbrium orientale**	eastern sisymbrium
CACTACEAE – CACTUS FAMILY	
Opuntia littoralis	seaside prickly-pear
Opuntia ×vaseyi	Vasey's prickly-pear
CARYOPHYLLACEAE – PINK FAMILY	
*Silene gallica**	small-flower catchfly
Silene laciniata	torn catchfly
*Stellaria media**	common chickweed
CHENOPODIACEAE – GOOSEFOOT FAMILY	
Chenopodium californicum	California goosefoot
*Salsola tragus**	Russian thistle
CONVOLVULACEAE – MORNING–GLORY FAMILY	
Calystegia macrostegia	large-bracted morning-glory
Cuscuta californica	chaparral dodder
CRASSULACEAE – STONECROP FAMILY	
Crassula connata	pygmy-weed
Dudleya lanceolata	lance-leaved dudleya
Dudleya multicaulis	many-stemmed dudleya
Dudleya pulverulenta	chalk dudleya
CUCURBITACEAE – GOURD FAMILY	
Cucurbita foetidissima	buffalo gourd
Marah macrocarpa	chilicothe
EUPHORBIACEAE – SPURGE FAMILY	
Croton californicus	California croton
Croton setiger	turkey-mullein
Euphorbia albomarginata	rattlesnake sandmat
*Euphorbia peplus**	petty spurge
*Ricinus communis**	common castor bean
FABACEAE – LEGUME FAMILY	
Acmispon americanus var. americanus	American deervetch
Acmispon glaber	deerweed
Acmispon maritimus	coastal deervetch
Acmispon micranthus	small-flowered deervetch
Astragalus brauntonii	Braunton's milkvetch

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
Astragalus pomonensis	Pomona milkvetch
*Cytisus multiflorus**	Spanish broom
Lupinus bicolor	miniature lupine
Lupinus hirsutissimus	stinging lupine
Lupinus sparsiflorus	Coulter's lupine
Lupinus succulentus	arroyo lupine
Lupinus truncatus	cut leaf lupine
*Medicago polymorpha**	variable burclover
*Melilotus albus**	white sweetclover
*Melilotus indicus**	sourclover
*Robinia pseudoacacia**	black locust
Trifolium willdenovii	tomcat clover
Vicia sp.	vetch
FAGACEAE – OAK FAMILY	
Quercus agrifolia	coast live oak
GERANIACEAE – GERANIUM FAMILY	
*Erodium botrys**	long-beaked filaree
*Erodium cicutarium**	redstem filaree
Geranium carolinianum	Carolina geranium
GROSSULARIACEAE – GOOSEBERRY FAMILY	
Ribes speciosum	fuchsia-flowered gooseberry
LAMIACEAE – MINT FAMILY	
*Marrubium vulgare**	common horehound
Salvia apiana	white sage
Salvia columbariae	chia
Salvia mellifera	black sage
Trichostema lanceolatum	vinegar weed
LOASACEAE – BLAZING STAR FAMILY	
Mentzelia micrantha	small-flowered blazing star
MALVACEAE – MALLOW FAMILY	
Malacothamnus fasciculatus var. *fasciculatus*	chaparral mallow
*Malva parviflora**	cheeseweed
Malvella leprosa	alkali-mallow
MELIACEAE – MAHOGANY FAMILY	
*Melia azedarach**	china berry
MONTIACEAE – MINER'S–LETTUCE FAMILY	
Calandrinia menziesii	red maids
Claytonia perfoliata	miner's lettuce
MYRSINACEAE – MYRSINE FAMILY	
*Lysimachia arvensis**	scarlet pimpernel

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
MYRTACEAE – MYRTLE FAMILY	
Eucalyptus spp.*	gum tree
NYCTAGINACEAE – FOUR O'CLOCK FAMILY	
Mirabilis laevis var. *crassifolia*	wishbone bush
OLEACEAE – OLIVE FAMILY	
*Olea europaea**	European olive
ONAGRACEAE – EVENING PRIMROSE FAMILY	
Camissoniopsis micrantha	small-flowered camissoniopsis
Clarkia epilobioides	epilobium-like clarkia
Clarkia purpurea	purple clarkia
Clarkia purpurea ssp. *quadrivulnera*	four-spot
Epilobium ciliatum	fringed willowherb
Gayophytum sp.	gayophytum
OROBANCHACEAE – BROOM–RAPE FAMILY	
Castilleja exserta	purple owl's-clover
Cordylanthus rigidus ssp. setiger	bristly rigid bird's-beak
OXALIDACEAE – OXALIS FAMILY	
*Oxalis pes-caprae**	Bermuda buttercup
PAEONIACEAE – PEONY FAMILY	
Paeonia californica	California peony
PAPAVERACEAE – POPPY FAMILY	
Eschscholzia californica	California poppy
Romneya coulteri	Coulter's matilija poppy
PHRYMACEAE – LOPSEED FAMILY	
Diplacus australis	southern monkeyflower
Diplacus longiflorus	long-flowered monkeyflower
Erythranthe cardinalis	scarlet monkeyflower
Erythranthe guttata	common monkeyflower
PINACEAE – PINE FAMILY	
Pinus sp.*	pine
PLANTAGINACEAE – PLANTAIN FAMILY	
Antirrhinum nuttallianum	Nuttall's snapdragon
Keckiella antirrhinoides	antirrhinum-like bush penstemon
Keckiella cordifolia	heart-leaved bush penstemon
Plantago erecta	erect plantain
*Veronica anagallis-aquatica**	water speedwell
PLATANACEAE – SYCAMORE FAMILY	
Platanus racemosa	western sycamore

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
POLEMONIACEAE – PHLOX FAMILY	
Gilia angelensis	chaparral gilia
Linanthus dianthiflorus	carnation-like linanthus
POLYGONACEAE – BUCKWHEAT FAMILY	
Eriogonum fasciculatum	California buckwheat
Persicaria lapathifolia	willow weed
*Polygonum aviculare**	knotweed
Pterostegia drymarioides	fairy mist
*Rumex crispus**	curly dock
RANUNCULACEAE – BUTTERCUP FAMILY	
Delphinium parryi ssp. *parryi*	Parry's larkspur
RHAMNACEAE – BUCKTHORN FAMILY	
Rhamnus ilicifolia	hollyleaf redberry
ROSACEAE – ROSE FAMILY	
Adenostoma fasciculatum	chamise
Heteromeles arbutifolia	toyon
RUBIACEAE – COFFEE FAMILY	
Galium angustifolium ssp. *angustifolium*	narrow-leaved bedstraw
Galium aparine	goose grass
SALICACEAE – WILLOW FAMILY	
Populus fremontii ssp. *fremontii*	Fremont cottonwood
Salix exigua	narrow-leaved willow
Salix gooddingii	Goodding's black willow
Salix laevigata	red willow
Salix lasiolepis	arroyo willow
SCROPHULARIACEAE – FIGWORT FAMILY	
Scrophularia californica	California figwort
Verbascum sp.*	mullein
SOLANACEAE – NIGHTSHADE FAMILY	
Datura wrightii	Wright's jimsonweed
*Nicotiana glauca**	tree tobacco
Solanum americanum	American nightshade
Solanum douglasii	Douglas' nightshade
Solanum umbelliferum	umbelled nightshade
Solanum xanti	Xantus' nightshade
TAMARICACEAE – TAMARISK FAMILY	
*Tamarix ramosissima**	saltcedar
URTICACEAE – NETTLE FAMILY	
*Urtica urens**	dwarf nettle

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
VERBENACEAE – VERVAIN FAMILY	
Phyla nodiflora	node-flowered phyla
Verbena bracteata	bracted vervain
Verbena lasiostachys	woolly-flowered vervain
VIOLACEAE – VIOLET FAMILY	
Viola pedunculata	Johnny-jump-up
VISCACEAE – MISTLETOE FAMILY	
Phoradendron leucarpum	American mistletoe
MONOCOTS	
AGAVACEAE – AGAVE FAMILY	
Chlorogalum sp.	soap plant
Hesperoyucca whipplei	Whipple's chaparral yucca
ALISMATACEAE – WATER–PLANTAIN FAMILY	
Echinodorus berteroi	Bertero's burhead
ARECACEAE – PALM FAMILY	
*Washingtonia robusta**	Mexican fan palm
CYPERACEAE – SEDGE FAMILY	
Cyperus sp.	flatsedge
Eleocharis sp.	spikerush
IRIDACEAE – IRIS FAMILY	
Sisyrinchium bellum	western blue-eyed-grass
JUNCACEAE – RUSH FAMILY	
Juncus bufonius	toad rush
Juncus mexicanus	Mexican rush
Juncus xiphioides	iris-leaved rush
LILIACEAE – LILY FAMILY	
Calochortus splendens	splendid mariposa lily
Calochortus weedii var. *intermedius*	intermediate mariposa-lily
POACEAE – GRASS FAMILY	
*Arundo donax**	giant reed
*Avena barbata**	slender wild oat
*Avena fatua**	wild oat
Bothriochloa barbinodis	cane bluestem
*Brachypodium distachyon**	two-corn false brome
*Bromus diandrus**	ripgut grass
*Bromus hordeaceus**	soft chess
*Bromus rubens**	red brome
*Cortaderia selloana**	pampas grass
*Crypsis schoenoides**	swamp prickle grass
*Cynodon dactylon**	Bermuda grass

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
Elymus condensatus	giant wild-rye
Elymus triticoides	beardless wild rye
*Festuca myuros**	rattail sixweeks grass
*Festuca perennis**	rye grass
*Gastridium phleoides**	nit grass
*Hordeum murinum**	wall barley
*Lamarckia aurea**	goldentop
Melica imperfecta	little California melica
Muhlenbergia microsperma	littleseed muhly
*Pennisetum setaceum**	crimson fountain grass
*Polypogon monspeliensis**	annual beard grass
*Polypogon viridis**	water beard grass
*Schismus barbatus**	barbed Mediterranean grass
Stipa lepida	foothill needle grass
Stipa miliacea var. *miliacea**	smilo grass
Stipa pulchra	purple needle grass
THEMIDACEAE – BRODIAEA FAMILY	
Bloomeria crocea	common goldenstar
Dipterostemon capitatus	blue dicks
TYPHACEAE – CATTAIL FAMILY	
Typha domingensis	southern cattail
Typha latifolia	broad-leaved cattail

CRPR: California Rare Plant Rank

* Non-native or invasive species

Species Status:

CRPR

1B Plants Rare, Threatened, or Endangered in California and elsewhere
4 Plants of limited distribution – watch list

Threat Code Extensions

.2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
INVERTEBRATES	
PAPILIONIDAE - SWALLOWTAIL BUTTERFLIES	
Papilio eurymedon	pale swallowtail
Papilio rutulus	western tiger swallowtail
Papilio zelicaon	anise swallowtail
PIERIDAE - WHITES, SULFURS AND ORANGETIPS	
Anthocharis sara	Sara's orangetip
Pieris rapae	cabbage white
Pontia protodice	common (checkered) white
Colias harfordii	Harford's sulfer
NYMPHALIDAE - BRUSH-FOOTED BUTTERFLIES	
Vanessa cardui	painted lady
DANAIDAE - MILKWEED BUTTERFLIES	
Danaus plexippus	monarch
HESPERIDAE - SKIPPERS	
Pyrgus albescens	white checkered-skipper
Erynnis funeralis	funereal duskywing
RIODINIDAE - METALMARKS	
Apodemia mormo	Behr's (Mormon) metalmark
LYCAENIDAE - BLUES, HAIRSTREAKS AND COPPERS	
Plebejus acmon	acmon blue
Brephidium exilis	western pygmy-blue
Leptotes marina	marine blue
FISH	
CYPRINIDAE – MINNOW FAMILY	
*Cyprinus carpio**	common carp
ICTALURIDAE – BULLHEAD CATFISH FAMILY	
Ictalurus sp.*	catfish
SALMONIDAE – SALMON AND TROUT FAMILY	
Oncorhynchus mykiss	rainbow trout
CENTRARCHIDAE – SUNFISH FAMILY	
*Lepomis macrochirus**	bluegill
Pomoxis sp.*	crappie
Micropterus sp.*	bass
AMPHIBIANS	
BUFONIDAE – TRUE TOAD FAMILY	
Anaxyrus boreas	western toad
RANIDAE – TRUE FROG FAMILY	
*Lithobates catesbeianus**	American bullfrog

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
HYLIDAE – TREEFROG FAMILY	
Pseudacris cadaverina	California treefrog
Pseudacris hypochondriaca	Baja California treefrog
LIZARDS	
PHRYNOSOMATIDAE –SPINY LIZARD FAMILY	
Sceloporus occidentalis	western fence lizard
Uta stansburiana	common side-blotched lizard
TEIIDAE – WHIPTAIL LIZARD FAMILY	
Aspidoscelis hyperythra beldingi	Belding's orange-throated whiptail
Aspidoscelis tigris stejnegeri	coastal whiptail
SNAKES	
COLUBRIDAE - COLUBRID SNAKE FAMILY	
Coluber flagellum piceus	red racer
Pituophis catenifer	gopher snake
NATRICIDAE – HARMLESS LIVE-BEARING SNAKE FAMILY	
Thamnophis hammondii	two-striped garter snake
BIRDS	
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY	
Branta canadensis	Canada goose
Mareca americana	American wigeon
Spatula cyanoptera	cinnamon teal
Spatula clypeata	northern shoveler
Anas platyrhynchos	mallard
Aythya affinis	lesser scaup
Bucephala albeola	bufflehead
Oxyura jamaicensis	ruddy duck
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY	
Callipepla californica	California quail
PODICIPEDIDAE – GREBE FAMILY	
Podilymbus podiceps	pied-billed grebe
Aechmophorus occidentalis	western grebe
Aechmophorus clarkii	Clark's grebe
COLUMBIDAE – PIGEON AND DOVE FAMILY	
*Columba livia**	rock pigeon
*Streptopelia decaocto**	Eurasian collared-dove
Zenaida macroura	mourning dove
CUCULIDAE – CUCKOO AND ROADRUNNER FAMILY	
Geococcyx californianus	greater roadrunner
CAPRIMULGIDAE – NIGHTJAR FAMILY	
Chordeiles acutipennis	lesser nighthawk

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
Phalaenoptilus nuttallii	common poorwill
APODIDAE – SWIFT FAMILY	
Aeronautes saxatalis	white-throated swift
TROCHILIDAE – HUMMINGBIRD FAMILY	
Archilochus alexandri	black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Selasphorus rufus	rufous hummingbird
Selasphorus sasin	Allen's hummingbird
RALLIDAE –RAIL AND COOT FAMILY	
Fulica americana	American coot
CHARADRIIDAE – PLOVER FAMILY	
Charadrius vociferus	killdeer
SCOLOPACIDAE – SANDPIPER FAMILY	
Calidris minutilla	least sandpiper
Calidris mauri	western sandpiper
Actitis macularius	spotted sandpiper
Gallinago delicata	Wilson's snipe
LARIDAE – GULL AND TERN FAMILY	
Larus delawarensis	ring-billed gull
Larus occidentalis	western gull
Hydroprogne caspia	Caspian tern
Sterna forsteri	Forster's tern
Thalasseus elegans	elegant tern
PHALACROCORACIDAE – CORMORANT FAMILY	
Phalacrocorax auritus	double-crested cormorant
PELECANIDAE – PELICAN FAMILY	
Pelecanus erythrorhynchos	American white pelican
ARDEIDAE – HERON FAMILY	
Ardea herodias	great blue heron
Ardea alba	great egret
Egretta thula	snowy egret
CATHARTIDAE – NEW WORLD VULTURE FAMILY	
Cathartes aura	turkey vulture
PANDIONIDAE - OSPREY FAMILY	
Pandion haliaetus	osprey
ACCIPITRIDAE – HAWK FAMILY	
Elanus leucurus	white-tailed kite
Haliaeetus leucocephalus	bald eagle
Accipiter striatus	sharp-shinned hawk

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
Accipiter cooperii	Cooper's hawk
Buteo lineatus	red-shouldered hawk
Buteo jamaicensis	red-tailed hawk
TYTONIDAE – BARN OWL FAMILY	
Tyto alba	barn owl
STRIGIDAE – TYPICAL OWL FAMILY	
Megascops kennicottii	western screech-owl
Bubo virginianus	great horned owl
PICIDAE – WOODPECKER FAMILY	
Melanerpes formicivorus	acorn woodpecker
Picoides nuttallii	Nuttall's woodpecker
Colaptes auratus	northern flicker
FALCONIDAE – FALCON FAMILY	
Falco sparverius	American kestrel
Falco peregrinus	peregrine falcon
PSITTACIDAE – PARROT FAMILY	
*Amazona viridigenalis**	red-crowned parrot*
TYRANNIDAE – TYRANT FLYCATCHER FAMILY	
Empidonax difficilis	Pacific-slope flycatcher
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Myiarchus cinerascens	ash-throated flycatcher
Tyrannus vociferans	Cassin's kingbird
VIREONIDAE – VIREO FAMILY	
Vireo bellii pusillus	least Bell's vireo
Vireo gilvus	warbling vireo
CORVIDAE – JAY AND CROW FAMILY	
Aphelocoma californica	California scrub-jay
Corvus brachyrhynchos	American crow
Corvus corax	common raven
ALAUDIDAE - LARK FAMILY	
Eremophila alpestris actia	California horned lark
HIRUNDINIDAE – SWALLOW FAMILY	
Tachycineta bicolor	tree swallow
Stelgidopteryx serripennis	northern rough-winged swallow
Petrochelidon pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
PARIDAE – TITMOUSE FAMILY	
Baeolophus inornatus	oak titmouse

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
AEGITHALIDAE – BUSHTIT FAMILY	
Psaltriparus minimus	bushtit
TROGLODYTIDAE – WREN FAMILY	
Troglodytes aedon	house wren
Thryomanes bewickii	Bewick's wren
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren
POLIOPTILIDAE – GNATCATCHER FAMILY	
Polioptila caerulea	blue-gray gnatcatcher
Polioptila californica	California gnatcatcher
SYLVIIDAE – SILVIID WARBLERS FAMILY	
Chamaea fasciata	wrentit
TURDIDAE – THRUSH FAMILY	
Turdus migratorius	American robin
Sialia mexicana	western bluebird
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY	
Toxostoma redivivum	California thrasher
Mimus polyglottos	northern mockingbird
STURNIDAE – STARLING FAMILY	
*Sturnus vulgaris**	European starling*
BOMBYCILLIDAE – WAXWING FAMILY	
Bombycilla cedrorum	cedar waxwing
PTILOGONATIDAE – SILKY-FLYCATCHER FAMILY	
Phainopepla nitens	phainopepla
FRINGILLIDAE – FINCH FAMILY	
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
Spinus tristis	American goldfinch
Spinus lawrencei	Lawrence's goldfinch
PASSERELLIDAE – NEW WORLD SPARROW FAMILY	
Ammodramus savannarum	grasshopper sparrow
Zonotrichia leucophrys	white-crowned sparrow
Chondestes grammacus	lark sparrow
Pipilo maculatus	spotted towhee
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow
Melozone crissalis	California towhee
Melospiza melodia	song sparrow
Melospiza lincolnii	Lincoln's sparrow
ICTERIIDAE – YELLOW-BREASTED CHAT FAMILY	
Icteria virens	yellow-breasted chat

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
ICTERIDAE – BLACKBIRDS AND ORIOLES	
Sturnella neglecta	western meadowlark
Icterus cucullatus	hooded oriole
Icterus bullockii	Bullock's oriole
Agelaius phoeniceus	red-winged blackbird
Molothrus ater	brown-headed cowbird
Quiscalus mexicanus	great-tailed grackle
PARULIDAE – WOOD-WARBLER FAMILY	
Geothlypis trichas	common yellowthroat
Setophaga petechia	yellow warbler
Setophaga coronata	yellow-rumped warbler
Cardellina pusilla	Wilson's warbler
CARDINALIDAE – CARDINALS AND ALLIES	
Piranga ludoviciana	western tanager
Pheucticus melanocephalus	black-headed grosbeak
Passerina caerulea	blue grosbeak
Passerina amoena	lazuli bunting
MAMMALS	
SCIURIDAE – SQUIRREL FAMILY	
*Sciurus niger**	eastern fox squirrel
Otospermophilus beecheyi	California ground squirrel
GEOMYIDAE – POCKET GOPHER FAMILY	
Thomomys bottae	Botta's pocket gopher
CRICETIDAE – NEW WORLD RATS AND MICE FAMILY	
Neotoma bryanti	Bryant's woodrat
Peromyscus sp.	mouse
LEPORIDAE – HARE AND RABBIT FAMILY	
Sylvilagus audubonii	desert cottontail
VESPERTILIONIDAE – VESPERTILIONID BAT FAMILY	
Order Chiroptera	bat
FELIDAE – CAT FAMILY	
Lynx rufus	bobcat (tracks)
Puma concolor	mountain lion (tracks)
CANIDAE – CANID FAMILY	
Canis latrans	coyote (tracks)
Urocyon cinereoargenteus	common gray fox
MEPHITIDAE - SKUNK FAMILY	
Mephitis mephitis	striped skunk
PROCYONIDAE – PROCYONID FAMILY	
Procyon lotor	northern raccoon (tracks)

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	**Common Name**
CERVIDAE – CERVID FAMILY	
Odocoileus hemionus	southern mule deer

* Non-native species

USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife

Species Status:

Federal (USFWS)	**State (CDFW)**
FT Threatened	SE Endangered PST Proposed State Threatened FP Fully Protected SSC Species of Special Concern

APPENDIX E

SPECIAL STATUS PLANT SURVEYS

September 3, 2020

Ms. Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

VIA EMAIL
corey@irwd.com

Subject: Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Corey:

This Letter Report presents the findings of special status plant surveys conducted in 2020 for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as "the project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of special status plant species on the project site.

PROJECT LOCATION AND DESCRIPTION

The Irvine Ranch Water District (IRWD) and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the early design phase but would be located within the project site provided by IRWD.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project site is depicted on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography in the center of the project site is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 657 to 898 feet above mean sea level (msl). Santiago Creek, a blueline stream, occurs on the project site. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

The following vegetation types and other areas occur on the project site: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed (Exhibit 3). Soils on the project site include Anaheim clay loam, Cieneba-rock outcrop complex, pits, riverwash, rock-outcrop-Cieneba complex, Soboba gravelly loamy sand, Soper gravelly loam, Soper-rock outcrop complex, and Sorrento loam (Exhibit 4).

METHODS

Botanical surveys were floristic in nature and consistent with the protocols created by the California Department of Fish and Wildlife (CDFW 2018). Prior to the 2020 field surveys, a literature search was conducted to identify special status plant species reported from the vicinity of the project site. Sources reviewed include the United States Geological Survey's Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2020) and the CDFW's California Natural Diversity Database (CNDDB) (CDFW 2020a).

Rainfall received in the winter and spring determines the germination of many annual and perennial herb species. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The average annual precipitation for this area is between 10 and 13 inches.

Reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive (Table 1). This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable on the project site. Reference populations were not monitored for species with a California Rare Plant Rank (CRPR) of 3 or 4, large perennials (e.g., Tecate cypress [*Hesperocyparis forbesii*] and chaparral nolina [*Nolina cismontana*]) which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

TABLE 1
REFERENCE POPULATIONS MONITORED IN THE PROJECT REGION

Species	Date Observed	Location	Phenology
Brodiaea filifolia thread-leaved brodiaea	May 15, 2020	San Clemente	in bloom
Calochortus weedii var. *intermedius* intermediate mariposa lily	June 1, 2020	Peters Canyon	in bloom
Dudleya multicaulis many-stemmed dudleya	April 12, 2017	City of Orange	vegetative

Surveys were conducted on April 30, May 21 and June 4, 2020, by Psomas Senior Biologist Allison Rudalevige. The total number of person-hours spent surveying was approximately 15.75 hours. The plant survey area included the entire project site boundary. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified to the taxonomic level necessary to determine whether they were a special status species. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2020), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2020b) for special status species and the Jepson eFlora (Jepson Flora Project 2020) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software and data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species). Representative photographs are included as Attachment A.

SURVEY RESULTS

Table 2 identifies the special status plants reported from the literature review with their status, their potential to occur in the survey area, and the survey results. Intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*) and Coulter's matilija poppy (*Romneya coulteri*) were observed during the surveys and are discussed further below. A list of all plants observed in the survey area during special status plant surveys is included in Attachment B.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
chaparral sand-verbena *Abronia villosa* var. *aurita*	—	—	1B.1	Sandy areas in chaparral, coastal scrub, desert dunes.	Not expected to occur; no suitable sandy soils.
Braunton's milk-vetch *Astragalus brauntonii*	FE	—	1B.1	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland.	Unknown; can only be observed for a few years following a fire; marginally suitable habitat; reported immediately north of the survey area in 2012 (CDFW 2020a).
Coulter's saltbush *Atriplex coulteri*	—	—	1B.2	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.	Not expected to occur; no suitable soils.
south coast saltscale *Atriplex pacifica*	—	—	1B.2	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes.	Not expected to occur; no suitable soils.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	—	—	1B.2	Alkaline soils in coastal bluff scrub, coastal scrub.	Not expected to occur; no suitable soils.
Malibu baccharis *Baccharis malibuensis*	—	—	1B.1	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland.	Not expected to occur because not observed during focused surveys; suitable habitat and reported immediately north of the survey area in 2000 (CCH 2020).
thread-leaved brodiaea *Brodiaea filifolia*	FT	SE	1B.1	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools.	Not expected to occur because not observed during focused surveys; suitable habitat.
Brewer's calandrinia *Calandrinia breweri*	—	—	4.2	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
Catalina mariposa lily *Calochortus catalinae*	—	—	4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Plummer's mariposa-lily *Calochortus plummerae*	—	—	4.2	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest.	Not expected to occur because not observed during focused surveys; suitable habitat.
intermediate mariposa-lily *Calochortus weedii* var. *intermedius*	—	—	1B.2	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland.	**Observed in the survey area.**
Lewis' evening-primrose *Camissoniopsis lewisii*	—	—	3	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.
southern tarplant *Centromadia parryi* ssp. *australis*	—	—	1B.1	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools.	Not expected to occur; no suitable soils.
San Fernando Valley spineflower *Chorizanthe parryi* var. *fernandina*	PT	SE	1B.1	Sandy soils in coastal scrub, valley and foothill grasslands.	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside the current known range of the species (CDFW 2020a).
long-spined spineflower *Chorizanthe polygonoides* var. *longispina*	—	—	1B.2	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools.	Not expected to occur because not observed during focused surveys; suitable habitat but at edge of current known range.
small-flowered morning-glory *Convolvulus simulans*	—	—	4.2	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands.	Not expected to occur because not observed during focused surveys; suitable habitat and reported just west of Irvine Lake in 2016 (CCH 2020).

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
paniculate tarplant *Deinandra paniculata*	—	—	4.2	Usually vernally mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools.	Not expected to occur because not observed during focused surveys; suitable habitat.
slender-horned spineflower *Dodecahema leptoceras*	FE	SE	1B.1	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub.	Not expected to occur; outside current known range.
Santa Monica Mountains dudleya *Dudleya cymosa* ssp. *ovatifolia*	FT	—	1B.1	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
many-stemmed dudleya *Dudleya multicaulis*	—	—	1B.2	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland.	**Observed in the survey area.**
Santa Ana River woollystar *Eriastrum densifolium* ssp. *sanctorum*	FE	SE	1B.1	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
Palmer's grapplinghook *Harpagonella palmeri*	—	—	4.2	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.
Los Angeles sunflower *Helianthus nuttallii* ssp. *parishii*	—	—	1A	Coastal and freshwater marshes and swamps.	Not expected to occur; no suitable habitat and presumed extinct.
Tecate cypress *Hesperocyparis forbesii*	—	—	1B.1	Clay or gabbro soils in closed-cone coniferous forest and chaparral.	Not expected to occur; perennial species not observed during survey
vernal barley *Hordeum intercedens*	—	—	3.2	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools.	Not expected to occur because not observed during focused surveys; marginally suitable habitat but reported just south of Irvine Lake in 1998 (CCH 2020

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
mesa horkelia *Horkelia cuneata* var. *puberula*	—	—	1B.1	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	—	—	1B.1	Usually on alkaline soils in coastal salt marsh, playas, vernal pools.	Not expected to occur because not observed during focused surveys; no suitable habitat but reported from oak woodland in 2008 (CCH 2020).
heart-leaved pitcher sage *Lepechinia cardiophylla*	—	—	1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland.	Not expected to occur; no suitable habitat and outside the current known elevational range.
Robinson's pepper-grass *Lepidium virginicum* var. *robinsonii*	—	—	4.3	Dry soils in chaparral and coastal scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
ocellated Humboldt lily *Lilium humboldtii* ssp. *ocellatum*	—	—	4.2	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland.	Not expected to occur because not observed during focused surveys; suitable habitat.
intermediate monardella *Monardella hypoleuca* ssp. *intermedia*	—	—	1B.3	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest.	Not expected to occur because not observed during focused surveys; suitable habitat.
mud nama *Nama stenocarpa*	—	—	2B.2	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps.	Not expected to occur because not observed during focused surveys; suitable habitat but at edge of current known range.
Gambel's water cress *Nasturtium gambelii*	FE	ST	1B.1	Freshwater and brackish marshes at the martins of lakes and along streams; in or just above the water level.	Not expected to occur because not observed during focused surveys; suitable habitat.
chaparral nolina *Nolina cismontana*	—	—	1B.2	Primarily sandstone and shale substrates in chaparral and coastal scrub	Not expected to occur because not observed during focused surveys; suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
California beardtongue *Penstemon californicus*	—	—	1B.2	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland.	Not expected to occur; no suitable habitat and outside current known range.
Allen's pentachaeta *Pentachaeta aurea* ssp. *allenii*	—	—	1B.1	Openings in coastal scrub and valley and foothill grasslands.	Not expected to occur because not observed during focused surveys; suitable habitat.
woolly chaparral-pea *Pickeringia montana* var. *tomentosa*	—	—	4.3	Gabbroic, granitic, or clay soil in chaparral.	Not expected to occur; no suitable habitat.
Fish's milkwort *Polygala cornuta* var. *fishiae*	—	—	4.3	Chaparral, cismontane woodland, riparian woodland.	Not expected to occur because not observed during focused surveys; suitable habitat.
white rabbit-tobacco *Pseudognaphalium leucocephalum*	—	—	2B.2	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral.	Not expected to occur because not observed during focused surveys; suitable habitat.
Coulter's matilija poppy *Romneya coulteri*	—	—	4.2	Chaparral and coastal scrub, often in burns.	**Observed in the survey area**.
chaparral ragwort *Senecio aphanactis*	—	—	2B.2	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub.	Not expected to occur; no suitable soils.
salt spring checkerbloom *Sidalcea neomexicana*	—	—	2B.2	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub.	Not expected to occur; no suitable soils.
estuary seablite *Suaeda esteroa*	—	—	1B.2	Coastal salt marshes in clay, silt, and sand substrates.	Not expected to occur; no suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
San Bernardino aster *Symphyotrichum defoliatum*	—	—	1B.2	Disturbed areas, vernally mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.

CRPR: California Rare Plant Rank; NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan

LEGEND:

Federal Status

FE	Endangered
FT	Threatened
PT	Proposed Threatened

State Status

SE	Endangered
ST	Threatened

CRPR

1A	Plants presumed extirpated in California and either rare or extinct elsewhere
1B	Plants Rare, Threatened, or Endangered in California and elsewhere
2B	Plants Rare, Threatened, or Endangered in California but more common elsewhere
3	Plants about which we need more information – A Review List
4	Plants of limited distribution – A Watch List

CRPR Threat Code Extensions

None	Plants lacking any threat information
.1	Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)
.2	Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)
.3	Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)

Species that were observed on site are shown in **boldface type.**

* Sources include CDFW 2020a, CNPS 2020, and Jepson Flora Project 2020.

Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species[1] in the Central Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2020; CNPS 2020). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2020). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2020).

One individual intermediate mariposa lily was observed in the survey area (Exhibit 5). This individual was observed in the eastern portion of the survey area on a moderately steep, south facing slope in disturbed sagebrush scrub with Ceineba-rock outcrop complex soil. The species associated with the intermediate mariposa lily observed in the survey area include California sagebrush (*Artemisia californica*), black mustard (*Brassica nigra*), coast morning glory (*Calystegia macrostegia*) and oats (*Avena* spp.). A voucher specimen was not collected because there was only one individual. A CNDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Many-Stemmed Dudleya

Many-stemmed dudleya has a CRPR of 1B.2. It is not covered by the Central Coastal NCCP/HCP. It typically blooms between April and June (Jepson Flora Project 2020; CNPS 2020). This perennial herb occurs on heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland at elevations between approximately 5 and 2,975 feet above msl (Roberts 2008; Jepson Flora Project 2020). This species is known from the South Coast (Jepson Flora Project 2020).

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations in the survey area (Exhibit 5). Approximately 800 individuals were observed in the eastern portion of the survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the survey area. The majority of individuals (eastern location) were observed in disturbed sagebrush scrub with Ceineba-rock outcrop complex and pits soil. The smaller population (western location) was observed in toyon-sumac chaparral with Sorrento loam soil. The species associated with the many-stemmed dudleya in the survey area included California sagebrush, California buckwheat (*Eriogonum fasciculatum*), daggerleaf cottonrose (*Filago gallica*), white sage (*Salvia apiana*), splendid mariposa lily (*Calochortus splendens*), common goldfields (*Lasthenia gracillis*), osmadenia (*Osmadenia tenella*), and little California melica (*Melica imperfecta*). A total of two voucher specimens were collected for this species. A CNDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Coulter's Matilija Poppy

Coulter's matilija poppy has a CRPR of 4.2. It is a Covered species in the Central Coastal NCCP/HCP. It typically blooms between March and July (Jepson Flora Project 2020; CNPS 2020). This perennial rhizomatous herb occurs in chaparral and coastal scrub, often in elevations between sea level and approximately 3,937 feet above msl (Roberts 2008; Jepson Flora Project 2020). This species grows as clones via rhizomes (Clarke et al. 2007; Jepson Flora Project 2020). This species is known from the South Coast, Western Transverse and Peninsular Ranges, and San Jacinto Mountains (Jepson Flora Project 2020).

[1] The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.

Approximately 46 Coulter's matilija poppy clones were observed in 3 populations in the survey area (Exhibit 5). Coulter's matilija poppy clones were observed in the northern and central portions of the survey area. The clones were observed in sagebrush scrub, coast live oak woodland, and toyon-sumac chaparral with Sorrento loam soil. The species associated with the Coulter's matilija poppy in the survey area include laurel sumac (*Melosma laurina*), blue elderberry (*Sambucus nigra*), California sagebrush, grayish shortpod mustard (*Hirschfeldia incana*), chilicothe (*Marah macrocarpa*), black sage (*Salvia melifera*), California buckwheat, coast live oak (*Quercus agrifolia*), long-flowered monkey flower (*Diplicus longiflorus*), and slender wild oat (*Avena barbata*). A voucher specimen was not collected and a CNDDB form will not be submitted because this species is a lower status species that is not tracked by the CNDDB (i.e., has a CRPR of 4.2).

CONCLUSIONS

The project is early in the preliminary design phase. Final project design will determine whether any special status plant populations will be impacted. Any impacts to intermediate mariposa lily (because there was only one individual) and Coulter's matilija poppy would be covered by the NCCP/HCP. Impacts to many-stemmed dudleya would require mitigation as this species is considered Threatened and Endangered in the project region (i.e., CRPR 1B.2). Impacts will be analyzed and mitigation will be determined in the Biological Technical Report for the project.

Although reference populations and regional rainfall amounts were monitored to ensure the scientific adequacy of these focused surveys, there is always a minimal potential for false negative survey results as species could possibly be present on a site but may not be detectable at the time of the surveys.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Allison Rudalevige (Allison.Rudalevige@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager

Allison D. Rudalevige
Senior Biologist

Enclosures:
Exhibit 1 – Project Location
Exhibit 2 – U.S. Geological Survey 7.5-Minute Digital Quadrangle
Exhibit 3 – Vegetation Types and Other Areas
Exhibit 4 – Soil Types
Exhibit 5 – Special Status Plant Species
Attachment A – Site Photographs
Attachment B – Plant Compendium
Attachment C – CNDBB Forms

REFERENCES

Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.

California Department of Fish and Wildlife (CDFW). 2020a. California Natural Diversity Database. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

———. 2020b (April). *Special Vascular Plants, Bryophytes, and Lichens List.* Sacramento, CA: CDFW, Natural Heritage Division.

———. 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.

California Irrigation Management Information System (CIMIS). 2020. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. http://www.cimis.water.ca.gov.

California Native Plant Society (CNPS). 2020. Inventory of Rare and Endangered Plants. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CNPS. http://www.cnps.org/inventory.

Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.

Consortium of California Herbaria (CCH). 2020 (February 24, date accessed). Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. http://ucjeps.berkeley.edu/consortium/.

Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.

Jepson Flora Project. 2020 (December 23, Revision 4). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. http://ucjeps.berkeley.edu/eflora/.

Munz, P.A. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.

D:\Projects\3IRW\000905\MXD\Plants\ex_LV_RL_20200831.mxd

Project Location

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

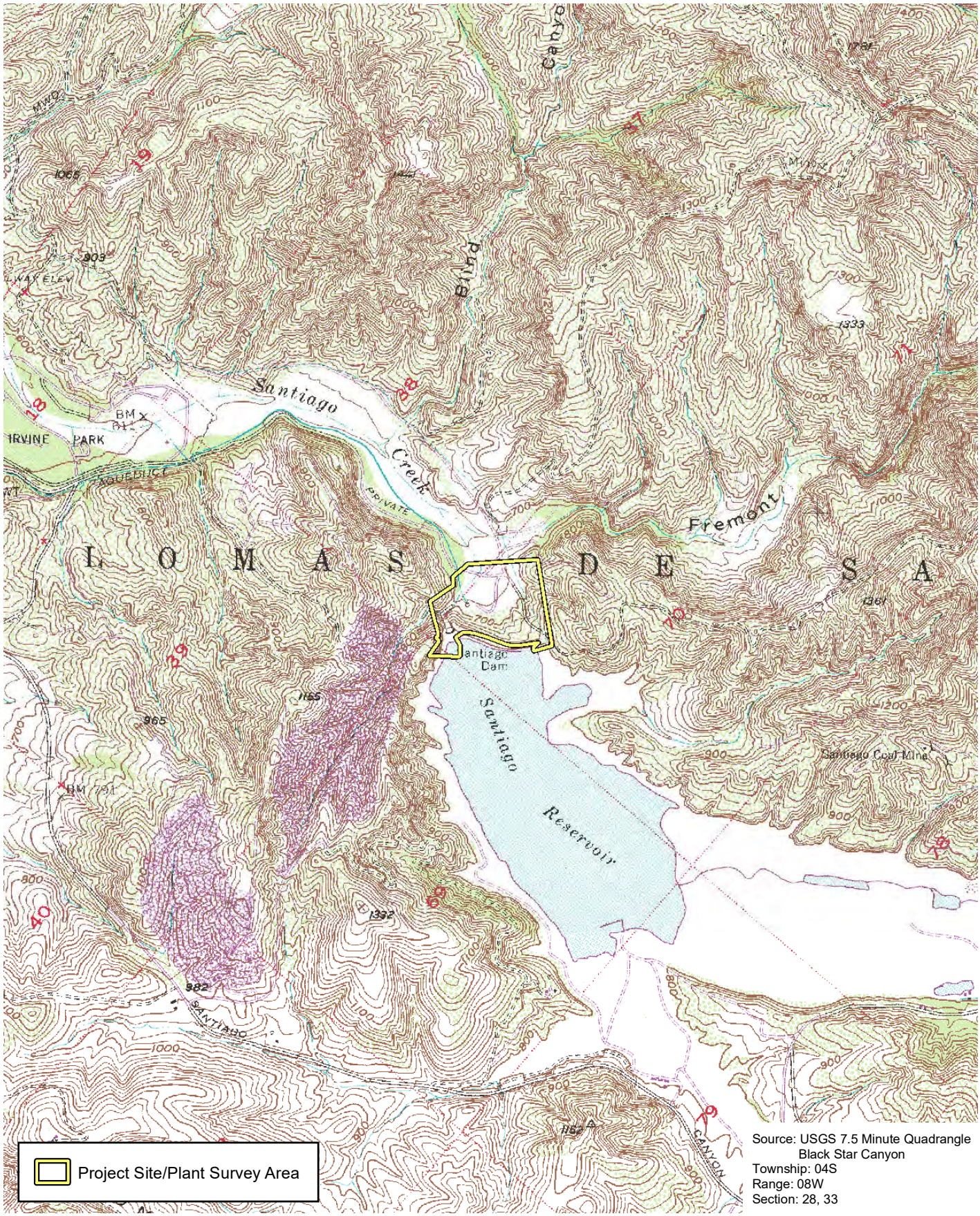
N
W E
S

1,100 550 0 1,100

Feet

PSOMAS

(Rev: 9-01-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_LV_RL.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S
Range: 08W
Section: 28, 33

D:\Projects\3IRW\00905\MXD\Plants\ex_USGS_20200831.mxd

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 2

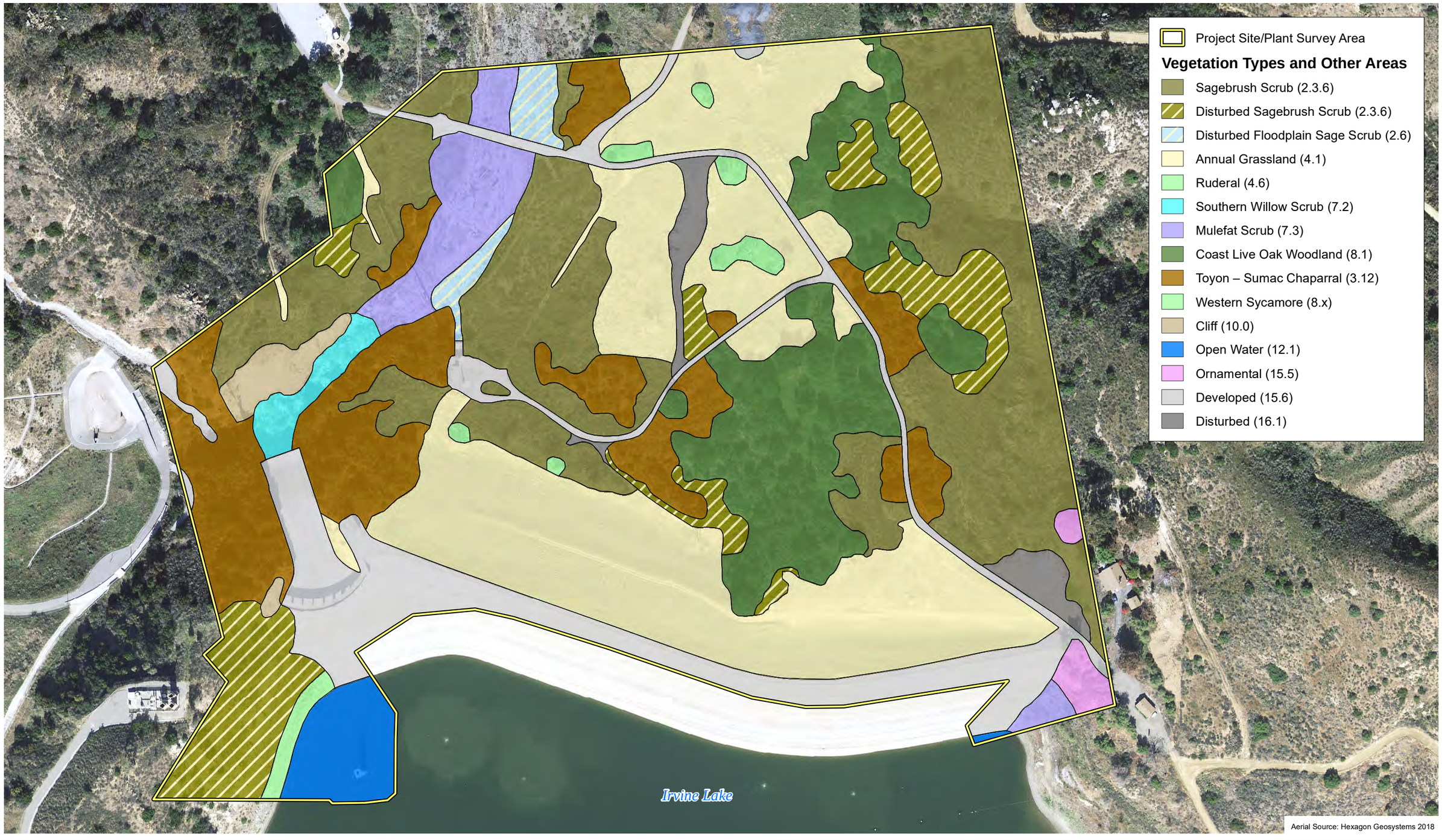
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 9-01-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_USGS.pdf



D:\Projects\3IRW000905\MXD\Plants\ex_Vegetation_20200901.mxd

Vegetation Types and Other Areas

Exhibit 3

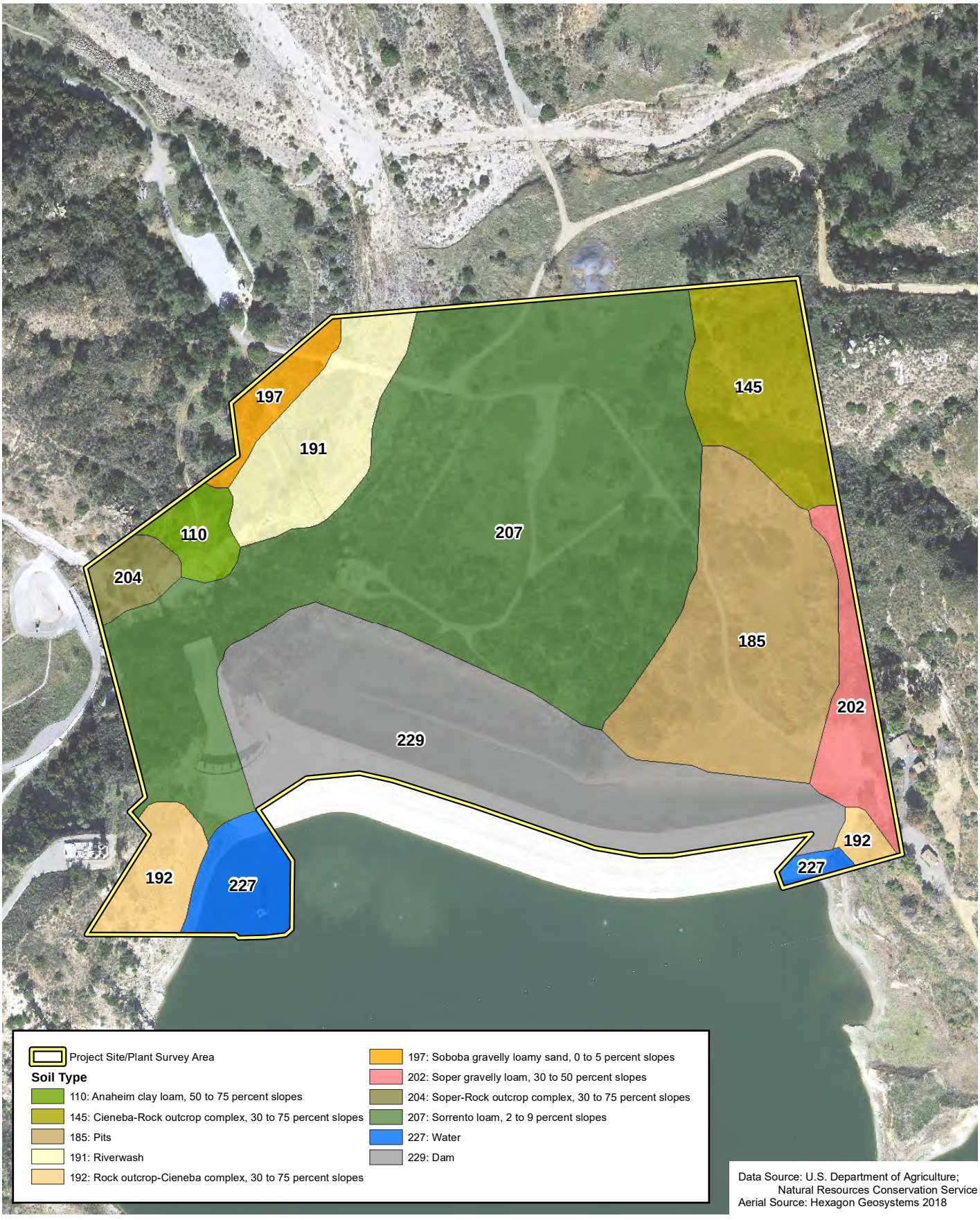
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

175 87.5 0 175 Feet

PSOMAS

(Rev: 09/02/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_Vegetation.pdf



Project Site/Plant Survey Area

Soil Type

- 110: Anaheim clay loam, 50 to 75 percent slopes
- 145: Cieneba-Rock outcrop complex, 30 to 75 percent slopes
- 185: Pits
- 191: Riverwash
- 192: Rock outcrop-Cieneba complex, 30 to 75 percent slopes
- 197: Soboba gravelly loamy sand, 0 to 5 percent slopes
- 202: Soper gravelly loam, 30 to 50 percent slopes
- 204: Soper-Rock outcrop complex, 30 to 75 percent slopes
- 207: Sorrento loam, 2 to 9 percent slopes
- 227: Water
- 229: Dam

Data Source: U.S. Department of Agriculture; Natural Resources Conservation Service
Aerial Source: Hexagon Geosystems 2018

D:\Projects\3IRW\00905\MXD\Plants\ex_Soils_20200831.mxd

Soil Types

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

300 150 0 300

Feet

PSOMAS

(Rev: 9-01-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_SoilTypes.pdf

Aerial Source: Hexagon Geosystems 2018

D:\Projects\3IRW000905\MXD\Plants\ex_SS_Plant_Species_20200831.mxd

Special Status Plant Species

Exhibit 5

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

175 87.5 0 175 Feet

PSOMAS

(Rev: 09/02/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_SS_Plant_Species.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Intermediate mariposa lily observed in the survey area.

Intermediate mariposa lily habitat in the survey area.

D:\Projects\3IRW\00905\GRAPHICS\Plants\AttA-1_SitePhotographs.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Tower and Spillway Improvement Project

PSOMAS

(08/21/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_SitePhotographs.pdf

Many-stemmed dudleya observed in the survey area.

Many-stemmed dudleya habitat in the survey area.

D:\Projects\3IRW\00905\GRAPHICS\Plants\AttA-2_SitePhotographs.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Tower and Spillway Improvement Project

PSOMAS

(08/21/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_SitePhotographs.pdf

Coulter's matilija poppy observed in the survey area.

Coulter's matilija poppy habitat in the survey area.

D:\Projects\3IRW\00905\GRAPHICS\Plants\AttA-3_SitePhotographs.ai

Site Photographs

Attachment A-3

Santiago Creek Dam Tower and Spillway Improvement Project

PSOMAS

(08/21/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_SitePhotographs.pdf

ATTACHMENT B

PLANT COMPENDIUM

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
FERNS		
POLYPODIACEAE – POLYPODY FAMILY		
Polypodium californicum	California polypody	
PTERIDACEAE – BRAKE FAMILY		
Pellaea andromedifolia	coffee fern	
Pentagramma triangularis	goldback fern	
EUDICOTS		
ADOXACEAE – MUSKROOT FAMILY		
Sambucus nigra ssp. caerulea	blue elderberry	
AIZOACEAE – FIG–MARIGOLD FAMILY		
*Carpobrotus edulis**	freeway iceplant	
AMARANTHACEAE – AMARANTH FAMILY		
*Amaranthus albus**	tumbleweed	
ANACARDIACEAE – SUMAC FAMILY		
Malosma laurina	laurel sumac	
Rhus integrifolia	lemonade berry	
*Schinus molle**	pepper tree	
Toxicodendron diversilobum	western poison oak	
APIACEAE – CARROT FAMILY		
Daucus pusillus	small daucus	
*Foeniculum vulgare**	fennel	
ASTERACEAE – SUNFLOWER FAMILY		
Acourtia microcephala	small-headed acourtia	
Ambrosia psilostachya	western ragweed	
Artemisia californica	California sagebrush	
Baccharis pilularis ssp. consanguinea	coyote brush	
Baccharis salicifolia ssp. salicifolia	mule fat	
Brickellia californica	California brickellbush	
*Carduus pycnocephalus ssp. pycnocephalus**	Italian thistle	
*Centaurea melitensis**	tocalote	
Chaenactis glabriuscula	yellow pincushion	
*Cirsium vulgare**	bull thistle	
Corethrogyne filaginifolia	filago-leaved sand-aster	
*Cotula australis**	Australian cotula	
*Cynara cardunculus ssp. cardunculus**	artichoke	
Deinandra fasciculata	fascicled tarplant	
Encelia californica	California encelia	
Erigeron canadensis	horseweed	
Erigeron foliosus	leafy fleabane	
*Gazania linearis**	parallel-sided treasure flower	
Grindelia camporum	field gumplant	
*Hedypnois rhagadioloides**	Crete weed	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
*Helminthotheca echioides**	bristly ox-tongue	
Heterotheca grandiflora	telegraph weed	
Heterotheca sessiliflora ssp. echioides	viper's sessileflower goldenaster	
*Hypochaeris glabra**	smooth cat's-ear	
Isocoma menziesii	coastal goldenbush	
*Lactuca serriola**	prickly lettuce	
Lasthenia gracilis	common goldfields	
Lepidospartum squamatum	scaly scale-broom	
Logfia filaginoides	California cottonrose	
*Logfia gallica**	daggerleaf cottonrose	
Madia exigua	small tarweed	
Osmadenia tenella	osmadenia	
Pseudognaphalium biolettii	Bioletti's cudweed	
Pseudognaphalium californicum	California cudweed	
*Pseudognaphalium luteoalbum**	white lamb cudweed	
Pseudognaphalium stramineum	straw-colored cudweed	
*Pulicaria paludosa**	marsh pulicaria	
Rafinesquia californica	California chicory	
*Senecio vulgaris**	common groundsel	
*Silybum marianum**	milk thistle	
*Sonchus asper ssp. asper**	prickly sow thistle	
*Sonchus oleraceus**	common sow thistle	
Uropappus lindleyi	Lindley's silverpuffs	
Xanthium strumarium	cocklebur	
BETULACEAE – BIRCH FAMILY		
Alnus rhombifolia	white alder	
BORAGINACEAE – BORAGE FAMILY		
Amsinckia intermedia	common fiddleneck	
Amsinckia menziesii	common fiddleneck	
Cryptantha sp.	cryptantha	
Eriodictyon crassifolium var. crassifolium	thick-leaved yerba santa	
Eucrypta chrysanthemifolia	chrysanthemum-leaved eucrypta	
Heliotropium curassavicum var. oculatum	seaside heliotrope	
Pectocarya linearis ssp. ferocula	narrow-toothed pectocarya	
Phacelia cicutaria	cicuta-leaved phacelia	
Phacelia parryi	Parry's phacelia	
Pholistoma auritum var. auritum	fiesta flower	
Plagiobothrys canescens	valley popcornflower	
BRASSICACEAE – MUSTARD FAMILY		
*Brassica nigra**	black mustard	
*Hirschfeldia incana**	grayish shortpod mustard	
*Lepidium latifolium**	perennial pepperweed	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
*Sisymbrium irio**	London rocket	
CACTACEAE – CACTUS FAMILY		
Opuntia littoralis	seaside prickly-pear	
Opuntia ×vaseyi	Vasey's prickly-pear	
CARYOPHYLLACEAE – PINK FAMILY		
*Silene gallica**	small-flower catchfly	
Silene laciniata	torn catchfly	
*Stellaria media**	common chickweed	
CHENOPODIACEAE – GOOSEFOOT FAMILY		
Chenopodium californicum	California goosefoot	
*Salsola tragus**	Russian thistle	
CONVOLVULACEAE – MORNING–GLORY FAMILY		
Calystegia macrostegia	large-bracted morning-glory	
Cuscuta californica	chaparral dodder	
CRASSULACEAE – STONECROP FAMILY		
Crassula connata	pygmy-weed	
Dudleya lanceolata	lance-leaved dudleya	
Dudleya multicaulis	many-stemmed dudleya	CRPR 1B.2
Dudleya pulverulenta	chalk dudleya	
CUCURBITACEAE – GOURD FAMILY		
Cucurbita foetidissima	buffalo gourd	
Marah macrocarpa	chilicothe	
EUPHORBIACEAE – SPURGE FAMILY		
Croton californicus	California croton	
Croton setiger	turkey-mullein	
Euphorbia albomarginata	rattlesnake sandmat	
*Euphorbia peplus**	petty spurge	
*Ricinus communis**	common castor bean	
FABACEAE – LEGUME FAMILY		
Acmispon glaber	deerweed	
Acmispon micranthus	small-flowered deervetch	
Lupinus bicolor	miniature lupine	
Lupinus sparsiflorus	Coulter's lupine	
*Medicago polymorpha**	variable burclover	
*Melilotus indicus**	sourclover	
Trifolium willdenovii	tomcat clover	
FAGACEAE – OAK FAMILY		
Quercus agrifolia	coast live oak	
GERANIACEAE – GERANIUM FAMILY		
*Erodium botrys**	long-beaked filaree	
*Erodium cicutarium**	redstem filaree	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
GROSSULARIACEAE – GOOSEBERRY FAMILY		
Ribes speciosum	fuchsia-flowered gooseberry	
LAMIACEAE – MINT FAMILY		
*Marrubium vulgare**	common horehound	
Salvia apiana	white sage	
Salvia mellifera	black sage	
Trichostema lanceolatum	vinegar weed	
MALVACEAE – MALLOW FAMILY		
Malacothamnus fasciculatus var. fasciculatus	chaparral mallow	
*Malva parviflora**	cheeseweed	
MELIACEAE – MAHOGANY FAMILY		
*Melia azedarach**	china berry	
MONTIACEAE – MINER'S–LETTUCE FAMILY		
Calandrinia menziesii	red maids	
Claytonia perfoliata	miner's lettuce	
MYRSINACEAE – MYRSINE FAMILY		
*Lysimachia arvensis**	scarlet pimpernel	
NYCTAGINACEAE – FOUR O'CLOCK FAMILY		
Mirabilis laevis var. crassifolia	wishbone bush	
ONAGRACEAE – EVENING PRIMROSE FAMILY		
Camissoniopsis micrantha	small-flowered camissoniopsis	
Clarkia epilobioides	epilobium-like clarkia	
Clarkia purpurea ssp. quadrivulnera	four-spot	
OROBANCHACEAE – BROOM–RAPE FAMILY		
Castilleja exserta	purple owl's-clover	
OXALIDACEAE – OXALIS FAMILY		
*Oxalis pes-caprae**	Bermuda buttercup	
PAPAVERACEAE – POPPY FAMILY		
Eschscholzia californica	California poppy	
Romneya coulteri	Coulter's matilija poppy	CRPR 4.2
PHRYMACEAE – LOPSEED FAMILY		
Diplacus longiflorus	long-flowered monkeyflower	
PLANTAGINACEAE – PLANTAIN FAMILY		
Antirrhinum nuttallianum	Nuttall's snapdragon	
Plantago erecta	erect plantain	
PLATANACEAE – SYCAMORE FAMILY		
Platanus racemosa	western sycamore	
POLEMONIACEAE – PHLOX FAMILY		
Gilia angelensis	chaparral gilia	
Linanthus dianthiflorus	carnation-like linanthus	
POLYGONACEAE – BUCKWHEAT FAMILY		
Eriogonum fasciculatum	California buckwheat	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
*Rumex crispus**	curly dock	
RANUNCULACEAE – BUTTERCUP FAMILY		
Delphinium parryi ssp. parryi	Parry's larkspur	
RHAMNACEAE – BUCKTHORN FAMILY		
Rhamnus ilicifolia	hollyleaf redberry	
ROSACEAE – ROSE FAMILY		
Heteromeles arbutifolia	toyon	
RUBIACEAE – COFFEE FAMILY		
Galium angustifolium ssp. angustifolium	narrow-leaved bedstraw	
Galium aparine	goose grass	
SALICACEAE – WILLOW FAMILY		
Populus fremontii ssp. fremontii	Fremont cottonwood	
Salix gooddingii	Goodding's black willow	
Salix lasiolepis	arroyo willow	
SCROPHULARIACEAE – FIGWORT FAMILY		
Scrophularia californica	California figwort	
SOLANACEAE – NIGHTSHADE FAMILY		
Datura wrightii	Wright's jimsonweed	
*Nicotiana glauca**	tree tobacco	
Solanum douglasii	Douglas' nightshade	
Solanum xanti	Xantus' nightshade	
TAMARICACEAE – TAMARISK FAMILY		
*Tamarix ramosissima**	saltcedar	
VERBENACEAE – VERVAIN FAMILY		
Phyla nodiflora	node-flowered phyla	
VISCACEAE – MISTLETOE FAMILY		
Phoradendron leucarpum	American mistletoe	
MONOCOTS		
AGAVACEAE – AGAVE FAMILY		
Chlorogalum sp.	soap plant	
Hesperoyucca whipplei	Whipple's chaparral yucca	
CYPERACEAE – SEDGE FAMILY		
Cyperus sp.	flatsedge	
IRIDACEAE – IRIS FAMILY		
Sisyrinchium bellum	western blue-eyed-grass	
LILIACEAE – LILY FAMILY		
Calochortus splendens	splendid mariposa lily	
Calochortus weedii var. intermedius	intermediate mariposa-lily	CRPR 1B.2
POACEAE – GRASS FAMILY		
*Arundo donax**	giant reed	
*Avena barbata**	slender wild oat	
Bothriochloa barbinodis	cane bluestem	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
*Bromus diandrus**	ripgut grass	
*Bromus hordeaceus**	soft chess	
*Bromus rubens**	red brome	
*Cortaderia selloana**	pampas grass	
*Cynodon dactylon**	Bermuda grass	
Elymus condensatus	giant wild-rye	
Elymus triticoides	beardless wild rye	
*Festuca myuros**	rattail sixweeks grass	
*Festuca perennis**	rye grass	
*Hordeum murinum**	wall barley	
*Lamarckia aurea**	goldentop	
Melica imperfecta	little California melica	
Muhlenbergia microsperma	littleseed muhly	
*Pennisetum setaceum**	crimson fountain grass	
*Polypogon monspeliensis**	annual beard grass	
*Schismus barbatus**	barbed Mediterranean grass	
Stipa lepida	foothill needle grass	
*Stipa miliacea var. miliacea**	smilo grass	
Stipa pulchra	purple needle grass	
THEMIDACEAE – BRODIAEA FAMILY		
Bloomeria crocea	common goldenstar	
Dipterostemon capitatus	blue dicks	
TYPHACEAE – CATTAIL FAMILY		
Typha latifolia	broad-leaved cattail	

CRPR: California Rare Plant Rank

* Non-native or invasive species

CRPR

1B Plants Rare, Threatened, or Endangered in California and elsewhere
4 Plants of limited distribution - watch list

Threat Code Extensions

.2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)

ATTACHMENT C

CNDBB FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code RUD20F0002
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Calochortus weedii var. intermedius*

Common name: intermediate mariposa-lily

Date of field work (mm-dd-yyyy): 06-04-2020

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300, Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 481-8024

Other observers:

DETERMINATION

Keyed in: Jepson Flora Project 2020

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Survey followed CDFW 2018 protocol.

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
0 %	100 %	0 %

SITE INFORMATION

Habitat description: Disturbed sagebrush scrub associated with Artemisia California, Brassica nigra, Calystegia macrostegia, and Avena sp.

Slope: moderate

Land owner/manager: Irvine Ranch Water District

Aspect: s-facing

Site condition + population viability: Good

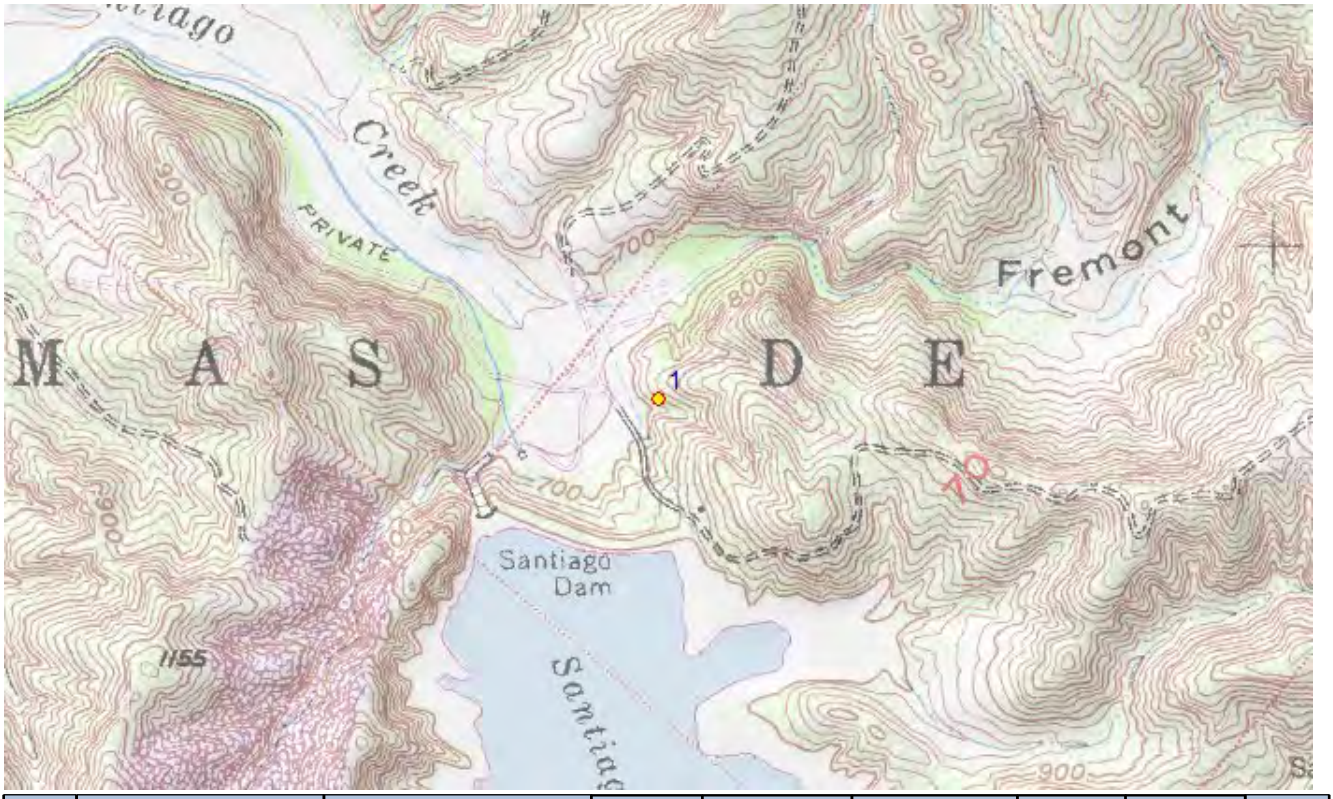
Immediate & surrounding land use: Open space in Irvine Regional Park, Limestone Canyon Regional Park, and Oak Canyon Park.

Visible disturbances: invasive weeds

Threats: nearby dam operations

General comments: Other special status species observed in vicinity include Dudleya multicaulis and Romneya coulteri.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	744	33.78880	-117.72334	433035	3738974	11

	Public Land Survey	Feature Comment
1	S T04S R08W 28	One individual

The mapped feature is accurate within: 5 m

Source of mapped feature: iPad with Avenza Maps application

Mapping notes:

Location/directions comments:

Attachment(s): IMG_7150.JPG, Photo of individual

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code RUD20F0003
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Dudleya multicaulis*

Common name: many-stemmed dudleya

Date of field work (mm-dd-yyyy): 06-04-2020

Comment about field work date(s): Species observed on Apr 30, May 21, and Jun 4, 2020

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300 , Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 481-8024

Other observers:

DETERMINATION

Keyed in: Jepson Flora Project 2020

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Survey followed CDFW 2018 protocol.

Total number of individuals: 810

Collection? Yes **Collection number:** Allison Rudalevige

Museum/Herbarium: California Botanic Garden

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
10 %	90 %	0 %

SITE INFORMATION

Habitat description: Pop 1 (800 individuals) in disturbed sagebrush scrub associated with Eriogonum fasciculatum, Logfia gallica, Artemisia californica, Festuca perennis, Calochortus splendens, Lasthenia gracilis, and Osmadenia tenella. Growing under Eriogonum fasciculatum canopy. Pop 2 (10 individuals) on vertical cliff face associated with Eriogonum fasciculatum, Salvia apiana, Artemisia californica, and Melica imperfecta.

Slope: P1-flat; P2-vertical

Land owner/manager: Irvine Ranch Water District

Aspect: P1-n/a; P2- E-facing

Site condition + population viability: Good

Immediate & surrounding land use: Open space in Irvine Regional Park, Limestone Canyon Regional Park, and Oak Canyon Park.

Visible disturbances: invasive weeds

Threats: nearby dam operations

General comments: Other special status species observed in vicinity include Calochortus weedii var. intermedius and Romneya coulteri.

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	761	33.78827	-117.72313	433054	3738916	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	800 individuals						

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	767	33.78717	-117.72774	432626	3738797	11
2	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	10 individuals						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPad with Avenza Maps application

Mapping notes: Population 1: 800 individuals; Population 2: 10 individuals

Location/directions comments:

Attachment(s): IMG_6711.JPG, Photo of individuals

September 27, 2022

Ms. Kellie Welch
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

VIA EMAIL
Welch@irwd.com

Subject: Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Welch:

This Letter Report presents the results of focused surveys for special status plant species for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of special status plant species upstream of Santiago Dam. Focused surveys for special status plants were conducted downstream of Santiago Dam in spring/summer 2020 (Psomas 2020).

PROJECT LOCATON AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Biological Study Area. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level (msl).

The Biological Study Area is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space", while

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake.

EXISTING CONDITIONS

The special status plant survey area included all project impact areas (i.e., permanent, temporary, and additional inundation areas) plus a 50-foot buffer. A variety of vegetation types occur in the survey area, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and vegetated fluctuating shoreline (Exhibit 3). Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

Soils mapped in the survey area include Alo variant clay, Anaheim loam, Anaheim clay loam, beaches, Bosanko clay, Botella clay loam, Capistrano sandy loam, Cieneba sandy loam, Cieneba–rock outcrop complex, Corralitos loamy sand, Myford sandy loam, riverwash, rock outcrop–Cieneba complex, Soboba gravelly loamy sand, Soper loam, Soper gravelly loam, Soper cobbly loam, and Sorrento loam (Exhibit 4).

SURVEY METHODS

Botanical surveys were floristic in nature and consistent with the protocols created by the California Department of Fish and Wildlife (CDFW; CDFW 2018). Prior to the 2022 field surveys, a literature search was conducted to identify special status plant species reported from the vicinity of the project site. Sources reviewed include the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2022) and the CDFW's California Natural Diversity Database (CNDDB) (CDFW 2022a).

Rainfall received in the winter and spring determines the germination of many annual and perennial herb species. The region received approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches.

[1] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive (Table 1). This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable on the survey area. Reference populations were not monitored for species with a California Rare Plant Rank (CRPR) of 3 or 4, large perennials (e.g., Tecate cypress [*Hesperocyparis forbesii*] and chaparral nolina [*Nolina cismontana*]) which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

TABLE 1
REFERENCE POPULATIONS MONITORED IN THE PROJECT REGION

Species	Date Observed	Location	Phenology
Calochortus weedii var. *intermedius* intermediate mariposa lily	May 12, 2022	Santiago Canyon vicinity	early bloom
Dudleya multicaulis many-stemmed dudleya	April 27, 2022	Santiago Canyon vicinity	in bloom
Pseudognaphalium leucocephalum white rabbit-tobacco	September 8, 2022	San Juan Capistrano	in bloom

Surveys were conducted on March 24, 2022, by Psomas Senior Biologist Allison Rudalevige; on April 25, 26, and 28, 2022, by Ms. Rudalevige and Consulting Botanist Sandra Leatherman; on May 23 and 26 by Ms. Rudalevige and Psomas Biologist Erin Ruckman; and on September 13, 2022, by Ms. Rudalevige and Psomas Biologist Sarah Thomas. The total number of person-hours spent surveying was approximately 87.75 hours. The special status plant survey area included all project impact areas (i.e., permanent, temporary, and additional inundation areas) plus a 50-foot buffer. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. Inaccessible areas (e.g., steep cliffs), were observed remotely with binoculars. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified to the taxonomic level necessary to determine whether they were a special status species. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2022), Baldwin et al. (2012), and Hickman (1993). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2022b) for special status species and the Jepson eFlora (Jepson Flora Project 2022) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software or with a handheld Garmin Global Positioning System (GPS) unit. Data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species). Representative photographs are included as Attachment A.

SURVEY RESULTS

Table 2 identifies the special status plants reported from the literature review with their status, their potential to occur in the survey area, and the survey results. Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), mud nama (*Nama stenocarpa*), and Coulter's matilija poppy (*Romneya coulteri*) were observed during the surveys and are discussed further below. A list of all plants observed in the survey area during 2022 special status plant surveys is included in Attachment B.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
chaparral sand-verbena *Abronia villosa* var. *aurita*	—	—	1B.1	Sandy areas in chaparral, coastal scrub, desert dunes. Blooms: (January) March – September.	Not expected to occur because not observed during focused surveys; suitable habitat.
Yucaipa onion *Allium marvinii*	—	—	1B.2	Dry slopes and ridges in chaparral. Blooms: April – May.	Not expected to occur; outside current known range.
Braunton's milk-vetch *Astragalus brauntonii*	FE	—	1B.1	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland. Reported immediately north of the survey area in 2012 (CDFW 2022a). Blooms: January – August.	**Observed in the survey area.**
Coulter's saltbush *Atriplex coulteri*	—	—	1B.2	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland. Blooms: March – October.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
south coast saltscale *Atriplex pacifica*	—	—	1B.2	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes. Blooms: March – October.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	—	—	1B.2	Alkaline soils in coastal bluff scrub, coastal scrub. Blooms: April – October.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
Malibu baccharis *Baccharis malibuensis*	—	—	1B.1	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland. Reported northeast of the survey area in 2000 (CCH 2022). Blooms: August.	Not expected to occur because not observed during focused surveys; suitable habitat.
thread-leaved brodiaea *Brodiaea filifolia*	FT	SE	1B.1	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools. Blooms: March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Brewer's calandrinia *Calandrinia breweri*	—	—	4.2	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub. Blooms: (January) March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.
Catalina mariposa lily *Calochortus catalinae*	—	—	4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Blooms: (February) March – June.	Not expected to occur because not observed during focused surveys; suitable habitat. Incidentally observed on access road outside survey area.
Plummer's mariposa-lily *Calochortus plummerae*	—	—	4.2	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Blooms: May – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
intermediate mariposa-lily *Calochortus weedii* var. *intermedius*	—	—	1B.2	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland. Blooms: May – July.	**Observed in the survey area.**
Lewis' evening-primrose *Camissoniopsis lewisii*	—	—	3	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland. Blooms: March – May (June).	Not expected to occur because not observed during focused surveys; suitable habitat.
southern tarplant *Centromadia parryi* ssp. *australis*	—	—	1B.1	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools. Blooms: May – November.	Not expected to occur because not observed during focused surveys; suitable habitat.
San Fernando Valley spineflower *Chorizanthe parryi* var. *fernandina*	—	SE	1B.1	Sandy soils in coastal scrub, valley and foothill grasslands. Blooms: April – July.	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside the current known range of the species (CDFW 2022a).
long-spined spineflower	—	—	1B.2	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and	Not expected to occur because not observed during focused surveys;

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Chorizanthe polygonoides var. *longispina*				seeps, valley and foothill grassland, vernal pools. Blooms: April – July.	suitable habitat but at edge of current known range.
small-flowered morning-glory *Convolvulus simulans*	—	—	4.2	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands. Reported just west of Irvine Lake in 2016 (CCH 2022). Blooms: March – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
paniculate tarplant *Deinandra paniculata*	—	—	4.2	Usually vernally mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools. Blooms: (March) April – November.	Not expected to occur because not observed during focused surveys; suitable habitat.
Cleveland's bush monkeyflower *Diplacus clevelandii*	—	—	4.2	Disturbed areas and open borders of chaparral, cismontane woodland, and lower montane coniferous forest. Blooms: April – July.	Not expected to occur; outside current known elevational range.
slender-horned spineflower *Dodecahema leptoceras*	FE	SE	1B.1	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub. Blooms: April – June.	Not expected to occur; outside current known range.
Santa Monica Mountains dudleya *Dudleya cymosa* ssp. *ovatifolia*	FT	—	1B.1	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub. Blooms: March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.
many-stemmed dudleya *Dudleya multicaulis*	—	—	1B.2	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland. Blooms: April – July.	Not expected to occur because not observed during focused surveys; suitable habitat. Known to occur just outside the survey area; observed during previous focused surveys downstream of the dam.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Santa Ana River woollystar *Eriastrum densifolium* ssp. *sanctorum*	FE	SE	1B.1	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral. Blooms: April – September.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
Palmer's grapplinghook *Harpagonella palmeri*	—	—	4.2	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland. Blooms: March – May.	Not expected to occur because not observed during focused surveys; suitable habitat.
Los Angeles sunflower *Helianthus nuttallii* ssp. *parishii*	—	—	1A	Coastal and freshwater marshes and swamps. Blooms: August – October.	Not expected to occur because not observed during focused surveys and because species is presumed extinct; suitable habitat.
Tecate cypress *Hesperocyparis forbesii*	—	—	1B.1	Clay or gabbro soils in closed-cone coniferous forest and chaparral. Perennial species observable year-round.	Not expected to occur; no suitable habitat.
Gowen cypress *Hesperocyparis goveniana*	FT	—	1B.2	Closed-cone coniferous forest, mixed evergreen forest, chaparral, and coastal terraces. Perennial species observable year-round.	Not expected to occur; outside current known range; no suitable habitat.
vernal barley *Hordeum intercedens*	—	—	3.2	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools. Reported just south of Irvine Lake in 1998 (CCH 2020). Blooms: March – June.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
mesa horkelia *Horkelia cuneata* var. *puberula*	—	—	1B.1	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub. Blooms: February – July (September).	Not expected to occur because not observed during focused surveys; suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Southern California black walnut *Juglans californica*	—	—	4.2	Chaparral, cismontane woodland, coastal scrub, and riparian woodland. Perennial species observable year-round. Blooms: March – August.	Not expected to occur because not observed during focused surveys.
southwestern spiny rush *Juncus acutus* ssp. *leopoldii*	—	—	4.2	Moist, saline places including coastal dunes, marshes and swamps, and meadows and seeps. Perennial species observable year-round. Blooms: (March) May – June.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	—	—	1B.1	Usually alkaline soils in coastal salt marsh, playas, vernal pools. Blooms: February – June.	Not expected to occur because not observed during focused surveys; no suitable habitat.
heart-leaved pitcher sage *Lepechinia cardiophylla*	—	—	1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland. Blooms: April – July.	Not expected to occur; outside the current known elevational range; no suitable habitat.
Robinson's pepper-grass *Lepidium virginicum* var. *robinsonii*	—	—	4.3	Dry soils in chaparral and coastal scrub. Blooms: January – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
Ocellated Humboldt lily *Lilium humboldtii* ssp. *ocellatum*	—	—	4.2	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland. Blooms: March – July (August).	Not expected to occur because not observed during focused surveys; suitable habitat.
California box-thorn *Lycium californicum*	—	—	4.2	Coastal bluff scrub and coastal scrub. Perennial species observable year-round. Blooms: March – August (December).	Not expected to occur; outside current known range.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
intermediate monardella *Monardella hypoleuca* ssp. *intermedia*	—	—	1B.3	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest. Blooms: April – September.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
mud nama *Nama stenocarpa*	—	—	2B.2	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps. Blooms: January – July.	**Observed in the survey area.**
Gambel's water cress *Nasturtium gambelii*	FE	ST	1B.1	Freshwater and brackish marshes at the margins of lakes and along streams; in or just above the water level. Blooms: April – October.	Not expected to occur because not observed during focused surveys; suitable habitat.
chaparral nolina *Nolina cismontana*	—	—	1B.2	Primarily sandstone and shale substrates in chaparral and coastal scrub. Perennial species observable year-round. Blooms: (March) May – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
California beardtongue *Penstemon californicus*	—	—	1B.2	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland. Blooms: May – June (August).	Not expected to occur; outside current known range; no suitable habitat.
Allen's pentachaeta *Pentachaeta aurea* ssp. *allenii*	—	—	1B.1	Openings in coastal scrub and valley and foothill grasslands. Blooms: March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.
Hubby's phacelia *Phacelia hubbyi*	—	—	4.2	Open gravelly or rocky slopes of chaparral, coastal scrub, and valley and foothill grassland. Blooms: April – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
woolly chaparral-pea *Pickeringia montana* var. *tomentosa*	—	—	4.3	Gabbroic, granitic, or clay soil in chaparral. Blooms: May – August.	Not expected to occur; no suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Fish's milkwort *Polygala cornuta* var. *fishiae*	—	—	4.3	Chaparral, cismontane woodland, riparian woodland. Blooms: May – August.	Not expected to occur because not observed during focused surveys; suitable habitat.
white rabbit-tobacco *Pseudognaphalium leucocephalum*	—	—	2B.2	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral. Blooms: (July) August – November (December).	Not expected to occur because not observed during focused surveys; suitable habitat.
Coulter's matilija poppy *Romneya coulteri*	—	—	4.2	Chaparral and coastal scrub, often in burns. Blooms: March – July (August).	**Observed in the survey area.**
chaparral ragwort *Senecio aphanactis*	—	—	2B.2	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub. Blooms: January – April (May).	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
salt spring checkerbloom *Sidalcea neomexicana*	—	—	2B.2	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub. Blooms: March – June.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
estuary seablite *Suaeda esteroa*	—	—	1B.2	Coastal salt marshes in clay, silt, and sand substrates. Blooms: (January – May) July – October.	Not expected to occur; no suitable habitat.
woolly seablite *Suaeda taxifolia*	—	—	4.2	Coastal bluff scrub, coastal dunes, and salt marshes. Blooms: January – December.	Not expected to occur; outside current known range; no suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
San Bernardino aster *Symphyotrichum defoliatum*	—	—	1B.2	Disturbed areas, vernally mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland. Blooms: July – November.	Not expected to occur because not observed during focused surveys; suitable habitat.
San Diego County viguiera *Viguiera laciniata*	—	—	4.3	Chaparral and coastal scrub. Blooms: February – June (August).	Not expected to occur because not observed during focused surveys; suitable habitat.

CRPR: California Rare Plant Rank

LEGEND:

Federal Status		**State Status**	
FE	Endangered	SE	Endangered
FT	Threatened	ST	Threatened

CRPR

1A	Plants presumed extirpated in California and either rare or extinct elsewhere
1B	Plants Rare, Threatened, or Endangered in California and elsewhere
2B	Plants Rare, Threatened, or Endangered in California but more common elsewhere
3	Plants about which we need more information – A Review List
4	Plants of limited distribution – A Watch List

CRPR Threat Code Extensions

None	Plants lacking any threat information
.1	Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)
.2	Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)
.3	Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)

Species that were observed on site are shown in **boldface type.** For blooming period, months included in parentheses are uncommon.

* Sources include CDFW 2022a, CNPS 2022, and Jepson Flora Project 2022.

Braunton's Milkvetch

Braunton's milkvetch is a federally listed Endangered species and has a CRPR of 1B.1. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and August (CNPS 2022). This perennial herb occurs in chaparral, coastal scrub, and valley and foothill grassland at elevations between approximately 15 and 2,100 feet above msl (Jepson Flora Project 2022; CNPS 2022). It generally occurs after recent burns or in disturbed areas, usually in sandstone with carbonate layers (CNPS 2022). This species is known from the western portion of the Western Transverse Ranges, the San Gabriel Mountains, tentatively from the San Gabriel Mountains/South Coast, and the northern Peninsular Ranges (Jepson Flora Project 2022); it is known from a few canyons in Orange County (Allen and Roberts 2013).

One individual Braunton's milkvetch was observed in the survey area (Exhibit 5). It was observed in the sandy channel of Santiago Creek, upstream of the lake. The species associated with the Braunton's milkvetch observed in the survey area include mule fat, cicuta-leaved phacelia (*Phacelia cicutaria*), and horseweed (*Erigeron canadensis*). A voucher specimen was not collected due to the limited population size (i.e., a single, small individual). A CNDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species[2] in the Central Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2022; CNPS 2022). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2022). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2022).

Four individual intermediate mariposa lilies were observed in the survey area and an additional individual was observed just outside the survey area (Exhibit 5). The four individuals were observed in two populations in the northwestern portion of the survey area on moderately steep, southeast- to east-facing slopes in sagebrush scrub. The species associated with the intermediate mariposa lilies observed in the survey area include California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), chilicothe (*Marah macrocarpa*), mule fat (*Baccharis salicifolia* ssp. *salicifolia*), California encelia (*Encelia californica*), and smilo grass (*Stipa miliacea* var. *miliacea*). A voucher specimen was not collected due to the limited population size. A CNDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Mud Nama

Mud nama has a CRPR of 2B.2. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and October (Jepson Flora Project 2022; CNPS 2022). This generally annual herb occurs in intermittently wet areas of marshes and swamps, including lake margins and riverbanks at elevations between approximately 15 and 1,640 feet above msl (Jepson Flora Project 2022; CNPS 2022). This species is known from the San Joaquin Valley, South Coast, southern Channel Islands, western Peninsular Ranges, and southeastern Sonoran Desert (Jepson Flora Project 2022).

Multiple populations were observed in the southern portion of Irvine Lake (Exhibit 5). This area experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping

[2] The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.

upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. The species associated with the mud nama observed in the survey area were primarily rabbitfoot grass (*Polypogon monspeliensis*), white sweetclover (*Melilotus albus*), and sourclover (*Melilotus indicus*) with scattered saltcedar (*Tamarix ramosissima*), alkali heliotrope (*Heliotropium curassavicum* var. *oculatum*), mule fat, flatsedge (*Cyperus* sp.), everlasting (*Pseudognaphalium* sp.), water cress (*Nasturtium officinale*), and willow weed (*Persicaria lapathifolia*). Approximately 98 percent of the populations were vegetative, and 2 percent were flowering.

Individuals covered a large area and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama (i.e., Population 1). This resulted in an average of 37.7 individuals per square foot. Therefore, a "high density" population was considered to have between 35 and 40 individuals per square foot. A "moderate density" population was considered to have between 20 and 25 individuals per square foot and a "low density" population was considered to have between 5 and 10 individuals per square foot. Based on these approximate population densities, the total number of individuals in the survey area was estimated using the square footage of each population. The total population was estimated to be between 3.5 and 5.5 million. Information on individual mud nama populations is provided in Table 3. A voucher specimen was collected and will be deposited in a herbarium. A CNDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

TABLE 3
MUD NAMA POPULATION INFORMATION

Population Number	Estimated Population Density	Population Area (square feet)	Estimated Population Size (Number of Individuals)
1	High density	25,023	875,805 – 1,000,920
2	Moderate density	15,709	314,180 – 392,725
3*	n/a	n/a	100
4*	n/a	n/a	1,000
5	Low density	284,500	1,422,500 – 2,845,000
6	Low density	12,647	63,235 – 126,470
7	Low density	1,121	5,605 – 11,210
8	High density	1,036	36,260 – 41,440
9	Low density	3,053	15,265 – 30,530
10	Low density	9,367	46,835 – 93,670
11	High density	17,305	605,675 – 692,200
12	Low density	8,335	41,675 – 83,350
		Total	**3,428,135 – 5,318,615**

High Density: 35–40 individuals per square foot; Moderate Density: 20–25 individuals per square foot; Low Density: 5–10 individuals per square foot

*Populations 3 and 4 were small and population sizes were estimated directly.

Coulter's Matilija Poppy

Coulter's matilija poppy has a CRPR of 4.2. It is a Covered species in the Central Coastal NCCP/HCP. It typically blooms between March and July (Jepson Flora Project 2020; CNPS 2020). This perennial rhizomatous herb occurs in chaparral and coastal scrub, often in elevations between sea level and

approximately 3,937 feet above msl (Roberts 2008; Jepson Flora Project 2020). This species grows as clones via rhizomes (Clarke et al. 2007; Jepson Flora Project 2020). This species is known from the South Coast, Western Transverse and Peninsular Ranges, and San Jacinto Mountains (Jepson Flora Project 2020).

One individual Coulter's matilija poppy was observed in the survey area (Exhibit 5). It was observed in a sandy/cobbly low terrace of Santiago Creek upstream of the lake. The species associated with the Coulter's matilija poppy observed in the survey area include mule fat, California buckwheat (*Eriogonum fasciculatum*), fennel (*Foeniculum vulgare*), and tocalote (*Centaurea melitensis*). A voucher specimen was not collected due to the limited population size (i.e., a single individual) and because it is known from the vicinity. A CNDDB form was not prepared for the species because it has a CRPR of 4.2.

OTHER OBSERVATIONS

One other special status species was observed in the survey area during the surveys: bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected). The bald eagle was observed flying over the survey area on the east side of Irvine Lake; a CNDDB form for bald eagle is attached to the coastal California gnatcatcher report for the project (Psomas 2022).

CONCLUSIONS

Based on the current project impact footprint, no Braunton's milkvetch, intermediate mariposa lily, mud nama, or Coulter's matilija poppy populations would be impacted by the project. The access road is less than 100 feet from mud nama Population 12. Therefore, it is recommended that a qualified botanist survey the impact area for mud nama during each year of construction following dewatering and prior to grading of the access road to flag the boundaries of mud nama population(s) adjacent to this impact area. The botanist will recommend minor re-routing of the access road to avoid impacts on this species to the extent possible. As the current footprint avoids all impacts to mud nama, it is assumed that potential future impacts due to routing of the access road would be entirely avoided or minimal (e.g., clipping the edge of one population, representing impacts to less than five percent of the population onsite).

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Allison Rudalevige (Allison.Rudalevige@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager, Resource Management

Allison D. Rudalevige
Senior Biologist

Attachments: Exhibits 1–5
A – Site Photographs
B – Plant Compendium
C – CNDDB Forms

cc: Jacob Moeder, Moeder@irwd.com

R:\Projects\IRW_IRWD\3IRW010200\Documentation\SS Plants\Santiago SS Plants-092722.docx

REFERENCES

Allen, R.L, and F.M. Roberts. 2013. *Wildflowers of Orange County and the Santa Ana Mountains.* Laguna Beach, CA: Laguna Wilderness Press.

Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.

California Department of Fish and Wildlife (CDFW). 2022a. California Natural Diversity Database. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

———. 2022b (July). *Special Vascular Plants, Bryophytes, and Lichens List.* Sacramento, CA: CDFW, Natural Heritage Division.

———. 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.

California Irrigation Management Information System (CIMIS). 2022. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. http://www.cimis.water.ca.gov.

California Native Plant Society (CNPS). 2022. Inventory of Rare and Endangered Plants. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CNPS. http://www.cnps.org/inventory.

Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.

Consortium of California Herbaria (CCH). 2022. Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. http://ucjeps.berkeley.edu/consortium/.

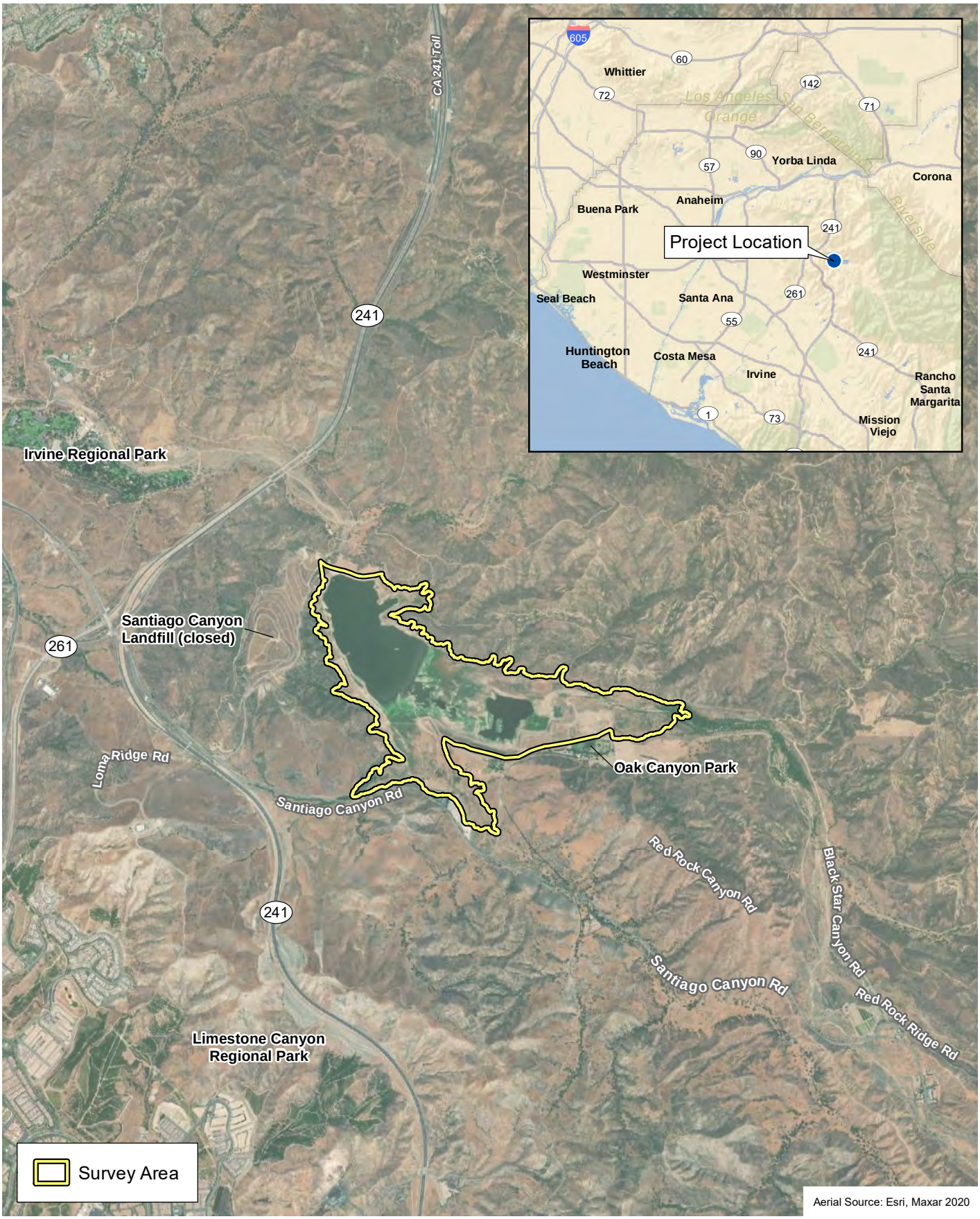
Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.

Jepson Flora Project. 2022 (May 31, Revision 10). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. http://ucjeps.berkeley.edu/eflora/.

Psomas. 2020 (September 3). Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California. Santa Ana, CA: Psomas.

Psomas. 2022 (August 24). Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California. Santa Ana, CA: Psomas.

Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\SS_Plants\ex_RL_LV_20220726.mxd

Regional Location and Local Vicinity

Exhibit 1

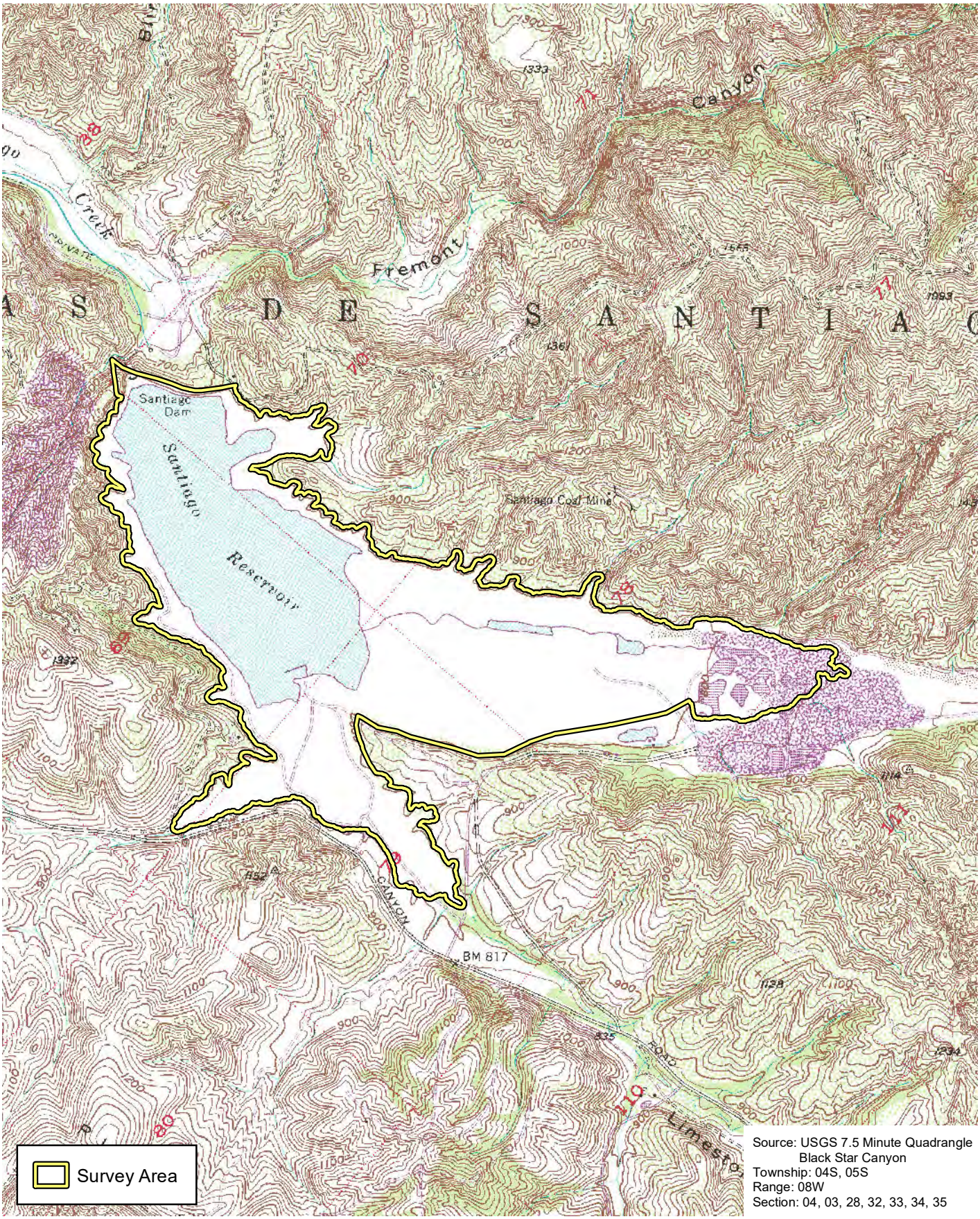
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

4,000 2,000 0 4,000 Feet

PSOMAS

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_RL_LV.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S, 05S
Range: 08W
Section: 04, 03, 28, 32, 33, 34, 35

D:\Projects\3IRW\010200\MXD\SS_Plants\ex_SurveyArea_USGS_20220726.mxd

Special Status Plant Species Survey Area

Exhibit 2

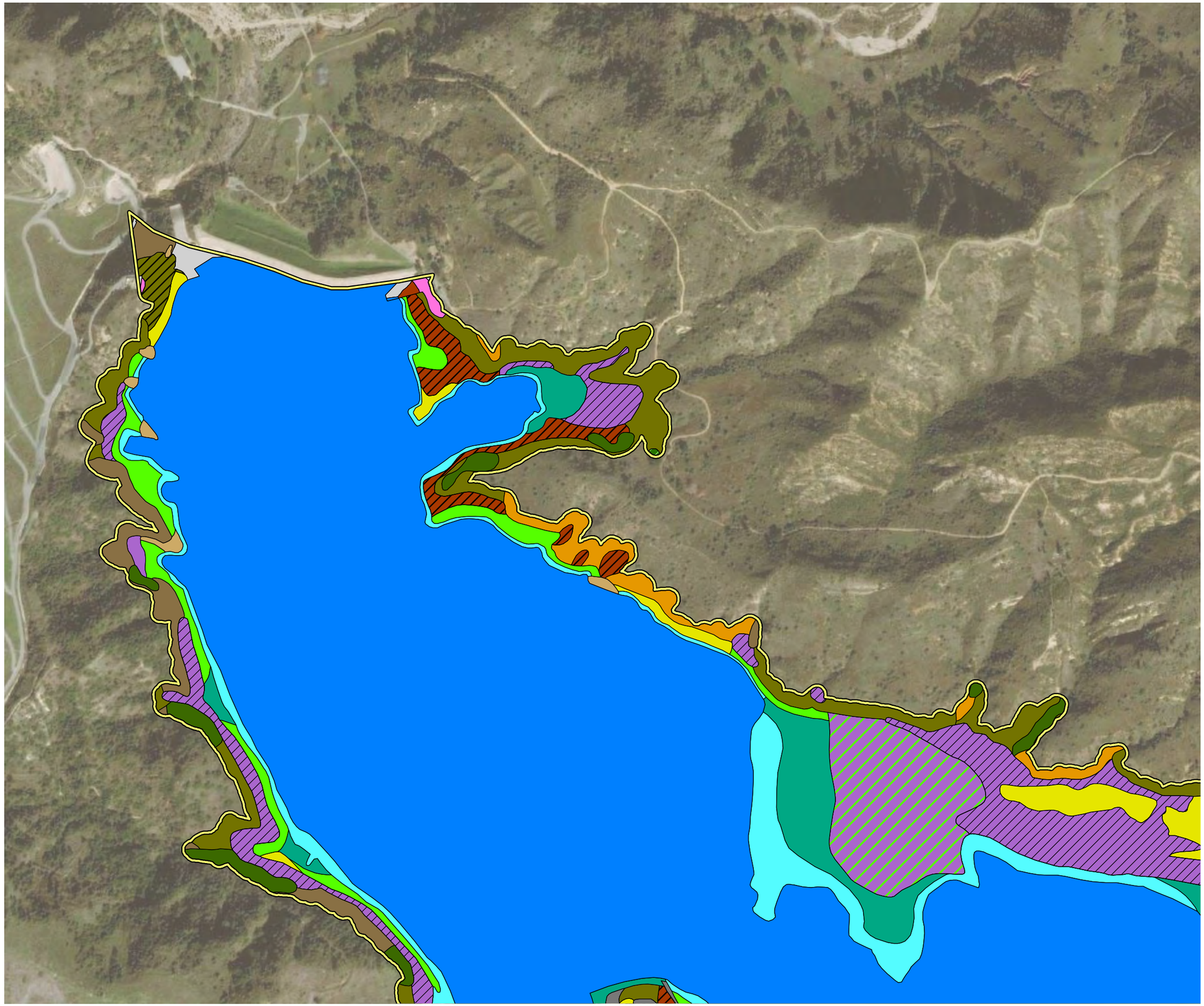
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

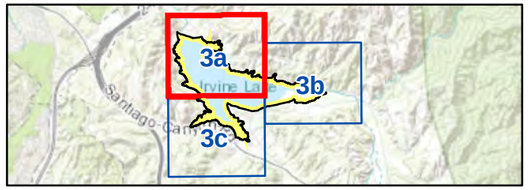
N
W E
S

2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 8-15-2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_SurveyArea_USGS.pdf





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600
Feet

Aerial Source: Esri, Maxar 2020

Vegetation Types and Other Areas

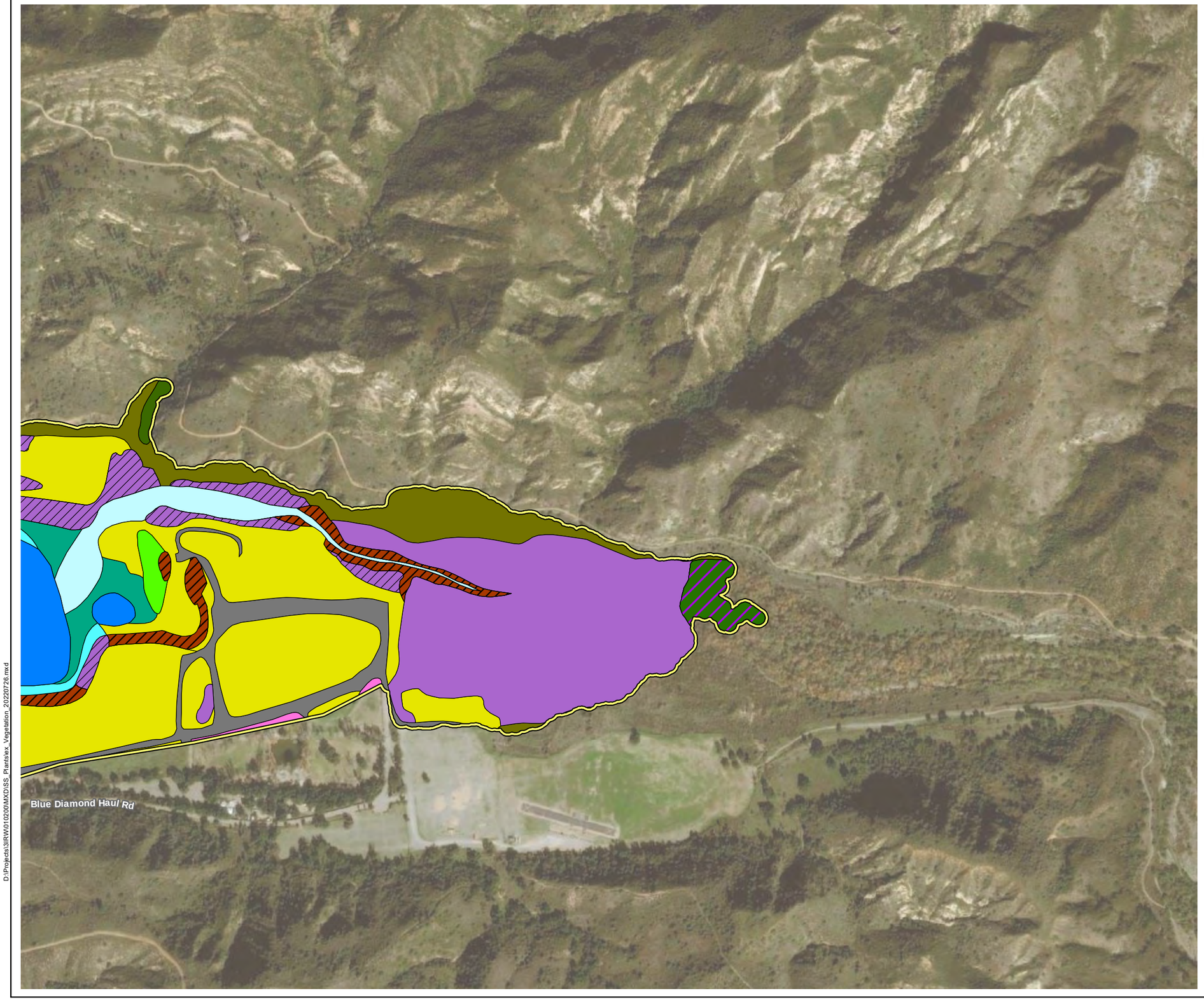
Exhibit 3a

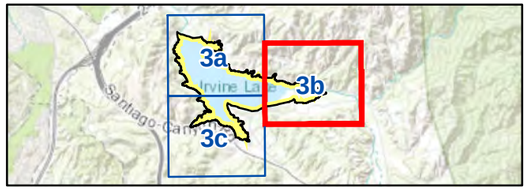
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Vegetation.pdf

D:\Projects\3IRW010200\MXD\SS_Plants\ex_Vegetation_20220726.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

Vegetation Types and Other Areas

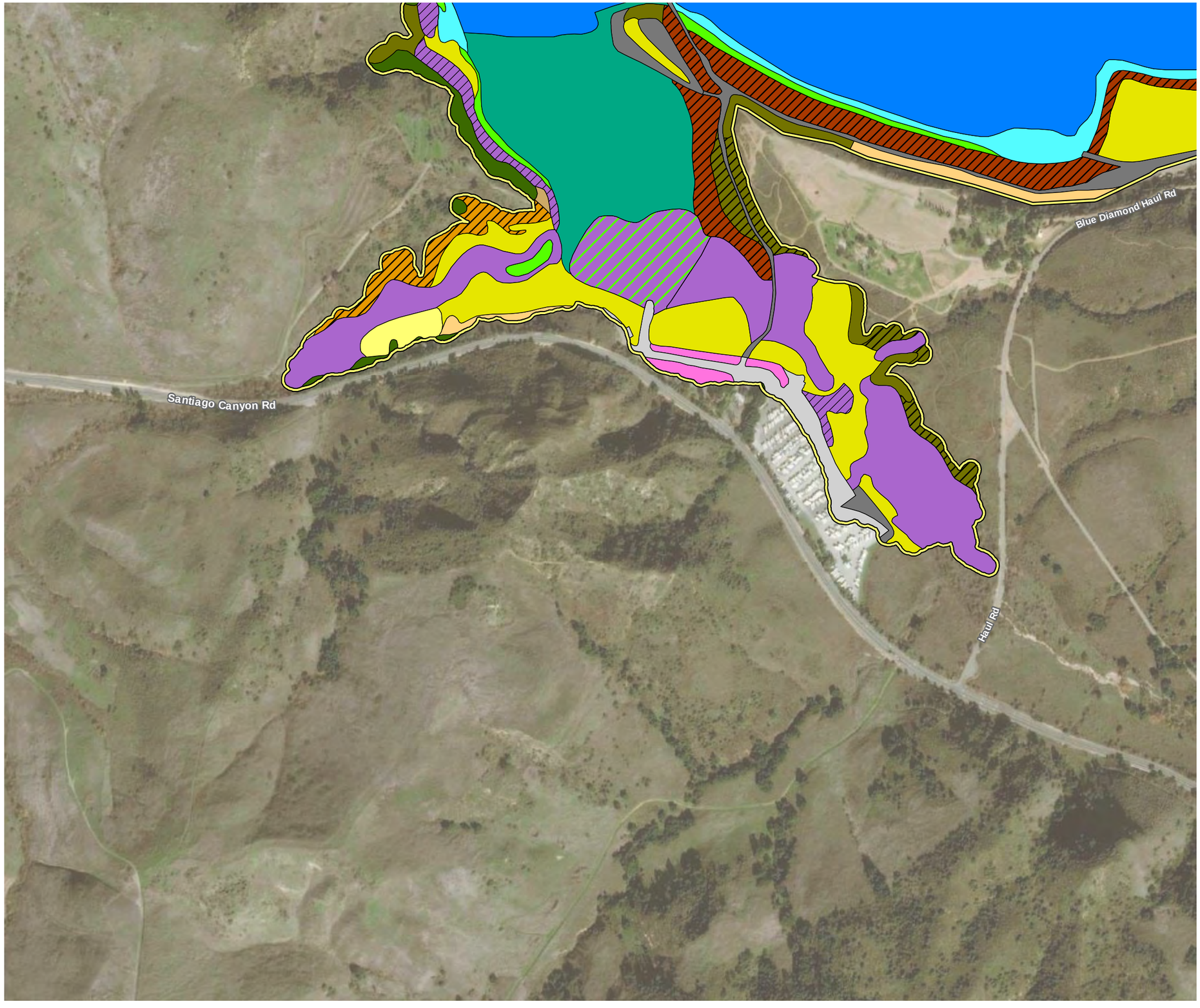
Exhibit 3b

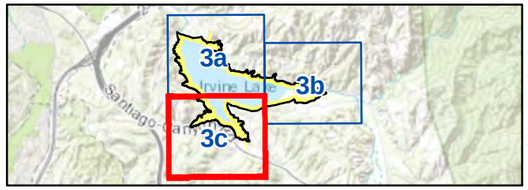
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Vegetation.pdf

D:\Projects\3IRW010200\MXD\SS_Plants\ex_Vegetation_20220726.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

Vegetation Types and Other Areas

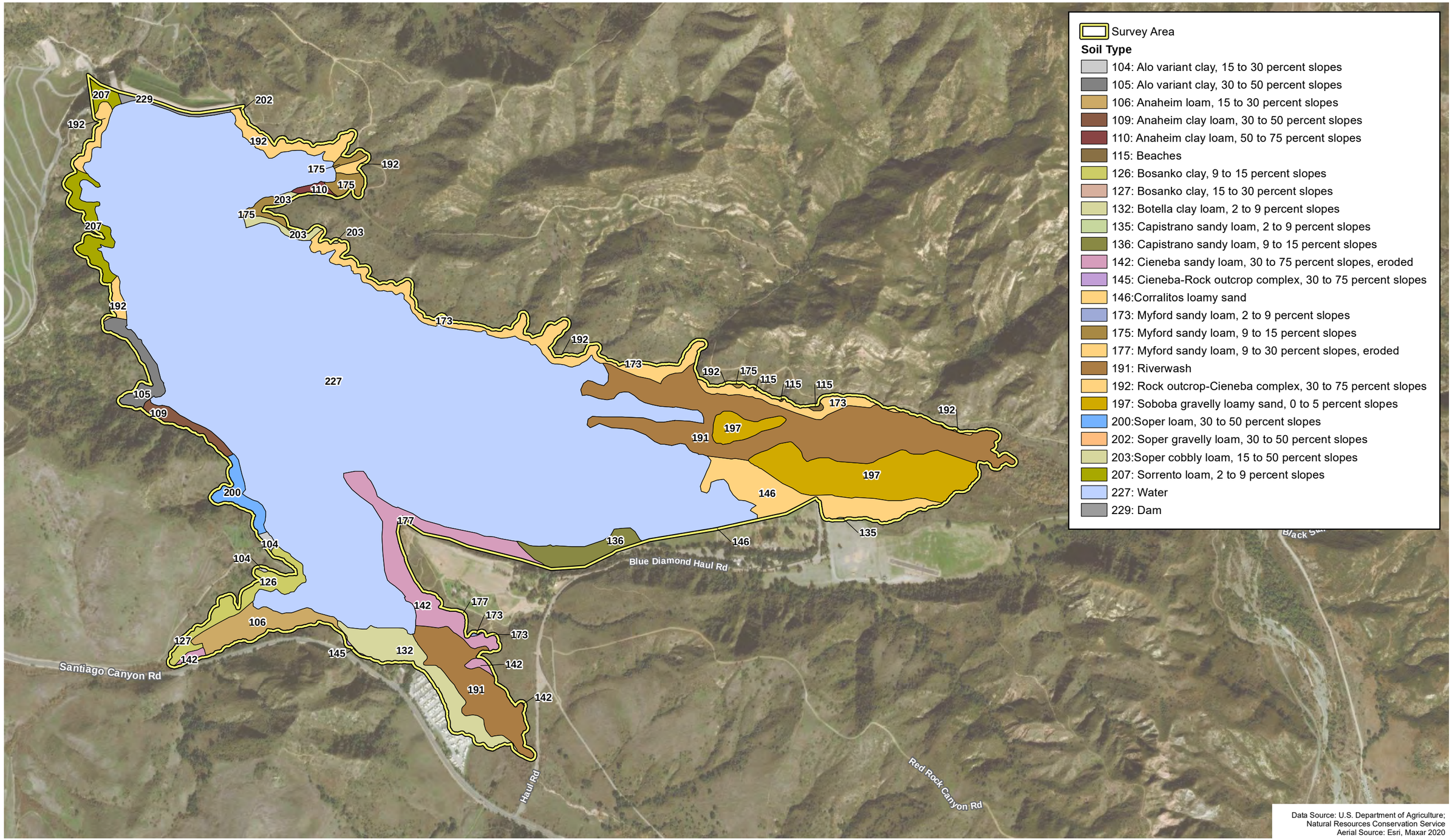
Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Vegetation.pdf

D:\Projects\3IRW010200\MXD\SS_Plants\ex_Vegetation_20220726.mxd



D:\Projects\3IRW\010200\MXD\SS_Plants\ex_Soils_20220726.mxd

Soil Types

Exhibit 4

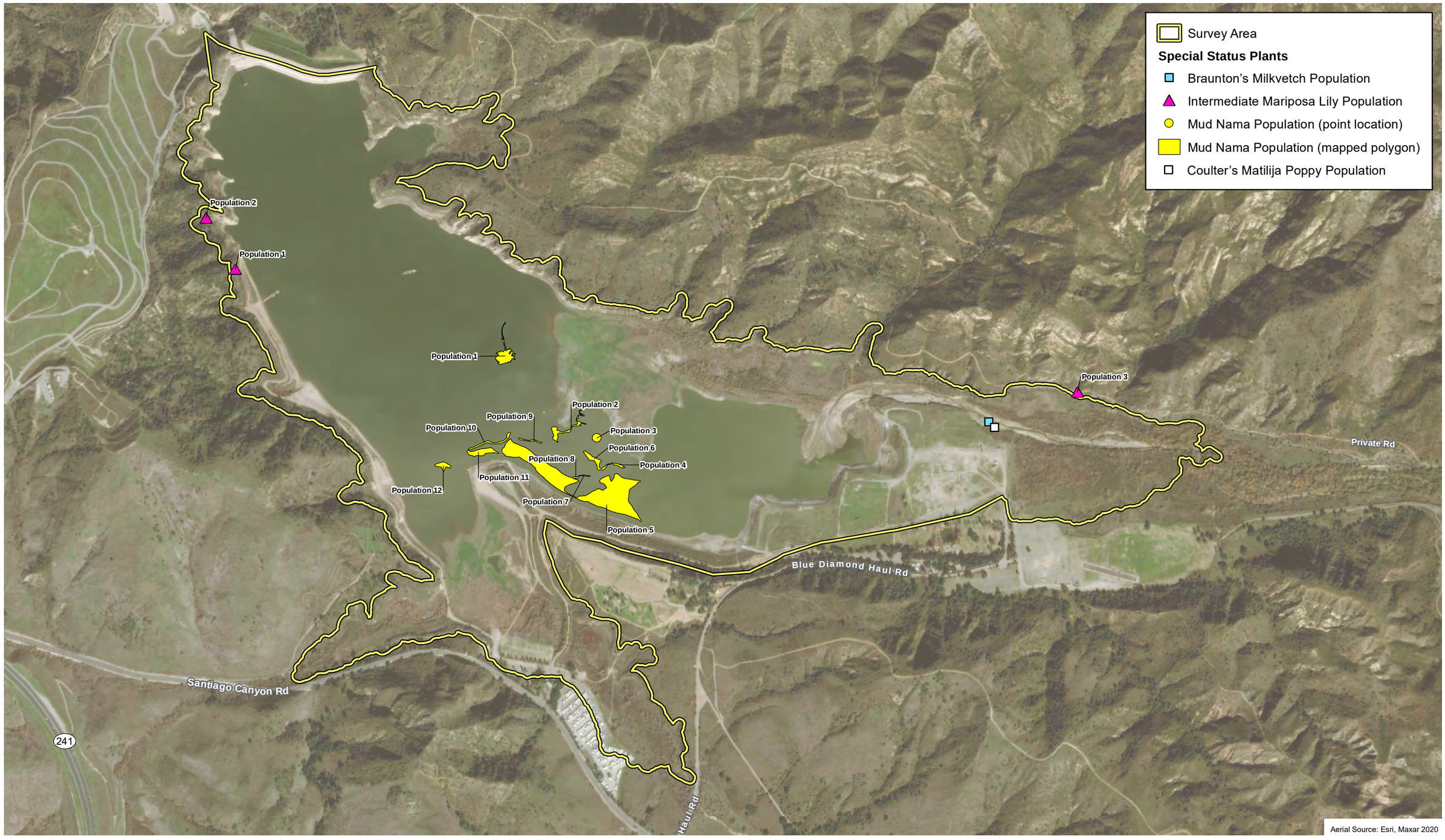
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

1,100 550 0 1,100 Feet

PSOMAS

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Soils.pdf



D:\Projects\3IRW\010200\MXD\SS_Plants\ex_SS_Species_20220815.mxd

Survey Results

Exhibit 5

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

1,000 500 0 1,000 Feet

PSOMAS

(Rev: 09/26/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_SurveyResults.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Braunton’s milkvetch observed in the survey area. September 13, 2022.

Intermediate mariposa lily observed in the survey area. May 23, 2022.

Mud nama habitat in the survey area. April 26, 2022.

Mud nama observed in the survey area. April 26, 2022.

D:\Projects\3IRW\010200\GRAPHICS\SS_Plants\Att_SP1_20220922.ai

Site Photographs

Attachment A

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(09/22/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\Att_SP.pdf

ATTACHMENT B

PLANT COMPENDIUM

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
LYCOPHYTES	
SELAGINELLACEAE – SPIKE–MOSS FAMILY	
Selaginella bigelovii	Bigelow's spike-moss
EUDICOTS	
ADOXACEAE – MUSKROOT FAMILY	
Sambucus mexicana	blue elderberry
AMARANTHACEAE – AMARANTH FAMILY	
*Amaranthus albus**	tumbleweed
ANACARDIACEAE – SUMAC FAMILY	
Malosma laurina	laurel sumac
Rhus integrifolia	lemonade berry
Rhus ovata	sugar bush
*Schinus molle**	pepper tree
Toxicodendron diversilobum	western poison oak
APIACEAE – CARROT FAMILY	
*Foeniculum vulgare**	fennel
*Torilis nodosa**	short sock-destroyer
APOCYNACEAE – DOGBANE FAMILY	
Asclepias fascicularis	narrow-leaf milkweed
ARECACEAE – PALM FAMILY	
*Washingtonia robusta**	Mexican fan palm
ASTERACEAE – SUNFLOWER FAMILY	
Acourtia microcephala	small-headed acourtia
Ambrosia acanthicarpa	annual bur-sage
Ambrosia psilostachya	western ragweed
Artemisia californica	California sagebrush
Baccharis pilularis ssp. consanguinea	coyote brush
Baccharis salicifolia ssp. salicifolia	mule fat
Baccharis sarothroides	broom baccharis
Bebbia juncea var. aspera	rough rush-like sweetbush
Brickellia californica	California brickellbush
*Carduus pycnocephalus ssp. pycnocephalus**	Italian thistle
*Centaurea melitensis**	tocalote
Chaenactis artemisiifolia	white pincushion
Cirsium occidentale	cobwebby thistle
*Cirsium vulgare**	bull thistle
*Cotula australis**	Australian cotula
*Cynara cardunculus ssp. cardunculus**	artichoke
Deinandra fasciculata	fascicled tarplant
Eclipta prostrata	false daisy
Encelia californica	California encelia
Encelia farinosa	brittlebush
Ericameria palmeri var. pachylepis	thickbracted goldenbush

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
*Erigeron bonariensis**	flax-leaved horseweed
Erigeron canadensis	horseweed
Eriophyllum confertiflorum var. confertiflorum	golden-yarrow
Hazardia squarrosa	saw-toothed goldenbush
*Hedypnois rhagadioloides**	Crete weed
Helianthus annuus	annual sunflower
Helianthus gracilentus	slender sunflower
*Helminthotheca echioides**	bristly ox-tongue
Heterotheca grandiflora	telegraph weed
*Hypochaeris glabra**	smooth cat's-ear
Isocoma menziesii	coastal goldenbush
*Lactuca serriola**	prickly lettuce
Logfia filaginoides	California cottonrose
*Logfia gallica**	daggerleaf cottonrose
Madia gracilis	gumweed
Malacothrix saxatilis	rocky malacothrix
*Matricaria discoidea**	pineapple weed
*Oncosiphon piluliferum**	stinknet
Pluchea sericea	arrow-weed
Pseudognaphalium biolettii	Bioletti's everlasting
Pseudognaphalium californicum	California everlasting
Pseudognaphalium canescens	hairy everlasting
*Pseudognaphalium luteoalbum**	white lamb everlasting
Psilocarphus brevissimus var. brevissimus	dwarf woollyheads
*Pulicaria paludosa**	marsh pulicaria
*Senecio vulgaris**	common groundsel
*Silybum marianum**	milk thistle
*Sonchus oleraceus**	common sow thistle
Stephanomeria diegensis	San Diego stephanomeria
Stylocline gnaphaloides	everlasting neststraw
*Taraxacum officinale**	common dandelion
Uropappus lindleyi	Lindley's silverpuffs
Xanthium strumarium	cocklebur
BORAGINACEAE – BORAGE FAMILY	
Amsinckia intermedia	common fiddleneck
Amsinckia menziesii	common fiddleneck
Cryptantha intermedia	intermediate cryptantha
Emmenanthe penduliflora	whispering bells
Eriodictyon crassifolium var. crassifolium	thick-leaved yerba santa
Eucrypta chrysanthemifolia	chrysanthemum-leaved eucrypta
Heliotropium curassavicum var. oculatum	seaside heliotrope
Nama stenocarpa	mud nama
Pectocarya linearis ssp. ferocula	narrow-toothed pectocarya

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
Phacelia cicutaria	cicuta-leaved phacelia
Phacelia parryi	Parry's phacelia
Pholistoma auritum var. auritum	fiesta flower
BRASSICACEAE – MUSTARD FAMILY	
*Brassica nigra**	black mustard
*Hirschfeldia incana**	grayish shortpod mustard
*Lepidium didymum**	lesser swine grass
Nasturtium officinale	water cress
*Raphanus sativus**	radish
Rorippa sp.	yellow cress
*Sisymbrium irio**	London rocket
*Sisymbrium orientale**	eastern sisymbrium
CACTACEAE – CACTUS FAMILY	
Opuntia littoralis	seaside prickly-pear
Opuntia vaseyi	Vasey's prickly-pear
CARYOPHYLLACEAE – PINK FAMILY	
*Silene gallica**	small-flower catchfly
Silene laciniata	torn catchfly
CHENOPODIACEAE – GOOSEFOOT FAMILY	
*Atriplex semibaccata**	Australian saltbush
*Chenopodium album**	lamb's quarters
*Salsola tragus**	Russian thistle
CONVOLVULACEAE – MORNING–GLORY FAMILY	
Calystegia macrostegia	large-bracted morning-glory
Cuscuta californica	chaparral dodder
CRASSULACEAE – STONECROP FAMILY	
Crassula connata	pygmy-weed
Dudleya lanceolata	lance-leaved dudleya
Dudleya pulverulenta	chalk dudleya
CUCURBITACEAE – GOURD FAMILY	
Cucurbita foetidissima	buffalo gourd
Marah macrocarpa	chilicothe
EUPHORBIACEAE – SPURGE FAMILY	
Croton setiger	turkey-mullein
Euphorbia albomarginata	rattlesnake sandmat
*Ricinus communis**	common castor bean
FABACEAE – LEGUME FAMILY	
Acmispon americanus var. americanus	American deervetch
Acmispon glaber	deerweed
Acmispon maritimus	coastal deervetch
Astragalus brauntonii	Braunton’s milkvetch
Astragalus pomonensis	Pomona milkvetch
*Cytisus multiflorus**	Spanish broom

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
Lupinus bicolor	miniature lupine
Lupinus hirsutissimus	stinging lupine
Lupinus succulentus	arroyo lupine
Lupinus truncatus	cut leaf lupine
*Medicago polymorpha**	variable burclover
*Melilotus albus**	white sweetclover
*Melilotus indicus**	sourclover
*Robinia pseudoacacia**	black locust
Trifolium willdenovii	tomcat clover
Vicia sp.	vetch
FAGACEAE – OAK FAMILY	
Quercus agrifolia	coast live oak
GERANIACEAE – GERANIUM FAMILY	
*Erodium botrys**	long-beaked filaree
*Erodium cicutarium**	redstem filaree
Geranium carolinianum	Carolina geranium
GROSSULARIACEAE – GOOSEBERRY FAMILY	
Ribes speciosum	fuchsia-flowered gooseberry
LAMIACEAE – MINT FAMILY	
*Marrubium vulgare**	common horehound
Salvia apiana	white sage
Salvia columbariae	chia
Salvia mellifera	black sage
Trichostema lanceolatum	vinegar weed
LOASACEAE – BLAZING STAR FAMILY	
Mentzelia micrantha	small-flowered blazing star
MALVACEAE – MALLOW FAMILY	
Malacothamnus fasciculatus var.	chaparral mallow
*Malva parviflora**	cheeseweed
Malvella leprosa	alkali-mallow
MONTIACEAE – MINER'S–LETTUCE FAMILY	
Claytonia perfoliata	miner's lettuce
MYRSINACEAE – MYRSINE FAMILY	
*Lysimachia arvensis**	scarlet pimpernel
MYRTACEAE – MYRTLE FAMILY	
Eucalyptus sp.*	gum tree
NYCTAGINACEAE – FOUR O'CLOCK FAMILY	
Mirabilis laevis var. crassifolia	wishbone bush
ONAGRACEAE – EVENING PRIMROSE FAMILY	
Camissoniopsis micrantha	small-flowered camissoniopsis
Clarkia purpurea	purple clarkia
Epilobium ciliatum	fringed willowherb
Gayophytum sp.	gayophytum

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
OROBANCHACEAE – BROOM–RAPE FAMILY	
Castilleja exserta	purple owl's-clover
Cordylanthus rigidus ssp. setiger	bristly rigid bird's-beak
PAEONIACEAE – PEONY FAMILY	
Paeonia californica	California peony
PAPAVERACEAE – POPPY FAMILY	
Eschscholzia californica	California poppy
Romneya coulteri	Coulter's matilija poppy
PHRYMACEAE – LOPSEED FAMILY	
Diplacus australis	southern monkeyflower
Erythranthe cardinalis	scarlet monkeyflower
Erythranthe guttata	common monkeyflower
PINACEAE – PINE FAMILY	
Pinus sp.*	pine
PLANTAGINACEAE – PLANTAIN FAMILY	
Keckiella antirrhinoides	antirrhinum-like bush penstemon
Keckiella cordifolia	heart-leaved bush penstemon
Plantago erecta	erect plantain
*Veronica anagallis-aquatica**	water speedwell
PLATANACEAE – SYCAMORE FAMILY	
Platanus racemosa	western sycamore
POLYGONACEAE – BUCKWHEAT FAMILY	
Eriogonum fasciculatum	California buckwheat
Persicaria lapathifolia	willow weed
*Polygonum aviculare**	knotweed
Pterostegia drymarioides	fairy mist
*Rumex crispus**	curly dock
ROSACEAE – ROSE FAMILY	
Adenostoma fasciculatum	chamise
Heteromeles arbutifolia	toyon
RUBIACEAE – COFFEE FAMILY	
Galium angustifolium ssp. angustifolium	narrow-leaved bedstraw
Galium aparine	goose grass
SALICACEAE – WILLOW FAMILY	
Populus fremontii ssp. fremontii	Fremont cottonwood
Salix exigua	narrow-leaved willow
Salix gooddingii	Goodding's black willow
Salix laevigata	red willow
Salix lasiolepis	arroyo willow
SCROPHULARIACEAE – FIGWORT FAMILY	
Scrophularia californica	California figwort
Verbascum sp.*	mullein

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
SOLANACEAE – NIGHTSHADE FAMILY	
Datura wrightii	Wright's jimsonweed
*Nicotiana glauca**	tree tobacco
Solanum americanum	American nightshade
Solanum umbelliferum	umbelled nightshade
TAMARICACEAE – TAMARISK FAMILY	
*Tamarix ramosissima**	saltcedar
URTICACEAE – NETTLE FAMILY	
*Urtica urens**	dwarf nettle
VERBENACEAE – VERVAIN FAMILY	
Phyla nodiflora	node-flowered phyla
Verbena bracteata	bracted vervain
Verbena lasiostachys	woolly-flowered vervain
VIOLACEAE – VIOLET FAMILY	
Viola pedunculata	Johnny-jump-up
MONOCOTS	
AGAVACEAE – AGAVE FAMILY	
Chlorogalum sp.	soap plant
Hesperoyucca whipplei	Whipple's chaparral yucca
CYPERACEAE – SEDGE FAMILY	
Cyperus sp.	flatsedge
Eleocharis sp.	spikerush
IRIDACEAE – IRIS FAMILY	
Sisyrinchium bellum	western blue-eyed-grass
JUNCACEAE – RUSH FAMILY	
Juncus bufonius	toad rush
Juncus mexicanus	Mexican rush
Juncus xiphioides	iris-leaved rush
LILIACEAE – LILY FAMILY	
Calochortus splendens	splendid mariposa lily
Calochortus weedii var. intermedius	intermediate mariposa-lily
POACEAE – GRASS FAMILY	
*Arundo donax**	giant reed
*Avena barbata**	slender wild oat
*Avena fatua**	wild oat
Bothriochloa barbinodis	cane bluestem
*Brachypodium distachyon**	two-corn false brome
*Bromus diandrus**	ripgut grass
*Bromus hordeaceus**	soft chess
*Bromus rubens**	red brome
*Cortaderia selloana**	pampas grass
*Crypsis schoenoides**	swamp prickle grass
*Cynodon dactylon**	Bermuda grass

PLANTS OBSERVED IN THE SURVEY AREA DURING 2022 SPECIAL STATUS PLANT SURVEYS

Species	
Scientific Name	**Common Name**
Elymus condensatus	giant wild-rye
*Festuca myuros**	rattail sixweeks grass
*Festuca perennis**	rye grass
*Gastridium phleoides**	nit grass
*Hordeum murinum ssp. leporinum**	hare barley
*Lamarckia aurea**	goldentop
Melica imperfecta	little California melica
*Pennisetum setaceum**	crimson fountain grass
*Polypogon monspeliensis**	annual beard grass
*Polypogon viridis**	water beard grass
*Schismus barbatus**	barbed Mediterranean grass
Stipa lepida	foothill needle grass
*Stipa miliacea var. miliacea**	smilo grass
Stipa pulchra	purple needle grass
THEMIDACEAE – BRODIAEA FAMILY	
Bloomeria crocea	common goldenstar
Dipterostemon capitatus	blue dicks
TYPHACEAE – CATTAIL FAMILY	
Typha sp.	Cattail
* Non-native or invasive species	

ATTACHMENT C

CNDDB FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code RUD22F0004
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Astragalus brauntonii*

Common name: Braunton's milk-vetch

Date of field work (mm-dd-yyyy): 09-13-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300 , Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 325-0129

Other observers: Sarah Thomas

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in: CalPhotos

By another person: Sandra Leatherman, Andrew Sanders

Other:

Identification explanation: images reviewed by Sandra Leatherman and Andrew Sanders

Identification confidence: Confident

Species found: Yes **If not found, why not?**

Level of survey effort: Used CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.

Total number of individuals: 1

Collection? **Collection number:**

Museum/Herbarium:

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
100 %		

SITE INFORMATION

Habitat description: Observed in sandy channel of Santiago Creek upstream of reservoir in an opening of mule fat scrub. Associated species include Baccharis salicifolia ssp. salicifolia, Phacelia cicutaria, and Erigeron canadensis.

Slope: flat

Land owner/manager: County of Orange

Aspect: n/a

Site condition + population viability: Good

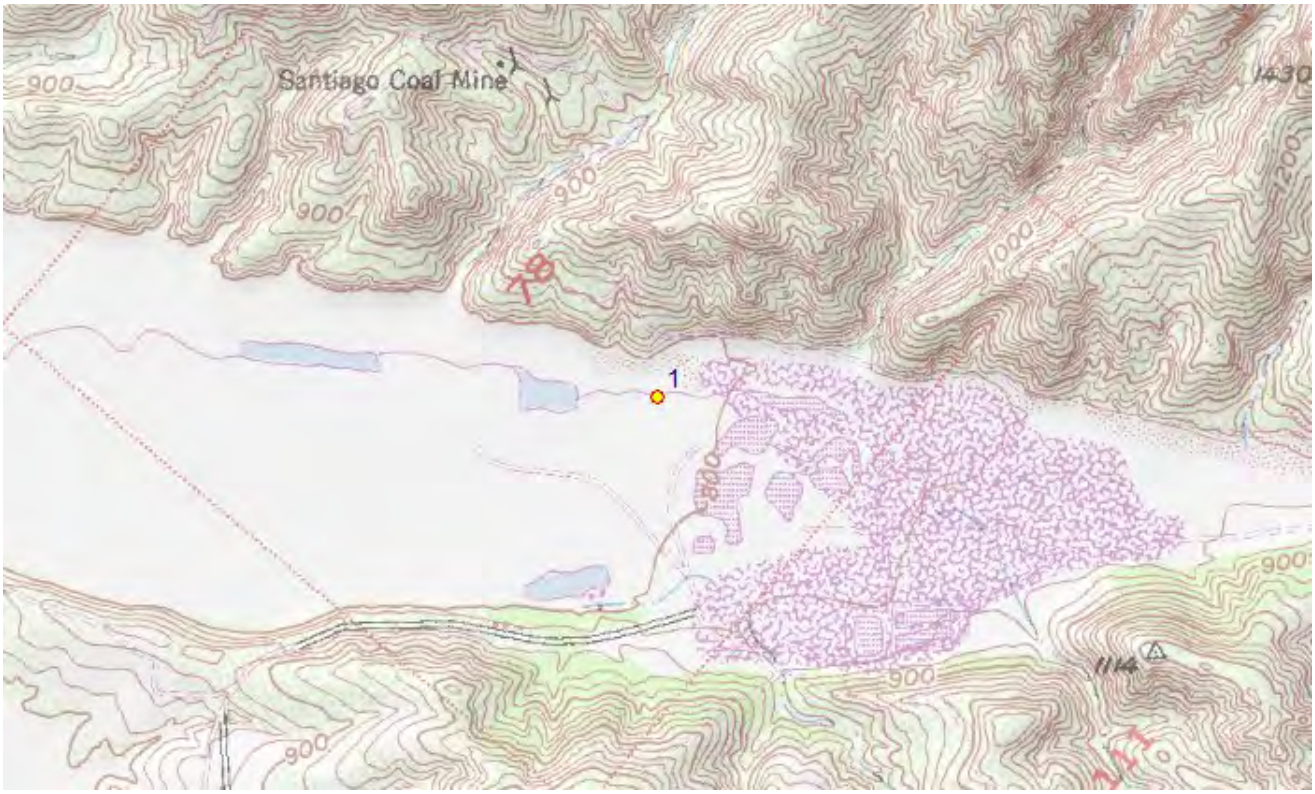
Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road

Visible disturbances: non-native species

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	786	33.77572	-117.70013	435174	3737509	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34							

The mapped feature is accurate within: 10 m

Source of mapped feature: Olympus T-5 camera with internal GPS

Mapping notes:

Location/directions comments:

Attachment(s): 3IRW010200_091322 (28).JPG

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code RUD22F0001
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Calochortus weedii var. intermedius*

Common name: intermediate mariposa-lily

Date of field work (mm-dd-yyyy): 05-26-2022

Comment about field work date(s): Species observed on 05/23/2022

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300 , Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 325-0129

Other observers: Erin Ruckman

DETERMINATION

Keyed in: Jepson eFlora. 2022.

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Followed CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
	100 %	

SITE INFORMATION

Habitat description: In rocky soil of sagebrush scrub vegetation. Associated species include Artemisia californica, Salvia mellifera, Marah macrocarpa, Baccharis salicifolia ssp. salicifolia, Encelia californica, and Stipa miliacea var. miliacea.

Slope: moderately steep

Land owner/manager: County of Orange

Aspect: southeast to east

Site condition + population viability: Good

Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road.

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	794	33.78014	-117.72724	432667	3738017	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	Population 1; 2 individuals blooming.						

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.78168	-117.72830	432570	3738188	11
2	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	Population 2; 2 individuals blooming.						

The mapped feature is accurate within: 10 m

Source of mapped feature: Garmin handheld GPS, accuracy 20 feet

Mapping notes:

Location/directions comments:

Attachment(s): 3IRW010200_052322 (28).JPG; 3IRW010200_052322 (32).JPG; 3IRW010200_052322 (30).JPG

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code RUD22F0002
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Calochortus weedii var. intermedius*

Common name: intermediate mariposa-lily

Date of field work (mm-dd-yyyy): 05-26-2022

Comment about field work date(s): Species observed on 05/23/2022

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300 , Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 325-0129

Other observers: Erin Ruckman

DETERMINATION

Keyed in: Jepson eFlora

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Followed CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
	100 %	

SITE INFORMATION

Habitat description: On east-west running ridgeline in sagebrush scrub vegetation. Associated species include Artemisia californica, Adenostoma fasciculatum, Bromus rubens, and Hirschfeldia incana.

Slope: gentle

Land owner/manager: County of Orange

Aspect: southwest

Site condition + population viability: Good

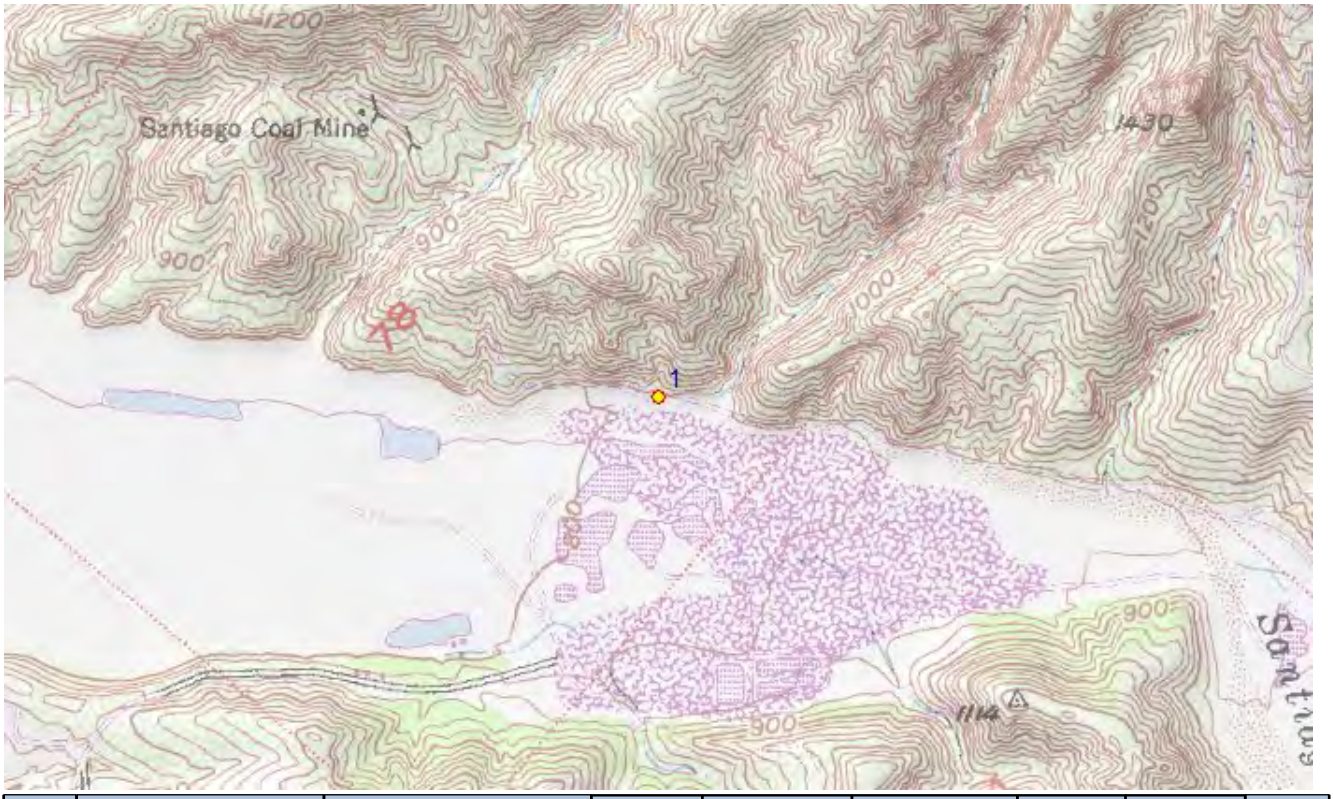
Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road.

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	820	33.77664	-117.69693	435471	3737609	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	1 individual blooming						

The mapped feature is accurate within: 10 m

Source of mapped feature: Garmin handheld GPS; accuracy 20 feet

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code RUD22F0003
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Nama stenocarpa*

Common name: mud nama

Date of field work (mm-dd-yyyy): 05-26-2022

Comment about field work date(s): Species observed on 4/26/2022 and 4/28/2022

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300 , Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 325-0129

Other observers: Sandra Leatherman

DETERMINATION

Keyed in: Jepson eFlora

Compared w/ specimen at:

Compared w/ image in:

By another person: Sandra Leatherman

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Used CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. Estimated population density based on counts in 10 1-square-foot quadrats for low, medium, and high density areas

Total number of individuals: 3,500,000-5,500,000

Collection? Yes **Collection number:** Sandra Leatherman

Museum/Herbarium: University of California, Riverside

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
98 %	2 %	

SITE INFORMATION

Habitat description: Observed along lakeshore in open areas of riparian herb vegetation. Area is periodically inundated. Associated species include Polypogon monspeliensis, Melilotus albus, Melilotus indicus, Tamarix ramosissima, Heliotropium curassavicum var oculatum, Baccharis salicifolia ssp salicifolia, Cyperus sp., Pseudognaphalium sp., Nasturtium officinale, and Persicaria lapathifolia.

Slope: flat

Aspect: n/a Land owner/manager: County of Orange

Site condition + population viability: Good

Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road

Visible disturbances: dirt roads, non-native species

Threats: Periodically used dirt access roads

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77474	-117.71611	433693	3737411	11
	Public Land Survey	**Feature Comment**						
1	S T04S R08W 33	Approximate center of populations						

The mapped feature is accurate within: 500 m

Source of mapped feature: Garmin handheld GPS

Mapping notes: Mapped population extent and estimated population density. See attached kmz for individual populations.

Location/directions comments:

Attachment(s): 3IRW010200_042622 (35).JPG, Representative habitat; 3IRW010200_042622 (45).JPG; 3IRW010200_042622 (47).JPG; Mud Nama Data_2022.kmz

APPENDIX F

QUINO CHECKERSPOT SURVEY

May 2, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for the Quino Checkerspot Butterfly for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused surveys for the Quino checkerspot butterfly (*Euphydras editha quino*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the Quino checkerspot butterfly on or immediately adjacent to the project site. Surveys were conducted by a Biologist who holds the necessary Federal Endangered Species Act survey permit and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS 2014). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on February 3, 2022.

PROJECT LOCATON AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the project site. Elevations in the project site range from approximately 657 to 996 feet above mean sea level.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase but would be located within the survey area provided by IRWD.

SURVEY AREA

A variety of vegetation types occur on the project site, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

Focused surveys for the Quino checkerspot butterfly were conducted within all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas) including a 50-foot buffer around the tentative impact footprint. All other vegetation types on the project site were excluded from focused surveys (Exhibit 3).

The Quino survey areas contained suitable habitat, open ground, clay soils, host plants, and/or nectar sources. These habitat types were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*), purple owl's-clover (*Castilleja exserta*), and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*), as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses (*Avena* sp. and *Bromus* spp.). Concentrations of host plants were mapped (Exhibit 4). Site photographs of representative habitat in the survey area are provided in Attachment A.

[1] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

BACKGROUND

The Quino checkerspot butterfly is a federally listed Endangered species. This species is known to occur in San Diego and Riverside Counties, as well as Baja California Norte, Mexico. The historic range of this species included much of coastal California south of Ventura County and inland valleys south of the Tehachapi Mountains. The distribution and abundance of the Quino checkerspot butterfly has been dramatically reduced during the past century as a result of agricultural and urban development and other land-use changes in Southern California (USFWS 2003).

According to the Recovery Plan, more than 75 percent of the Quino checkerspot butterfly's historic range has been lost, including more than 90 percent of its coastal mesa and bluff distribution. The Recovery Plan also states that Quino checkerspot butterfly populations appear to have been reduced in number and size by more than 95 percent range-wide, due to direct and indirect human impacts, including habitat loss and fragmentation, infestation of non-native plant species, and disrupted fire regimes (USFWS 2003).

The life cycle of the Quino checkerspot butterfly typically includes one generation of adults per year, with a four- to six-week flight period. The flight season begins from late January to early March and may continue as late as early May, depending on weather conditions (Emmel and Emmel 1973; USFWS 2003). If a sufficient amount of rain falls in late summer or early fall, a rare second generation of Quino checkerspot butterfly may occur in reduced numbers (Mattoni et al. 1997). Females usually mate on the day they emerge from pupae and lay one or two egg clusters per day for most of their adult life. Adults live from 10 to 14 days; however, adult emergence from pupae is staggered, resulting in a 1-to-2-month flight season. As with most brush-footed butterflies, peak emergence for Quino checkerspot butterfly Quino checkerspot butterfly is expected to occur in the second week of the flight season (USFWS 2003).

Eggs deposited by adults hatch in 10 to 14 days. As many as seven larval molts (instars) may occur prior to pupation. During larval development, the host plants age, eventually dry out and become inedible (senescence). At the time of host plant senescence, if larvae are old enough and have accumulated sufficient reserves, they are able to enter diapause, a resting state that enables larvae to maintain a low metabolic rate and survive harsh environmental conditions that could not typically be tolerated. Like many other related butterflies, Quino checkerspot butterfly larvae can live for several years. One mechanism that generates longevity is repeated diapause (Singer and Ehrlich 1979), which occurs when larvae emerge from diapause, feed, and then re-enter diapause, postponing development until the next year. It has been suggested that Quino checkerspot butterfly larvae may also be able to survive without "breaking" diapause to feed in extremely dry years (USFWS 2003). It is unknown whether Quino checkerspot butterfly larvae can store enough energy reserves to prolong diapause without feeding at all for more than a year (USFWS 2003).

The Quino checkerspot butterfly is a member of the brush-footed butterfly family *Nymphalidae*. The dorsal (top) sides of the wings have a red, black, and cream-colored checkered pattern, with a distinctively larger orange subterminal band on the lower hind wings. The ventral (bottom) sides are dominated by a checkered red and cream pattern with heavy black lines separating the colors. The abdomen of the Quino checkerspot butterfly has three red bands, which makes it distinct from the three checkerspot species that could co-occur with the Quino: Chalcedon/Variable checkerspot (*E. chalcedona*) have red bands with white dots; Gabb's checkerspot (*Chlosyne gabbii gabbii*) have orange bands and no dots; and Leanira checkerspots (*Chlosyne leanira*) have cream bands and no dots (USFWS 2003).

The larva (caterpillar of the Quino checkerspot butterfly) can be distinguished after their second molt by the characteristic dark-black coloration and row of eight to nine orange tubercles on their back. Larvae feed on specific plants (host plants), primarily two types of plantain, erect plantain and Patagonian plantain (*Plantago patagonica*) when developing. Secondary host plants that may be utilized when

plantain is not available include Coulter's snapdragon (*Antirrhinum coulterianum*), rigid bird's beak (*Cordlyanthus rigidus*), purple owl's-clover, Chinese houses (*Collinsia* spp.), and possibly related Indian paintbrush (*Castilleja affinis* ssp. *affinis*). The USFWS published a Revised Critical Habitat for Quino checkerspot butterfly on June 17, 2009. The designation covers 62,125 acres of land in San Diego and Riverside Counties (USFWS 2009). The project site is not located in the Revised Critical Habitat for the Quino checkerspot butterfly.

SURVEY METHODOLOGY

All Quino checkerspot butterfly surveys were conducted following guidelines from USFWS Survey Protocol (USFWS 2014) to maximize detection of adults during the flight season. Protocol surveys consist of an initial site assessment to determine if the project site contains areas recommended for Quino checkerspot butterfly surveys. If the project site is determined to be comprised solely of excluded areas (described below), Quino checkerspot butterfly surveys are not recommended. If a project site has areas suitable for butterfly surveys (non-excluded areas), then surveys should be conducted in those portions of the project site. Per USFWS protocol, five weekly focused surveys were conducted beginning the third week of February.

Site Assessment

All areas within 50-feet of the proposed impact footprint (including additional inundation areas) were included in the site assessment. The site assessment was conducted prior to the first focused butterfly survey to identify which portions of the project site provide suitable habitat for Quino checkerspot butterfly. The assessment was conducted by Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) on February 15 and 16, 2022.

Orchards, developed areas, or small in-fill parcels (plots smaller than one acre that are completely surrounded by urban development) largely dominated by non-native vegetation, active/in-use agricultural fields, closed-canopy forests or riparian areas, dense chaparral, and small openings (less than one acre) completely enclosed within dense chaparral, were considered unsuitable and designated as "excluded areas". Areas outside of excluded areas, regardless of the presence/absence of host plants and nectar sources, were considered potential habitat areas.

Quino Survey Area

All areas that were not excluded were surveyed for Quino checkerspot butterfly, regardless of host plant presence, absence, and/or density. The Quino checkerspot butterfly is generally associated with sage scrub, open chaparral, grasslands, and vernal pools. Within these communities, they are usually observed in open or sparsely vegetated areas (including trails and dirt roads), on hilltops, and on ridgelines. All wildlife species observed were recorded (Attachment B).

Vegetation types in the survey area were previous mapped by Psomas Senior Biologist Allison Rudalevige downstream of the dam in February 2020. Ms. Rudalevige and Ms. Messett mapped vegetation mapping upstream of the dam in September 2020. Nomenclature of vegetation types generally follows that of Gray and Bramlet (1992) but was cross-referenced to A Manual of California Vegetation (CNPS 2020), which is the most current vegetation classification system used by the California Department of Fish and Wildlife (CDFW) for assessing sensitive natural communities (CDFW 2020).

Focused Surveys

The survey area contained approximately 308 acres of suitable habitats that could not be excluded per USFWS protocol (Exhibit 3); two days were required to complete each survey visit. The survey visits were divided into two areas (i.e., upstream of Santiago Dam and downstream of Santiago Dam). Ms. Messett conducted five rounds of focused survey visits in the survey areas during the 2022 flight season. Surveys were conducted once per week (weather permitting) on non-consecutive days during the peak of the flight season on February 18, 19, 25, 27; March 3, 4, 10, 11, 17, and 18, 2022. Table 1 below summarizes the survey conditions during each of the ten surveys.

TABLE 1
SUMMARY OF QUINO CHECKERSPOT BUTTERFLY SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Surveyor	Weather Conditions		
					Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Dam	February 18, 2022	0900/1500	Messett	62/70	0–1/2–5	Clear/Clear
1	Upstream of Santiago Dam	February 19, 2022	0930/1530	Messett	60/70	0–1/4–6	25/20
2	Downstream of Santiago Dam	February 25, 2022	1000/1600	Messett	60/63	2–3/5–7	Clear/Clear
2	Upstream of Santiago Dam	February 27, 2022	1000/1545	Messett	61/70	0–1/5–6	10/10
3	Upstream of Santiago Dam	March 3, 2022	0930/1555	Messett	62/67	1–2/8–10	50/30
3	Downstream of Santiago Dam	March 4, 2022	0915/1530	Messett	63/65	0–1/2–5	50/50
4	Upstream of Santiago Dam	March 10, 2022	0845/1550	Messett	63/71	2–3/4–6	30/Clear
4	Downstream of Santiago Dam	March 11, 2022	0815/1530	Messett	68/74	3–4/6–8	Clear/Clear
5	Upstream of Santiago Dam	March 17, 2022	0930/1600	Messett	65/80	0–1/2–5	25/30
5	Downstream of Santiago Dam	March 18, 2022	0900/1515	Messett	68/74	1–2/4–6	Clear/Clear

Surveys focused on likely breeding areas (host plant patches), feeding areas (nectaring plant patches), and topographical features conducive to detecting the Quino checkerspot butterfly (ridgelines, hilltops, rock outcrops, dirt roads, and open ground with clay soils). Survey areas were walked at an average rate of 10 to 15 acres per hour. Binoculars were used to identify the majority of butterfly species that could not be seen at close range. General survey forms were filled out for each survey, noting weather conditions, survey date, start and end times, and nectaring sources in bloom (Attachment C).

SURVEY RESULTS

Two host plant species: erect plantain and purple owl's-clover were observed in the survey area. Plantain was located throughout the survey area with the most abundant patches located downstream of Santiago Dam (in the northern portion of the survey area) and in the central-southern portion of the survey area, south of Irvine Lake. A few individual purple owl's-clover were observed on the project site in this same general location (Exhibit 4).

Several nectar sources occur throughout the survey area, including valley popcornflower (*Plagiobothrys canescens*), common fiddleneck (*Amsinckia intermedia*) and (*Amsinckia menziesii*), red maids (*Calandrinia menziesii*), blue dicks (*Dipterostemon capitatus*), common goldfields (*Lasthenia gracilis*), western blue-eyed grass (*Sisyrinchium bellum*), and California buckwheat (*Eriogonum fasciculatum*).

Several topographic features (i.e., rock outcrops, dirt roads) known to attract Quino checkerspot butterfly and other butterfly species were present in the survey area.

No Quino checkerspot butterfly larvae or adults were observed during the surveys.

OTHER OBSERVATIONS

Four special status species were observed and/or detected in the survey area during the surveys: bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected), American peregrine falcon (*Falco peregrinus anatum*, California Fully Protected), coastal California gnatcatcher (*Polioptila californica californica*, federally Threatened, California Species of Special Concern), and southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*, CDFW Watch List) (Exhibit 4). These species are all tracked by the California Natural Diversity Database (CNDDB). The bald eagles were observed at their nest during a focused survey for coastal California gnatcatcher for the same project; the CNDDB form for bald eagle will be attached to that report (Psomas 2022 [in preparation]). CNDDB forms for the other three species are included in Attachment D and will be submitted online by Ms. Messett.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager, Resource Management

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.

Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-5)

Attachments: Exhibits 1–4
A – Site Photographs
B – Plant and Wildlife Compendium
C – Data Sheets
D – CNDDB Forms

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com
David Mayer, David.Mayer@wildlife.ca.gov
AskR5@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW010200\Documentation\Quino Report\Santiago QCB-050922.docx

REFERENCES

California Department of Fish and Wildlife (CDFW). 2020 (September 9). *California Natural Communities List*. Natural Communities List Arranged Alphabetically by Life Form (PDF). Sacramento, CA: CDFW Biogeographic Data Branch. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

California Native Plant Society (CNPS). 2020 (February 24 and September 21, dates accessed). A Manual of California Vegetation, Online Edition. Sacramento, CA: CNPS. http://www.cnps.org/cnps/vegetation/.

Emmel, T.C. and J.F. Emmel. 1973 (November 30). The Butterflies of Southern California. *Natural History Museum of Los Angeles County, Science Series 26.* Los Angeles, CA: Natural History Museum of Los Angeles County.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

Mattoni, R., G.F. Pratt, T.R. Longcore, J.F. Emmel, and J.N. George. 1997. The Endangered Quino Checkerspot Butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). *Journal of Research on the Lepidoptera* 34:99–118. Arcadia, CA: Lepidoptera Research Foundation.

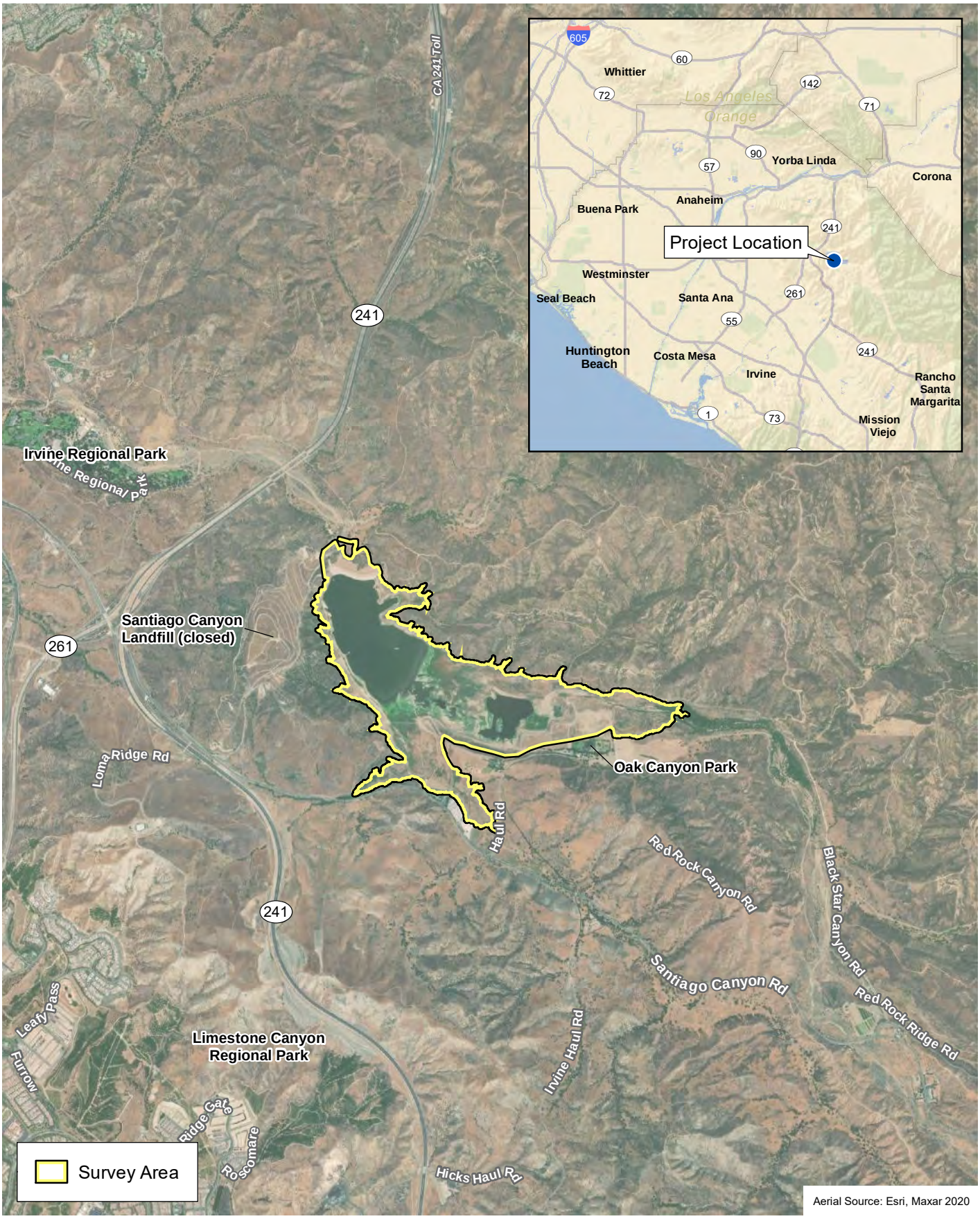
Psomas. 2022 [in preparation]. Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California. Santa Ana, CA.

Singer, M.C. and P.R. Elrich. 1979. Population dynamics of the checkerspot butterfly *Euphydryas editha*. *Fortschritte der Zoologie* 25:53–60.

U.S. Fish and Wildlife Service (USFWS). 2014 (December). *Quino Checkerspot Butterfly Survey Guidelines*. Carlsbad, CA: USFWS.

———. 2009 (June 17). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Quino Checkerspot Butterfly (Euphydryas editha quino); Final Rule. *Federal Register* 74(115): 28776–28862. Washington, D.C.: USFWS.

———. 2003 (September). *List of California Terrestrial Natural Communities Recognized by the Natural Diversity Data Base.* Sacramento, CA: CDFG, Natural Heritage Division.



D:\Projects\3IRW\010200\MXD\Quino\ex_LV_RL_20220425.mxd

Regional Location and Local Vicinity

Exhibit 1

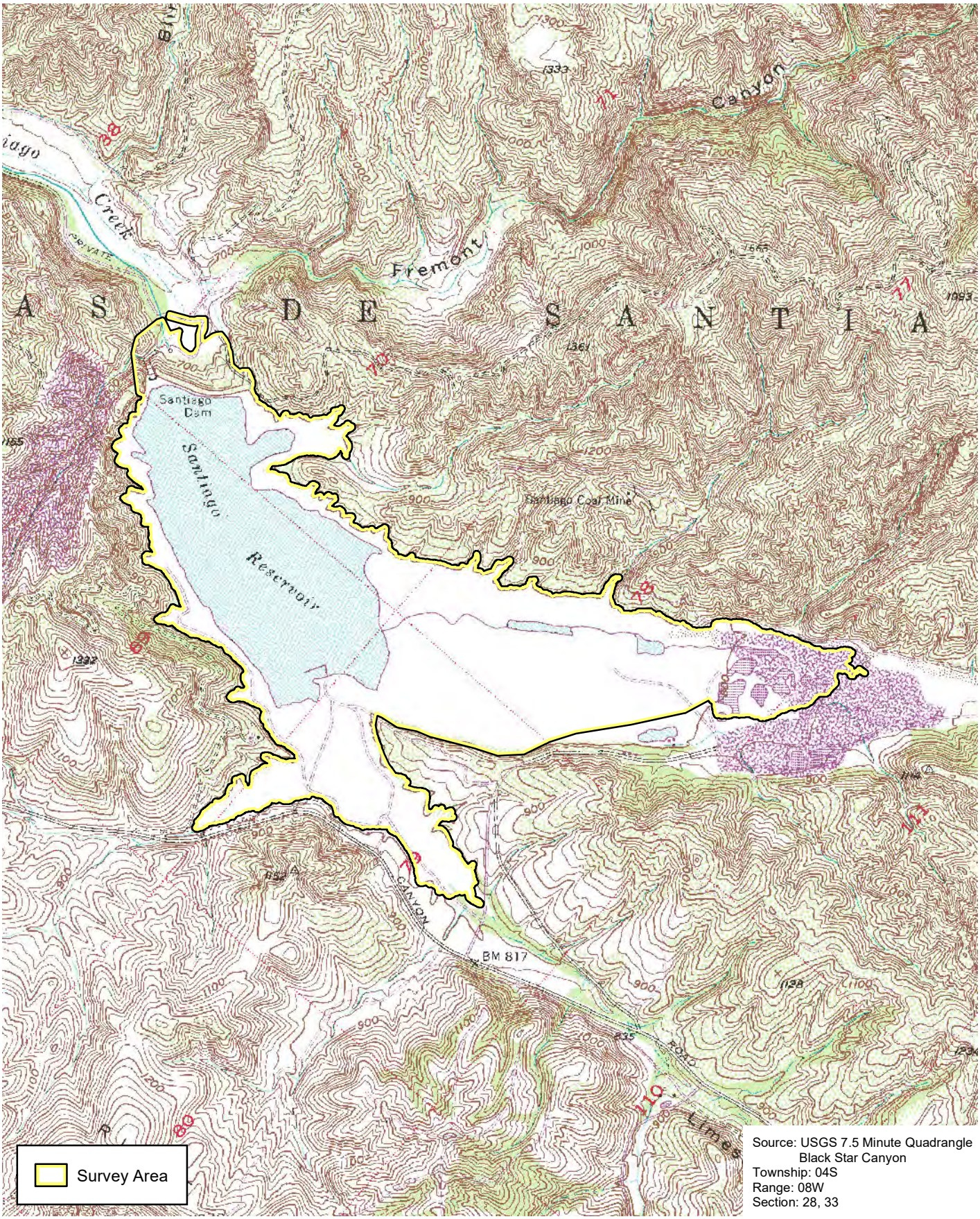
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

4,000 2,000 0 4,000 Feet

PSOMAS

(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_LV_RL.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S
Range: 08W
Section: 28, 33

Quino Checkerspot Survey Area

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

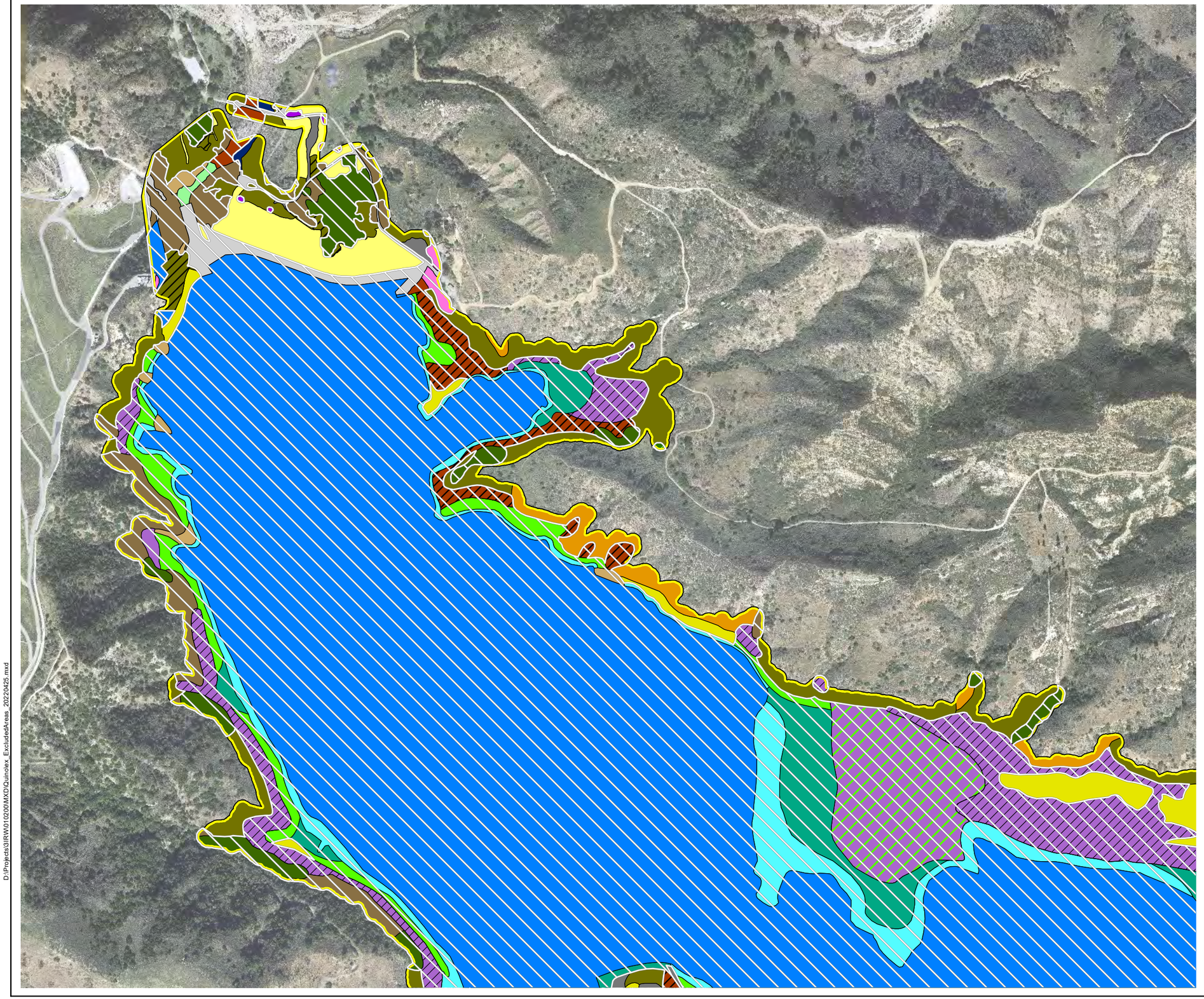
N
W E
S

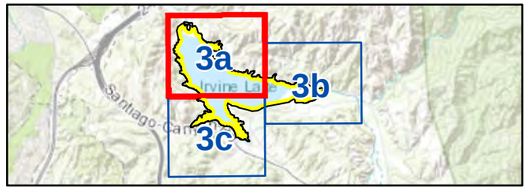
2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 5-02-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_Quino_SurveyArea.pdf

D:\Projects\3IRW\010200\MXD\Quino\ex_Quino_SurveyArea_20220425.mxd





Survey Area
Excluded Areas

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Disturbed Floodplain Sage Scrub (2.6)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Southern Willow Scrub (7.2)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Western Sycamore (8.x)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600
Feet

Aerial Source: Hexagon Geosytems 2017
Esri, Maxar 2020

Excluded Areas

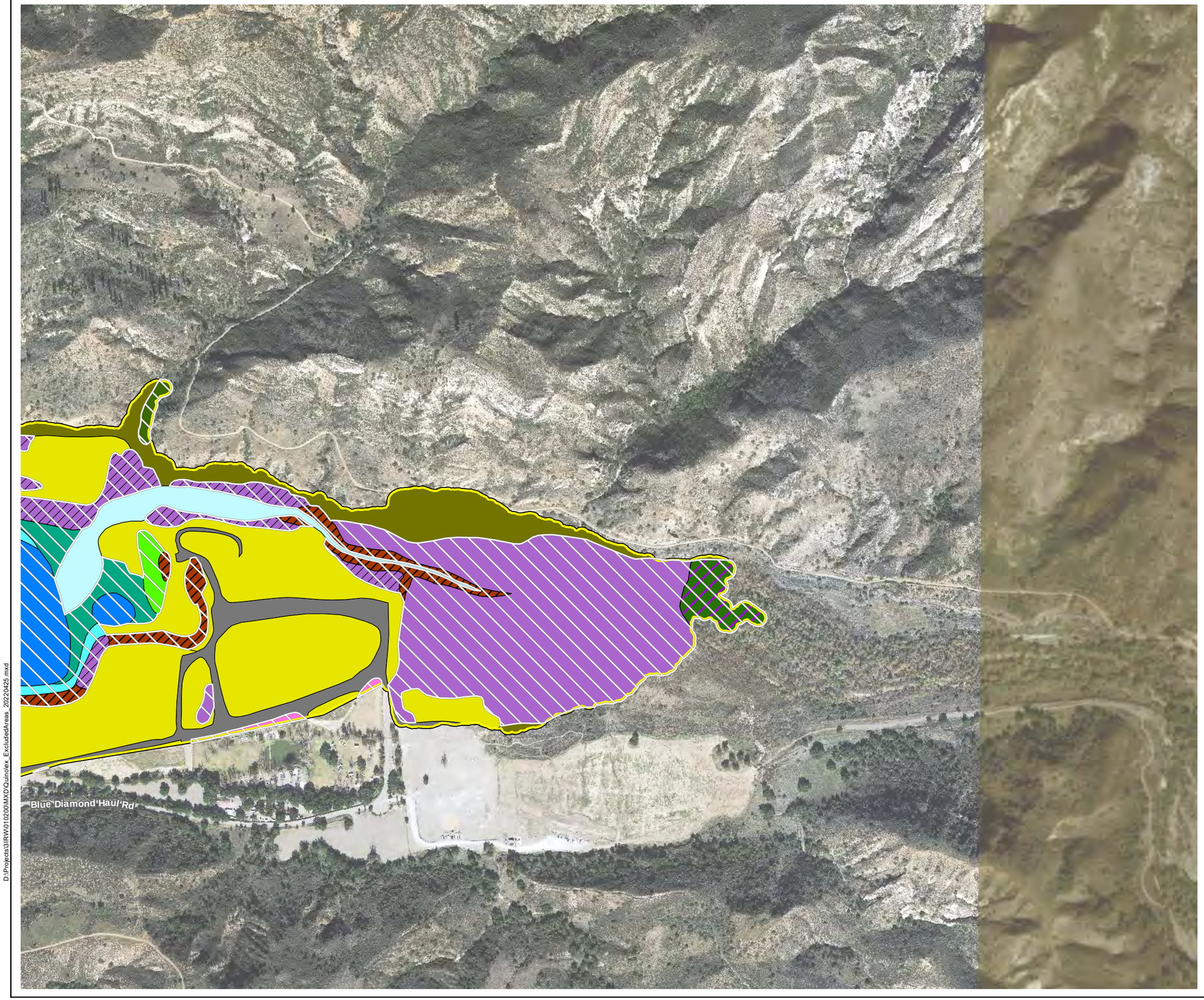
Exhibit 3a

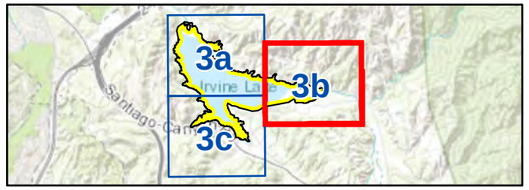
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_Excluded.pdf

D:\Projects\3IRW010200\MXD\Quino\ex_ExcludedAreas_20220425.mxd





Survey Area
Excluded Areas

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Hexagon Geosytems 2017
Esri, Maxar 2020

Excluded Areas

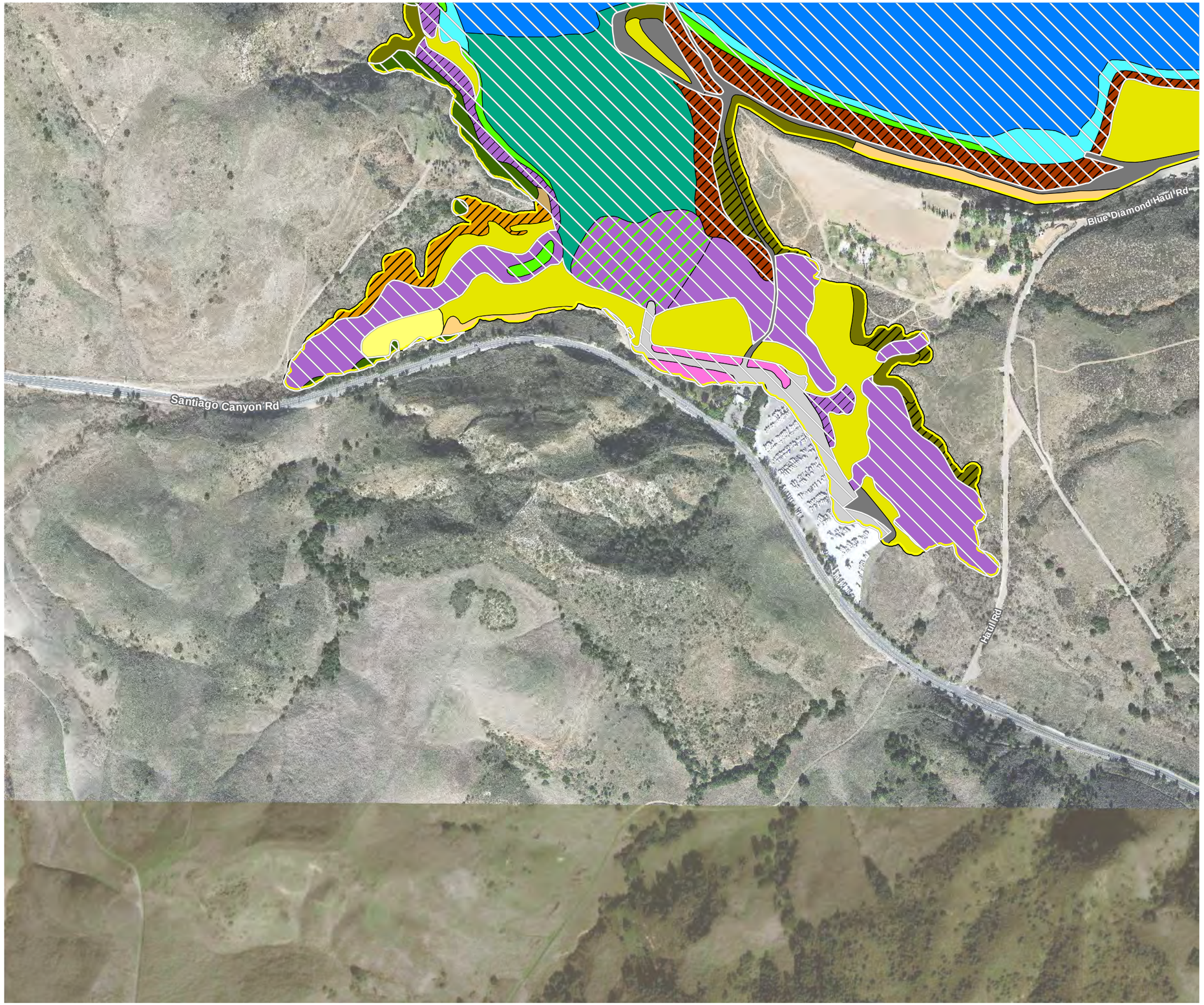
Exhibit 3b

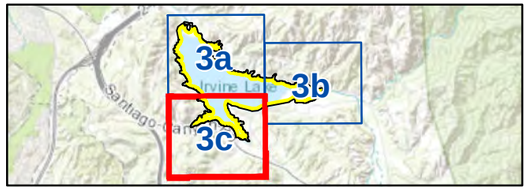
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_Excluded.pdf

D:\Projects\3IRW\010200\MXD\Quino\ex_ExcludedAreas_20220425.mxd





Survey Area
Excluded Areas

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Hexagon Geosytems 2017
Esri, Maxar 2020

Excluded Areas

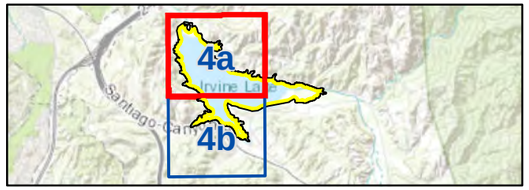
Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_Excluded.pdf

D:\Projects\3IRW\010200\MXD\Quino\ex_ExcludedAreas_20220425.mxd



Survey Area

Host Plant Locations

Erect Plantain

Erect Plantain and Purple Owl's Clover

Special Status Species Observed

American Peregrine Falcon

Coastal California Gnatcatcher Pair

Southern California Rufous-Crowned Sparrow

N
W E
S

600 300 0 600
Feet

Aerial Source: Hexagon Geosytems 2017
Esri, Maxar 2020

Survey Results

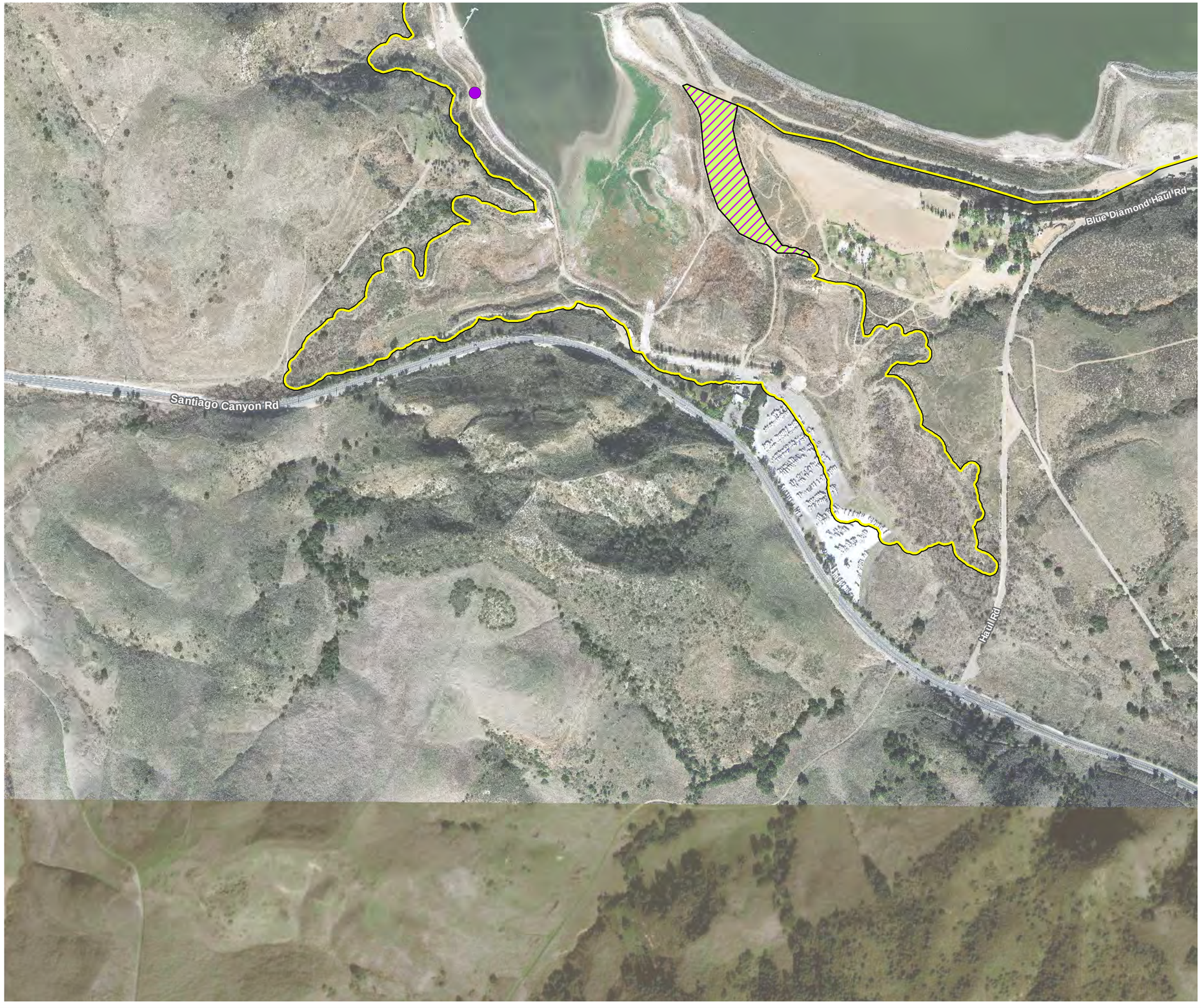
Exhibit 4a

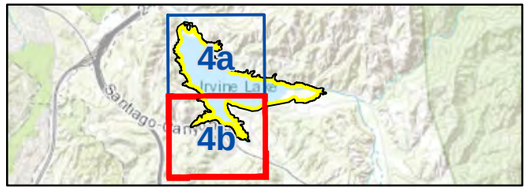
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 05/05/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_SurveyResults.pdf

D:\Projects\3IRW\010200\MXD\Quinolex_SurveyResults_20220427.mxd





Survey Area

Host Plant Locations

Erect Plantain and Purple Owl's Clover

Special Status Species Observed

Bald Eagle

N
W E
S

600 300 0 600
Feet

Aerial Source: Hexagon Geosytems 2017
Esri, Maxar 2020

Survey Results — Exhibit 4b

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 05/05/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\ex_SurveyResults.pdf

D:\Projects\3IRW\010200\MXD\Quinolex_SurveyResults_20220427.mxd

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1 – View of northern polygon containing erect plantain, located in the downstream portion of the survey area, looking west.

Photo 2 – View of southern polygon containing erect plantain, located in the downstream portion of the survey area, looking north.

D:\Projects\3IRW\010200\GRAPHICS\Quino\Att_SP_1_20220427.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\Att_SP.pdf

Photo 3 – View of eastern polygon containing erect plantain, located in the downstream portion of the survey area, looking north.

Photo 4 – View of polygon containing erect plantain and purple owl's clover, located in the upstream portion of the survey area, looking northwest.

D:\Projects\3IRW\010200\GRAPHICS\Quino\Att_SP_2_20220427.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

Photo 5 – Close-up view of erect plantain located in the downstream portion of the survey area.

Photo 6 – Close-up view of erect plantain located in the downstream portion of the survey area.

D:\Projects\3IRW\010200\GRAPHICS\Quino\Att_SP_3_20220427.ai

Site Photographs

Attachment A-3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

Photo 7 – Close-up view of purple owl's clover located in the upstream portion of the survey area.

D:\Projects\3IRW\010200\GRAPHICS\Quino\Att_SP_4_20220427.ai

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	**Common Name**	
INVERTEBRATES		
PAPILIONIDAE - SWALLOWTAIL BUTTERFLIES		
Papilio eurymedon	pale swallowtail	
Papilio rutulus	western tiger swallowtail	
Papilio zelicaon	anise swallowtail	
PIERIDAE - WHITES, SULFURS AND ORANGETIPS		
Anthocharis sara	Sara's orangetip	
Pieris rapae	cabbage white	
Pontia protodice	common (checkered) white	
Colias harfordii	Harford's sulfer	
NYMPHALIDAE - BRUSH-FOOTED BUTTERFLIES		
Vanessa cardui	painted lady	
DANAIDAE - MILKWEED BUTTERFLIES		
Danaus plexippus	monarch	
HESPERIDAE - SKIPPERS		
Pyrgus albescens	white checkered-skipper	
Erynnis funeralis	funereal duskywing	
RIODINIDAE - METALMARKS		
Apodemia mormo	Behr's (Mormon) metalmark	
LYCAENIDAE - BLUES, HAIRSTREAKS AND COPPERS		
Plebejus acmon	acmon blue	
Brephidium exilis	western pygmy-blue	
Leptotes marina	marine blue	
AMPHIBIANS		
HYLIDAE - TREEFROG FAMILY		
Pseudacris cadaverina	California treefrog	
Pseudacris hypochondriaca	Baja California treefrog	
LIZARDS		
PHRYNOSOMATIDAE - SPINY LIZARD FAMILY		
Sceloporus occidentalis	western fence lizard	
SNAKES		
COLUBRIDAE - COLUBRID SNAKE FAMILY		
Pituophis catenifer	gopher snake	
BIRDS		
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY		
Branta canadensis	Canada goose	
Mareca americana	American wigeon	
Anas platyrhynchos	mallard	
Aythya affinis	lesser scaup	
Oxyura jamaicensis	ruddy duck	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY		
Callipepla californica	California quail	

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	**Common Name**	
PODICIPEDIDAE - GREBE FAMILY		
Aechmophorus occidentalis	western grebe	
COLUMBIDAE - PIGEON AND DOVE FAMILY		
*Columba livia**	rock pigeon	
Zenaida macroura	mourning dove	
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY		
Geococcyx californianus	greater roadrunner	
CAPRIMULGIDAE - NIGHTJAR FAMILY		
Chordeiles acutipennis	lesser nighthawk	
TROCHILIDAE - HUMMINGBIRD FAMILY		
Calypte anna	Anna's hummingbird	
Selasphorus sasin	Allen's hummingbird	
CHARADRIIDAE - PLOVER FAMILY		
Charadrius vociferus	killdeer	
LARIDAE - GULL AND TERN FAMILY		
Larus occidentalis	western gull	
PHALACROCORACIDAE - CORMORANT FAMILY		
Phalacrocorax auritus	double-crested cormorant	
ARDEIDAE - HERON FAMILY		
Ardea alba	great egret	
Egretta thula	snowy egret	
Nycticorax nycticorax	black-crowned night-heron	
CATHARTIDAE - NEW WORLD VULTURE FAMILY		
Cathartes aura	turkey vulture	
PANDIONIDAE - OSPREY FAMILY		
Pandion haliaetus	osprey	
ACCIPITRIDAE - HAWK FAMILY		
Haliaeetus leucocephalus	bald eagle	SE, FP
Buteo jamaicensis	red-tailed hawk	
STRIGIDAE - TYPICAL OWL FAMILY		
Megascops kennicottii	western screech-owl	
Bubo virginianus	great horned owl	
PICIDAE - WOODPECKER FAMILY		
Melanerpes formicivorus	acorn woodpecker	
Picoides nuttallii	Nuttall's woodpecker	
Colaptes auratus	northern flicker	
FALCONIDAE - FALCON FAMILY		
Falco sparverius	American kestrel	
Falco peregrinus	peregrine falcon	FP
TYRANNIDAE - TYRANT FLYCATCHER FAMILY		
Sayornis nigricans	black phoebe	
Tyrannus vociferans	Cassin's kingbird	

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	**Common Name**	
CORVIDAE - JAY AND CROW FAMILY		
Aphelocoma californica	California scrub-jay	
Corvus brachyrhynchos	American crow	
Corvus corax	common raven	
ALAUDIDAE - LARK FAMILY		
Eremophila alpestris actia	California horned lark	
HIRUNDINIDAE - SWALLOW FAMILY		
Stelgidopteryx serripennis	northern rough-winged swallow	
Petrochelidon pyrrhonota	cliff swallow	
AEGITHALIDAE - BUSHTIT FAMILY		
Psaltriparus minimus	bushtit	
TROGLODYTIDAE - WREN FAMILY		
Troglodytes aedon	house wren	
Thryomanes bewickii	Bewick's wren	
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	SSC
POLIOPTILIDAE - GNATCATCHER FAMILY		
Polioptila caerulea	blue-gray gnatcatcher	
Polioptila californica	California gnatcatcher	FT, SSC (subsp. californica)
SYLVIIDAE - SILVIID WARBLERS FAMILY		
Chamaea fasciata	wrentit	
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY		
Toxostoma redivivum	California thrasher	
Mimus polyglottos	northern mockingbird	
STURNIDAE - STARLING FAMILY		
*Sturnus vulgaris**	European starling*	
FRINGILLIDAE - FINCH FAMILY		
Haemorhous mexicanus	house finch	
Spinus psaltria	lesser goldfinch	
PASSERELLIDAE - NEW WORLD SPARROW FAMILY		
Pipilo maculatus	spotted towhee	
Aimophila ruficeps	rufous-crowned sparrow	
Melozone crissalis	California towhee	
Melospiza melodia	song sparrow	
ICTERIDAE - BLACKBIRDS AND ORIOLES		
Sturnella neglecta	western meadowlark	
Icterus cucullatus	hooded oriole	
Agelaius phoeniceus	red-winged blackbird	
PARULIDAE - WOOD-WARBLER FAMILY		
Geothlypis trichas	common yellowthroat	
Setophaga coronata	yellow-rumped warbler	

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	**Common Name**	
MAMMALS		
SCIURIDAE - SQUIRREL FAMILY		
Otospermophilus beecheyi	California ground squirrel	
GEOMYIDAE - POCKET GOPHER FAMILY		
Thomomys bottae	Botta's pocket gopher	
CRICETIDAE - NEW WORLD RATS AND MICE FAMILY		
Neotoma bryanti	Bryant's woodrat	
LEPORIDAE - HARE AND RABBIT FAMILY		
Sylvilagus audubonii	desert cottontail	
CANIDAE - CANID FAMILY		
Canis latrans	coyote	
MEPHITIDAE - SKUNK FAMILY		
Mephitis mephitis	striped skunk	
PROCYONIDAE - PROCYONID FAMILY		
Procyon lotor	northern raccoon	
CERVIDAE - CERVID FAMILY		
Odocoileus hemionus	southern mule deer	

ATTACHMENT C

DATA SHEETS

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 2/18/22 Survey Week Number 1
Survey Partner(s) n/a
Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 957 Min 946

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0900	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	0-1 mph	62
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1100	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	0-1 mph	64
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1300	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	3-4 mph	69
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1500	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	2-5 mph	70

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)	1		*Apodemia mormo* (Mormon Metalmark)	11	
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)	1	
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)	1	
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	IIII 1	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)	1		*Pontia protodice* (Checkered White)		
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias* harfordii (Harford's Sulphur)	1	
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)			**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)			*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)					
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett Date: 2/18/22

Comments:

Several polygons containing Plantago. The Plantago is very small and patchy but flowering. Most nectar sources aren't flowering yet but are present and should be flowering soon.

Plant Communities and Habitat Information:

Surveys were conducted in sagebrush scrub, disturbed sage brush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas (dirt roads).

Host Plants Present:

Pontago erecta
Castilleja exserta

Nectar Plants Present:

Popcornflower, fiddleneck, red maids, buckwheat, blue dicks, gold fields, mustard, erodium.

☐ **Quino Sighting** n/a **Date:** n/a **GPS Location:** n/a

Photographs Taken: n/a

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 2/19/22 Survey Week Number 1
Survey Partner(s) N/A
Total Acres: 307 Portion Surveyed: Upstream Elevation: Max 657 Min 994

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0930	25	☐clear ☑patchy ☐ overcast ☐ drizzle shower	0-1 mph	60
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1135	25	☐clear ☑patchy ☐ overcast ☐ drizzle shower	1-2 mph	68
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1400	25	☐clear ☑patchy ☐ overcast ☐ drizzle shower	3-5 mph	68
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1530	20	☐clear ☑patchy ☐ overcast ☐ drizzle shower	4-6 mph	70

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)	III	
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)		
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)	I	
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	HHT II	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)	II		*Pontia protodice* (Checkered White)		
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias harfordii* (Harford's Sulphur)	III	
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)			**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)	I		*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)					
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Nesseth Date: 2/19/22

Comments:
Most of the survey area is lower quality w/ ruderal and disturbed areas, however ther is one large area that contains Plantago and nectar sources. There is also good quality habitat immediately adjacent to this polygon.
Plant Communities and Habitat Information:
Sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas.
Host Plants Present:
Plantago erecta Castilleja exserta
Nectar Plants Present:
Blue dicks, buckwheat, fiddleneck, oxalis, mustard, lupine, red maids, gold fields
☐ Quino Sighting n/a Date: n/a GPS Location: n/a
Photographs Taken: n/a

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 2/25/22 Survey Week Number 2
Survey Partner(s) NA
Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 1000	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	2-3 mph	60
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1200	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	1-2 mph	62
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1430	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	4-6 mph	62
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1600	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	5-7 mph	63

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)		
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)	\	
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)		
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)	\	
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	III	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)	\		*Pontia protodice* (Checkered White)		
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias* harfordii (Harford's Sulphur)	\	
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	\		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)	III		*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	II				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett Date: 2/25/22

Comments:

Plantago is still small in most Blygons but larger in a few too. Nectar sources are flowering more.

→ a crew was weeding a large area on the back slope of the dam. The area contained mostly non-natives (grasses) but did also contain scattered CBS shrubs and nectar sources (primarily fiddleneck w/ some blue dicks) The crew parked trucks on Plantago. I asked them to move and keep all equipment on the other side of the road.

Plant Communities and Habitat Information:

Sagebrush / disturbed Sagebrush Scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

fiddleneck, blue dicks, popcorn flower, buckwheat, goldfields, mustard, erodium, red maids

☐ **Quino Sighting** — **Date:** — **GPS Location:** —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 2/27/22 Survey Week Number 2
Survey Partner(s)
Total Acres: 357 Portion Surveyed: Upstream Elevation: Max 957 Min 946

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 1000	10	☐clear ☑patchy ☐ overcast ☐ drizzle shower	0-1 mph	61
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1230	5	☐clear ☑patchy ☐ overcast ☐ drizzle shower	0-1 mph	65
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1405	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	4-5 mph	66
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1545	10	☐clear ☑patchy ☐ overcast ☐ drizzle shower	5-6 mph	70

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)	1		*Apodemia mormo* (Mormon Metalmark)	11	
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)		
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)	1	
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)	1		**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	4	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)	111	
Danaus plexippus (Monarch)			*Pontia protodice* (Checkered White)	11	
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias harfordii* (Harford's Sulphur)	1	
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	1		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)	11		*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	111				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett Date: 2/27/22

Comments:

Plantago is larger, nectar sources flowering more as well. Only 1 large polygon of good quality habitat. Other portions of the survey area are really low quality w/ very few nectar sources.

Plant Communities and Habitat Information:

Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

fiddleneck, erodium, mustard, lupine, goldfields, blue dicks, popcorn flower, goldfields.

☐ **Quino Sighting** — **Date:** — **GPS Location:** —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 3/31/22 Survey Week Number 3
Survey Partner(s) —
Total Acres: 307 Portion Surveyed: upstream Elevation: Max 1057 Min 994

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0930	50	☐clear ☑patchy ☐overcast ☐drizzle shower	1-2 mph	62
		☐clear ☐patchy ☐overcast ☐drizzle shower		
1100	40	☐clear ☑patchy ☐overcast ☐drizzle shower	3-4 mph	64
		☐clear ☐patchy ☐overcast ☐drizzle shower		
1330	30	☐clear ☑patchy ☐overcast ☐drizzle shower	5-6 mph	66
		☐clear ☐patchy ☐overcast ☐drizzle shower		
Stop 1555	30	☐clear ☑patchy ☐overcast ☐drizzle shower	8-10 mph	67

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)		
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)	\	
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)	\	
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	\	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)			*Pontia protodice* (Checkered White)		
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias harfordii* (Harford's Sulphur)		
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	\\\\		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)			*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	\\				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett **Date:** 3/3/22

Comments:
Plantago and Castilleja in full bloom along w/ other nectar sources.
Plant Communities and Habitat Information:
Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, and disturbed areas.
Host Plants Present:
Plantago erecta Castilleja exserta
Nectar Plants Present:
erodium, mustard, blue dicks, goldfields, popcorn flower, fiddleneck, lupine
☐ **Quino Sighting** — **Date:** — **GPS Location:** —
Photographs Taken: —

1.	**2.**	**3.**
4.	**5.**	**6.**
7.	**8.**	**9.**
10.	**11.**	**12.**

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 3/4/22 Survey Week Number 3
Survey Partner(s) —
Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 1057 Min 990

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0915	50	☐clear ☑patchy ☐ overcast ☐ drizzle shower	0-1 mph	63
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1115	50	☐clear ☑patchy ☐ overcast ☐ drizzle shower	0-1 mph	63
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1330	50	☐clear ☑patchy ☐ overcast ☐ drizzle shower	1-2 mph	65
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1530	50	☐clear ☑patchy ☐ overcast ☐ drizzle shower	2-5 mph	65

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)	III	
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)	I	
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)		
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)	I	
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	IIII	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)	II	
Danaus plexippus (Monarch)	II		*Pontia protodice* (Checkered White)	III	
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias harfordii* (Harford's Sulphur)		
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	III		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)			*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)	II		**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	II				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Mossett Date: 3/4/22

Comments:

Plantago is much larger and blooming in all polygons. Nectar sources occur throughout the survey area.

Plant Communities and Habitat Information:

Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

goldfields, blue dicks, mustard, erodium, popcornflower buckwheat, fiddleneck.

☐ **Quino Sighting** — **Date:** — **GPS Location:** —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 3/10/22 Survey Week Number 4
Survey Partner(s) —
Total Acres: 307 Portion Surveyed: Upstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0845	30	☐clear ☑patchy ☐ overcast ☐ drizzle shower	2-3 mph	63
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1030	25	☐clear ☑patchy ☐ overcast ☐ drizzle shower	2-3 mph	68
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1330	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	1-2 mph	70
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1550	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	4-6 mph	71

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)		
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)		
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)		
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)		
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Dannidae			*Anthocharis sara* (Sara's Orangetip)	\	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)			*Pontia protodice* (Checkered White)	\	
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias* harfordii (Harford's Sulphur)	\\	
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	HH		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)	|||		*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	|				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett Date: 3/10/22

Comments:

Plantago and Castilleja still blooming and looking good. Some nectar sources are dying off but others are now blooming. This weeks survey had the most nectar sources blooming.

Plant Communities and Habitat Information:

Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

lupine, buckwheat, mustard, blue dicks, red maids, fiddleneck, popcornflower, goldfields.

☐ **Quino Sighting** — **Date:** — **GPS Location:** —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Wisseff Date 3/11/22 Survey Week Number 4
Survey Partner(s) —
Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0815	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	3-4 mph	68
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1030	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	2-3 mph	70
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1250	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	5-6 mph	73
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1530	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	6-8 mph	74

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)	\	
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)		
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)	\	
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)		
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)			**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	\\\	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)			*Pontia protodice* (Checkered White)		
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias* harfordii (Harford's Sulphur)		
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	\\		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)			*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	\				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett Date: 3/11/22

Comments:

Plantago is ~~beginning~~ begining to dry out in some spots but is still looking good and much bigger in most polygons. Nectar sources are still plentyful throughout the survey area.

Plant Communities and Habitat Information:

Sagebrus scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal disturbed areas

Host Plants Present:

Plantago erecta

Castilleja exserta

Nectar Plants Present:

fiddleneck, popcorn flower, red maids, blue dicks, mustard erodium, goldfields.

☐ **Quino Sighting** — **Date:** — **GPS Location:** —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Messett Date 3/17/22 Survey Week Number 5
Survey Partner(s) —
Total Acres: 357 Portion Surveyed: Upstream Elevation: Max 1057 Min 994

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0930	25	☐clear ☑patchy ☐ overcast ☐ drizzle shower	1-2 mph	65
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1100	20	☐clear ☑patchy ☐ overcast ☐ drizzle shower	2-3 mph	72
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1430	35	☐clear ☑patchy ☐ overcast ☐ drizzle shower	3-4 mph	78
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1600	30	☐clear ☑patchy ☐ overcast ☐ drizzle shower	2-5 mph	80

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)	11	
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)			*Apodemia mormo* (Mormon Metalmark)		
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)			*Papilio eurymedon* (Pale Swallowtail)		
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)		
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)	11		**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	1111	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)		
Danaus plexippus (Monarch)			*Pontia protodice* (Checkered White)	111	
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias* harfordii (Harford's Sulphur)		
Hylephila phyleus (Fiery Skipper)			*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)			**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)	HH		*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)					
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Messett Date: 3/17/22

Comments:

Plantago is drying out in about half of the polygon where it occurs. Castilleja is also dry but some newer individuals have bloomed. Most nectar sources are still blooming.

Plant Communities and Habitat Information:

sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas.

Host Plants Present:

Plantago erecta

Castilleja exserta

Nectar Plants Present:

fiddleneck, goldfields, mustard, buckwheat, lupine, erodium, red maids, popcorn flower.

☐ **Quino Sighting** — **Date:** — **GPS Location:** —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form **Adult Survey**

Location Santiago Creek Dam
Surveyor Lindsay Wescott Date 3/18/22 Survey Week Number 5
Survey Partner(s) —
Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 657 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0900	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	1-2 mph	68
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1120	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	1-2 mph	72
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
1410	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	2-3 mph	73
		☐clear ☐ patchy ☐ overcast ☐ drizzle shower		
Stop 1515	0	☑clear ☐ patchy ☐ overcast ☐ drizzle shower	4-6 mph	74

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago, Castilleja, Cordylanthus, Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			*Leptotes marina* (Marine Blue)		
Euphydras editha quino (Quino Checkerspot)			*Philotes sonorensis* (Sonoran Blue)		
Euphydras chalcedona (Chalcedon Checkerspot)			*Lycaeides melissa* (Melissa Blue)		
Chlosyne gabbii gabbii (Gabb's Checkerspot)			*Cupido* amyntula (Western Tailed-Blue)		
Phycoides mylitta (Mylitta Crescent)			*Brephidium exilis* (Western Pygmy-Blue)	1	
Chlosyne leanira (Leanira Checkerspot)			**Riodinidae (Metalmarks)**		
Nymphalis antiopa (Mourning Cloak)	1		*Apodemia mormo* (Mormon Metalmark)	𝍸 1	
Limenitis lorquini (Lorquin's Admiral)			**Papilionidae (Swallowtails)**		
Junonia coenia (Common Buckeye)	1		*Papilio eurymedon* (Pale Swallowtail)		
Vanessa annabella (West Coast Lady)			*Papilio rutulus* (Western Tiger Swallowtail)		
Vanessa atalanta (Red Admiral)			*Papilio zelicaon* (Anise Swallowtail)		
Vanessa cardui (Painted Lady)	11		**Pieridae (Whites and Orangetips)**		
Vanessa virginiensis (American Lady)			*Anthocharis cethura* (Desert Orangetip)		
Danaidae			*Anthocharis sara* (Sara's Orangetip)	𝍸 1	
Danaus gilippus (Queen)			*Pieris rapae* (Cabbage White)	1111	
Danaus plexippus (Monarch)	1		*Pontia protodice* (Checkered White)	111	
Hesperidae			*Colias eurytheme* (Orange Sulphur)		
Heliopetes ericetorum (Northern White-Skipper)			*Colias* harfordii (Harford's Sulphur)		
Hylephila phyleus (Fiery Skipper)	1		*Eurema nicippe* (Sleepy Orange)		
Pyrgus albescens (White Checkered-Skipper)	111		**Satyridae (Satyrids)**		
Erynnis funeralis (Funereal Duskywing)	𝍸		*Coenonympha tullia californica* (California Ringlet)		
Erynnis tristis (Mournful Duskywing)			**OTHERS:**		
Erynnis propertius (Propertius Duskywing)					
Ochlodes agricola (Rural Skipper)					
Lycaenidae (Hairstreaks)					
Atlides halesus (Great Purple Hairstreak)					
Callophrys augustinus (Brown Elfin)					
Callophrys perplexa (Perplexing/Green Hairstreak)					
Strymon melinus (Gray Hairstreak)					
Glaucopsyche lygdamus (Silvery Blue)					
Plebejus acmon (Acmon Blue)	11				
Celastrina ladon (Spring Azure)					

Surveyor Lindsay Mosett **Date:** 3/13/22

Comments:
Most of the Plantag is dried out. There is still some flowering in the most eastern polygon. Nectar sources are still blooming but getting sparser than in previous weeks.
Plant Communities and Habitat Information:
sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas.
Host Plants Present:
Plantago erecta Castilleja exserta
Nectar Plants Present:
fiddleneck, buckwheat, goldfields, erodium, mustard, poppy, corn flower, blue dicks, lupine.
☐ **Quino Sighting** — **Date:** — **GPS Location:** —
Photographs Taken: —

1.	**2.**	**3.**
4.	**5.**	**6.**
7.	**8.**	**9.**
10.	**11.**	**12.**

ATTACHMENT D

CNDDB FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0001
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Falco peregrinus anatum*

Common name: American peregrine falcon

Date of field work (mm-dd-yyyy): 02-27-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidentally observed during a focused Quino checkerspot butterfly survey

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2				

Age class comment: Pair observed flying together

Bird site use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: No known nesting locations on the project site, but there is suitable foraging habitat and suitable nesting habitat adjacent to the site.

What was the observed behavior? The pair was observed flying together over Santiago Dam. They flew high and continued traveling off site to the northeast.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: The closest vegetation type was ornamental vegetation. The surrounding area largely contained sagebrush scrub.

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	-9999	33.78627	-117.72250	433111	3738694	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	American peregrine falcon (pair)						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0002
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Polioptila californica californica*

Common name: coastal California gnatcatcher

Date of field work (mm-dd-yyyy): 02-18-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidentally observed during focused Quino checkerspot butterfly survey

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
4				

Age class comment: Two separate pairs were observed.

Bird site use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Gnatcatchers occur on the site year-round.

What was the observed behavior? One pair was observed carrying nesting material and the second pair was observed foraging together.

Describe any evidence of reproduction: The individuals were paired and one pair was observed carrying nesting material.

SITE INFORMATION

Habitat description: sagebrush scrub

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	-9999	33.78832	-117.72598	432791	3738923	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	coastal California gnatcatcher (Pair)						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes: Mapped point represents one pair that was observed nest building. A second pair was observed foraging together at the following location 33.787196, -117.722768

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0003
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Aimophila ruficeps canescens*

Common name: southern California rufous-crowned sparrow

Date of field work (mm-dd-yyyy): 03-04-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidentally observed during focused Quino checkerspot butterfly survey

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: southern California rufous-crowned sparrows occur year-round on the site.

What was the observed behavior? Detected the individual through vocalization then subsequently observed foraging and singing within sagebrush scrub vegetation

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: sagebrush scrub

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	-9999	33.78888	-117.72317	433051	3738983	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	southern California rufous-crowned sparrow						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes:

Location/directions comments:

Attachment(s):

APPENDIX G

CROTCH'S BUMBLE BEE SURVEY

September 19, 2024

Justin Garcia
California Endangered Species Act,
Memorandum of Understanding Coordinator
California Department of Fish and Wildlife
1010 Riverside Pkwy
West Sacramento, California 95605

VIA EMAIL
Justin.Garcia@wildlife.ca.gov

Hillary Sardiñas
Bumble Bee Coordinator
California Department of Fish and Wildlife
1010 Riverside Pkwy
West Sacramento, California 95605

VIA EMAIL
Hillary.Sardinas@wildlife.ca.gov

Kyle Rice
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
Kyle.Rice@wildlife.ca.gov

Subject: Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Justin Garcia, Hillary Sardiñas, and Kyle Rice:

This Letter Report presents the results of focused surveys for the Crotch's bumble bee (*Bombus crotchii*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California (Exhibit 1). The purpose of the surveys was to determine the presence or absence of the Crotch's bumble bee in the biological survey area. Surveys were conducted by a Biologist who holds the necessary Memorandum of Understanding (MOU) to handle this species and were completed according to the guidelines established by the California Department of Fish and Wildlife (CDFW 2023).

PROJECT LOCATION AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
www.Psomas.com

The project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the project site. Elevations in the project site range from approximately 657 to 996 feet above mean sea level.

The project site is located in the Central–Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD) is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

IRWD is proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway and the dam require structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase but would be located within the survey area provided by IRWD.

SURVEY AREA

A variety of vegetation types occur in the Biological Study Area (BSA) for the project, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline (Exhibit 3). Other landcovers include cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

The Crotch's bumble bee survey area was limited to the impact areas within the BSA, including permanent and temporary impact areas and the proposed additional inundation area (i.e., a two-foot change in elevation around the entire perimeter of the lake). The survey area included all habitat areas, excluding open water and developed areas.

The survey area contained suitable habitat, and/or nectar sources for Crotch's bumble bee. These areas were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*), and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*), as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses (*Avena* sp. and *Bromus* spp.).

While all habitat was surveyed, higher amounts of time were spent in habitats that provided suitable feeding areas (i.e., those areas with flowering plants) and potential nesting areas (i.e., those areas with rodent burrows, leaf litter, and brush piles) within the survey area (Exhibit 3). Less time was spent in marginal/lower quality habitat where suitable nectar sources were not readily available (i.e. cliff, coast live oak woodland, disturbed mulefat scrub, mulefat scrub, disturbed southern black willow forest, southern black willow forest, fluctuating shoreline, southern sycamore riparian woodland, southern willow scrub, and western sycamore).

Plants with flowers blooming during these surveys included the following: short-podded mustard (*Herschfeldia incana*), black mustard (*Brassica nigra*), Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*), telegraph weed (*Heterotheca grandiflora*), narrow leaf milkweed (*Asclepias fascicularis*), California buckwheat, deerweed, black sage (*Salvia melifera*), white sage (*Salvia apiana*), tree tobacco (*Nicotiana glauca*), California cudweed (*Pseudognaphalium californicum*), laurel sumac, clustered small tarweed (*Madia exigua*), toyon, Wright's jimsonweed (*Datura wrightii*), bristly ox-tongue (*Helminthotheca echioides*), prickly lettuce (*Lactuca serriola*), golden yarrow (*Eriophyllum confertiflorum var. confertiflorum*), monkey flower (*Diplacus australis*), vinegar weed (*Trichostema lanceolatum*), saltcedar (*Tamarix ramosissima*), and scaly scale-broom. These flowering plants were distributed throughout the survey area and decreased in number over the time between the first and third surveys. Photographs of representative habitat in the survey area are provided in Attachment A.

BACKGROUND

The Crotch's bumble bee is a near endemic species in California. It occurs throughout most of southwestern California including the Mediterranean region, along the Pacific coast, western deserts, Great Valley, and adjacent foothills (Williams *et al.* 2014; Zungri 2005). It was historically common in the Central Valley of California, but currently appears to be absent from most of it, especially in the center of its historic range (Hatfield *et al.* 2014). It has also been documented in southwest Nevada near the California border and in Baja California, Mexico in the Sierra de Jaurez Mountain Range (Labougle 1990; Williams 2014); however, there are only 12 records of this species in Mexico (ECOSUR 2014). While this species can be found in most native habitats, it prefers grassland and scrub habitat types.

Bumble bees are social insects that live in colonies composed of a queen, workers, males, and gynes/new queens. Colonies are annual and only the new, mated queens overwinter. The mated queens emerge from hibernation in the spring and begin forage for pollen and nectar and look for a new colony nest location. Bumble bees do not dig their own nest cavities, but instead utilize abandoned rodent burrows, hollow logs, leaf litter, tufted grass patches, rock piles, and above ground man-made structures. The Crotch's bumble bee is a ground nester and often makes its nest in abandoned mammal burrows. Once a nest site is located, the queen will lay

the first clutch of eggs. After hatching, the larvae feed on stored pollen (i.e., brood clump) for approximately two weeks before pupating for another two weeks. The adults that emerge from these pupae are females/workers who then take over foraging for resources, and tending to new clutches of eggs and larvae, while the queen lays more eggs. The workers/females also help to regulate the temperature of the nest and defend the nest against predators (Williams 2014). Colonies persist through the spring and summer months with successive broods of workers/females being produced as more floral resources become available. At some point in the summer, the colony switches to produce males and queens. The timing of this switch is not well understood but is generally thought to be related to the age of the queen and the size of the colony (Williams 2014). Adult male bumble bees do not forage for the colony but instead, leave the nest to feed at flowers and search for mates. The male Crotch's bumble bee perches on pheromone-scented vegetation and waits for queens to fly by. While male bumble bees feed and search for mates, newly emerged queens leave the colony to feed during the day. The queens eat a large amount of pollen and nectar to build up fat reserves for overwintering. Queens typically mate only once with only one male, and then begin their search for an overwintering location. Little is known about overwintering sites; however, overwintering queens have been reported to use animal burrows, holes in loose dirt, leaves, or compost piles (Williams 2014). Once the new queen has mated, the colony declines, and the remaining bees die before winter begins.

The Crotch's bumble bee is a larger bumble bee with the queen measuring approximately 22 to 25 millimeters (mm) and the workers measuring approximately 12 to 20 mm (Williams 2014). Crotch's bumble bee is a short-tongued species and prefers food plants from the following families: *Asclepias*, *Chaenactis*, *Lupinus*, *Medicago*, *Phacelia*, and *Salvia* (Williams 2014). The hairs on Crotch's bumble bee are very short and even, giving it a clean appearance. The head of this species is considered short, with the cheek (oculo-malar area) distinctly shorter than broad (Williams 2014). Crotch's bumble bee females/workers show yellow only on the front of the thorax and on the second abdominal segment (terga 2), males show yellow on both the front and back of the thorax and on both abdominal segments 1 and 2 (terga 1 and 2). In certain parts of its range, Crotch's bumble bee may also show some reddish-brown coloration on the lower abdomen segments (terga 4 and 5). Bumble bee species most similar in appearance to the Crotch's bumble bee include the brown-belted bumble bee (*Bombus griseocollis*), southern plains bumble bee (*Bombus fraternus*), red-belted bumble bee (*Bombus rufocintus*), frigid bumble bee (*Bombus frigidus*), and Nevada bumble bee (*Bombus nevadensis*) (Williams 2014). These species generally do not occur in southern California; therefore, misidentification of Crotch's with these species is unlikely. Bumble bee species that are present within the southern California range of Crotch's bumble bee include California bumble bee (*Bombus californicus*), yellow-faced bumble bee (*Bombus vosnesenskii*), Vandyke bumble bee (*Bombus vandykii*), and black-tail bumble bee (*Bombus melanopygus*).

Crotch's bumble bee has been impacted by many environmental factors including rapid urbanization and the spread of agriculture. This is most evident in the Central Valley of California where this species now appears to be absent. Climate change, specifically increasing aridity, is an additional threat, especially because Crotch's bumble bee has a very narrow climatic specialization compared to most bumble bees (NatureServe 2014). Bumble bees in general are threatened by several additional factors including pesticide use, pathogens from managed pollinators, as well as competition with non-native bees (Goulson 2010; Williams *et al.* 2009; Williams and Osborne 2009; Cameron *et al.* 2011; Fürst *et al.* 2014; Hatfield *et al.* 2012). Reduced genetic diversity resulting from any of these threats is also a limiting factor

for bumble bee populations, because their method of sex-determination can be disrupted by inbreeding.

The Crotch's bumble bee was proposed as a Candidate to be State listed as Endangered in June 2019. The status of the Crotch's bumble bee has changed multiple times based on court rulings between June 2019 and September 2022. In November 2020, the Sacramento Superior Court ruled that insects are not eligible for listing under the California Endangered Species Act because the law does not mention insects (*Almond Alliance of California v. CDFW*). In February 2021, the California Fish and Game Commission appealed the decision. The Third District Court of Appeals ruled that the bees could be protected because the law's definition of fish includes invertebrates. In September 2022, the California Supreme Court decided that it would not review the petition for appeal, allowing the decision from the Third District Court to stand stating that the intent of the law is to protect declining species. Therefore, the proposed Candidate status was reinstated in September 2022.

SURVEY METHODS

In June 2023, the California Department of Fish and Wildlife (CDFW) issued survey guidelines for Candidate bumble bee species recommending at least three visual surveys conducted two to four weeks apart during the appropriate Colony Active Period (April to August for Crotch's bumble bee) to ensure the highest probability of detecting the species (CDFW 2023). Surveys must be conducted at a rate of three acres per hour within optimal habitat by a qualified Biologist (i.e., one with appropriate permits and experience in the identification of bee species). Psomas Senior Biologist Lindsay Messett (Scientific Collecting Permit [SCP]; 182810004-20009-001[1]) conducted all focused surveys for Crotch's bumble bee. The survey included all suitable foraging and potential nesting habitats for the Crotch's bumble bee in the survey area. Surveys were conducted on June 20 and 21; July 16 and 17; and August 5 and 6, 2024.

Ms. Messett conducted the surveys by walking meandering transects, slowly across the survey area, through all appropriate habitats, to obtain a 100 percent survey cover. The surveys were paced at approximately three acres per hour in optimal habitats but were more quickly paced in areas lacking available nectar sources. Ms. Messett scanned for bee activity on the ground and spent additional time at any flowering plants to look for foraging bees. Potential nest sites (e.g., forest edges, unmowed areas, and cavities such as mammal burrows) were inspected with binoculars for evidence of bumble bee use. If multiple exiting/entering bumble bees were observed at a cavity, further observation was made until nesting could be confirmed (e.g., multiple individuals entering the cavity).

Surveys were non-lethal (capture, photograph, release) and were conducted in accordance with the CDFW Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023) and authorizations in Ms. Messett's SCP and MOU issued by CDFW. All bumble bees observed were captured using a butterfly net. Bees were carefully transferred to a clear, plastic vial and placed in a cooler with ice to chill. Once the bees were cooled, they were removed from the vial and photographed. Photographs focused on specific identifiable areas of the bees (i.e. the top of the abdomen, side of the thorax and abdomen, and the front and side views of the head). The bees were processed within 15 minutes of capture

[1] Lindsay Messett's SCP includes a MOU to allow her to capture and handle Crotch's bumble bee according to the survey guidelines.

and were released within 100 feet of the capture site. Bumble bee species were identified by Ms. Messett using *Bumble Bees of North America: An Identification Guide* (Williams *et al.* 2014). Photographs of the bumble bees observed during the surveys were also provided to taxonomist Dr. Keng-Lou James Hung, PhD (University of Oklahoma) to confirm species identification; representative photos are included in Attachment A.

Surveys were conducted at least one hour after sunrise and two hours before sunset (ideally between 9:00 AM and 1:00 PM) during suitable weather conditions. Surveys should be conducted on warm, but not hot, sunny days (i.e., between 65 and 90 degrees Fahrenheit [°F]) with low wind (i.e., wind speed less than 8 miles per hour). Surveys may be conducted during partly cloudy or overcast conditions if a person's shadow is visible; however, surveys should not be conducted during wet, foggy, or rainy conditions. A summary of weather conditions during each survey is provided in Table 1. Survey data was recorded on Bumble Bee Survey Field Datasheets (adapted for Crotch's bumble bee from Protocols for the Rusty Patched Bumble Bee) and are included as Attachment B.

Ms. Messett is a Certified Wildlife Biologist® with the Wildlife Society and has over 24 years of experience in surveying special status wildlife species throughout southern and central California including invertebrates, birds, amphibians, and mammals. She currently holds a U.S. Fish and Wildlife Service 10(a)(1)(A) permit (TE 067064-6) for the following invertebrate species: Quino checkerspot butterfly and El Segundo blue butterfly. She also holds a CDFW SCP (S-182810004-20009-001) that includes the following invertebrate species: Quino checkerspot butterfly and Crotch's bumble bee in addition to a MOU for handling and processing Crotch's bumble bee. Ms. Messett has attended multiple bumble bee trainings and live webinars presented by the The Xerces Society in partnership with the Western Section of the Wildlife Society including the California Rare Bumble Bees Workshop (May 4, 2021), The Bumble Bee Field Course (July 21–23, 2023), Western Bumble Bee Identification for Bumble Bee Atlas Volunteers (October 11, 2023), and Male Bumble Bee Identification along the Pacific Coast of North America (December 6, 2023). She is also a listed volunteer on the Xerces Society's SCP (S-210530001-21053-001) and MOU (Dated October 18, 2022).

TABLE 1
SUMMARY OF CROTCH'S BUMBLE BEE SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Acres Surveyed (acres)	Surveyor	Weather Conditions		
						Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Dam	June 20, 2024	9:00 AM/3:00 PM	15	Messett	66/80	1–1/1–2	0/0
1	Upstream of Santiago Dam	June 21, 2024	8:10 AM/3:55 PM	35	Messett	68/76	0–1/4–5	0/0
2	Downstream of Santiago Dam	July 16, 2024	9:00 AM/2:50 PM	15	Messett	68/81	0–1/3–4	10/0
2	Upstream of Santiago Dam	July 17, 2024	8:00 AM/3:45 PM	35	Messett	71/80	1–2/1–2	75/30
3	Downstream of Santiago Dam	August 5, 2024	9:00 AM/12:50 PM	15	Messett	80/92	1–2/1–2	0/0
3	Upstream of Santiago Dam	August 6, 2024	8:25 AM/2:45 PM	35	Messett	71/80	0–1/1–2	0/0

°F: Fahrenheit; mph: miles per hour; %: percent.

SURVEY RESULTS

One male Crotch's bumble bee was observed during the second focused survey on July 17, 2024, upstream of Santiago Dam. This individual was observed foraging in a small patch of leafy California buckwheat, in the southern portion of the survey area (Exhibit 3). No Crotch's bumble bees were observed during the third focused survey. A California Natural Diversity Database (CNDDB) form for this observation will be submitted electronically by Ms. Messett and is included in Attachment C.

At the time of the focused surveys, most plants were no longer flowering. The available floral resources in the survey area during the late summer appeared to provide a limited amount of habitat for bumble bees; floral resources were likely higher in the spring and early summer. The estimated percent cover of floral resources was approximately 20 to 30 percent of the survey area during the June visit. Percent cover of floral resources continually decreased on the second and third surveys. During the focused surveys, the species in bloom consisted primarily of short-podded mustard, black mustard, leafy California buckwheat and deerweed. The entire survey area was surveyed; however, more time was spent in areas that had the most flowering resources during each survey. Potential bumble bee nest sites and overwintering habitat included small rodent burrows and leaf litter located in the survey area.

The following bees were also observed during the focused surveys: western honeybee (*Apis mellifera*), yellow-faced bumble bee, California bumble bee, and black-tailed bumble bee.

Photographs of all bumble bees were submitted to taxonomist Dr. Keng-Lou James Hung and identifications were confirmed.

OTHER OBSERVATIONS

Two additional special status species were observed in the survey area during the surveys: coastal California gnatcatcher (*Polioptila californica californica*), a federally listed Threatened and California Species of Special Concern, and least Bell's vireo (*Vireo bellii pusillus*), a federally and State listed Endangered species (Exhibit 3). The CNDDB forms for these species are included in Attachment C and have been submitted online by Ms. Messett.

RECOMMENDATIONS

Because Crotch's bumble bee was observed during the focused surveys, IRWD would need to consult with CDFW to obtain an Incidental Take Permit for the loss of Crotch's bumble bee habitat. Avoidance and minimization measures would also be required to minimize take of the species.

Per CDFW guidelines, it is recommended that a biological monitor be present onsite during vegetation clearing and/or ground-disturbing activities that take place during the queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring would be required if vegetation clearing or ground-disturbing occurs from November to January.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.

Lindsay A. Messett, CWB®
Senior Biologist
(SCP; 182810004-20009-001)

Attachments: Exhibits 1–3
A – Representative Photographs
B – Survey Datasheets
C – CNDDB Forms

cc: Andy Uk (uk@irwd.com)
Fiona Sanchez (Sanchezf@irwd.com)
WildlifeResearchPermits@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW010204\Documentation\CBB\Santiago CBB Report-091924.docx

REFERENCES

California Department of Fish and Wildlife (CDFW). 2023 (June 6, 2023). *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species*. Sacramento, CA: CDFW.

Cameron, S.A., Lozier, J.D., Strange, J.P, Koch, J.B., Cordes, N., Solter, L.F. and Griswold, T.L. 2011. Patterns of widespread decline in North American bumble bees. *Proceedings of the National Academy of Science (USA)* 108(2): 662–667.

ECOSUR. 2014. *Mexican Bumble Bee Database based on ECOSUR (El Colegio de la Frontera Sur) and other Mexican collections.*

Fürst, M.A., McMahon, D.P., Osborne, J.L., Paxton, R.J. and Brown, M.J.F. 2014. Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature* 506: 364–366.

Goulson, D. 2010. *Bumblebees: behaviour, ecology, and conservation*. Oxford University Press, Oxford.

Hatfield, R, Colla, S.R., Jepsen, S., Richardson, L., Thorp, R. and Foltz Jordan, S. 2014. Draft IUCN Assessments for North American *Bombus* spp. for the North American IUCN Bumble Bee Specialist Group. The Xerces Society for Invertebrate Conservation, www.xerces.org, Portland, OR.

Hatfield, R., Jepsen, S., Mader, E., Black, S.H. and Shepherd, M. 2012. *Conserving Bumble Bees. Guidelines for Creating and Managing Habitat for America's Declining Pollinators*. The Xerces Society for Invertebrate Conservation., Portland, OR.

Labougle, J. M. 1990. Bombus of Mexico and Central America (Hymenoptera, Apidae). *University of Kansas Science Bullelin* 54 (3): 35–73.

NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life. Arlington, Virginia. Available at: http://explorer.natureserve.org. (Accessed: July 18, 2014).

Williams, P.H., Thorp, R.W., Richardson, L.L. and Colla, S.R. 2014. *The Bumble bees of North America: An Identification guide*. Princeton University Press, Princeton.

Williams, P.H. and Osborne, J.L. 2009. Bumble bee vulnerability and conservation world-wide. *Apidologie* 40: 367–387.

Williams, P.H., Colla, S.R. and Xie, Z. 2009. Bumblebee vulnerability: common correlates of winners and losers across three continents. *Conservation Biology* 23: 931–940.

Zungri, D. 2005. Notes on three species of Bombus (Hymenoptera: Apidae) in the Central Valley of California: new records of distribution and abundance. *Pan-Pacific Entomologist* 81(3–4): 179–180.

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

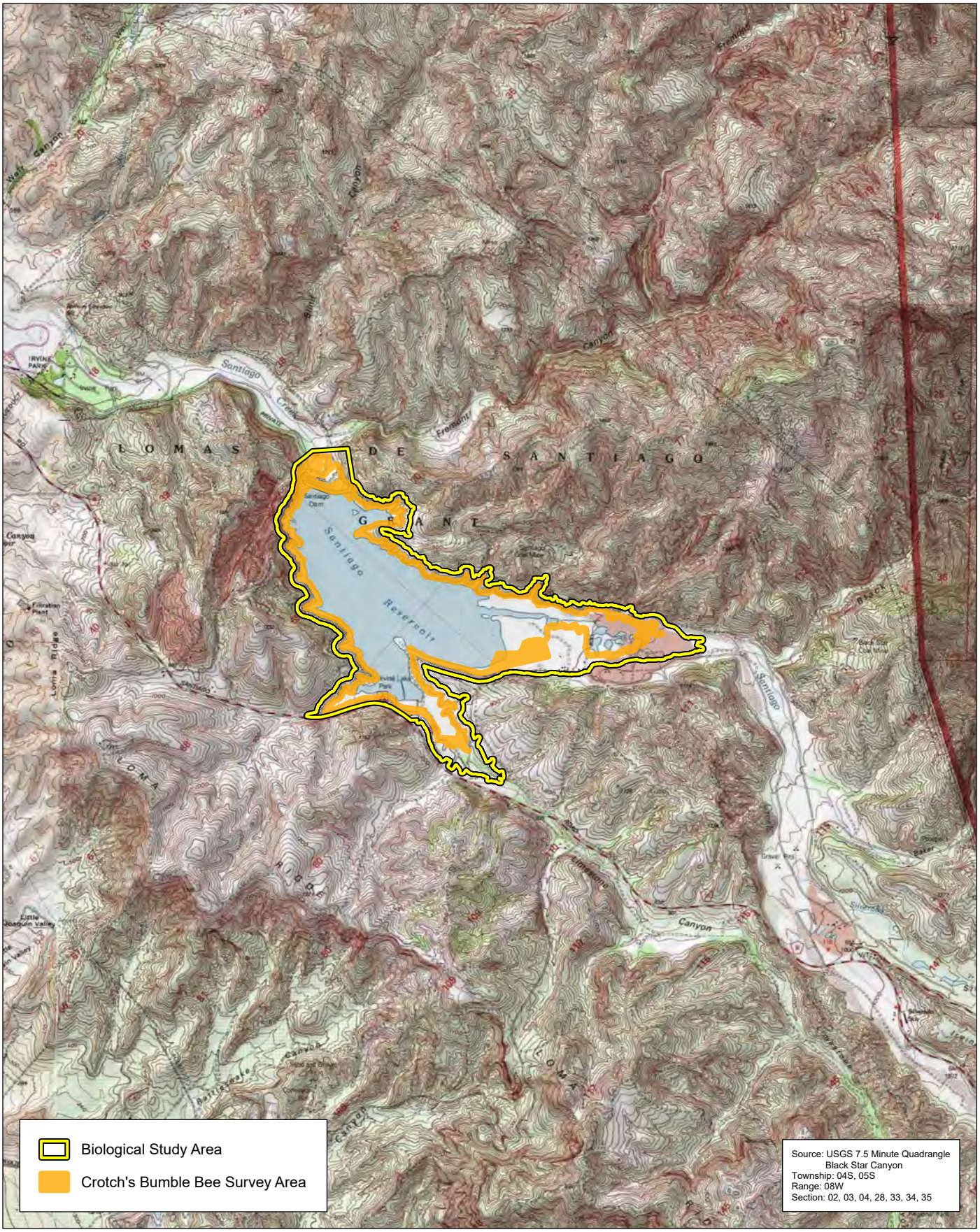
N W E S

0 2,000 4,000 Feet

PSOMAS

(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010204\Graphics\CBB\ex_RL_LV.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB.aprx\ex_RL_LV



U.S. Geological Survey 7.5-Minute Digital Quadrangle

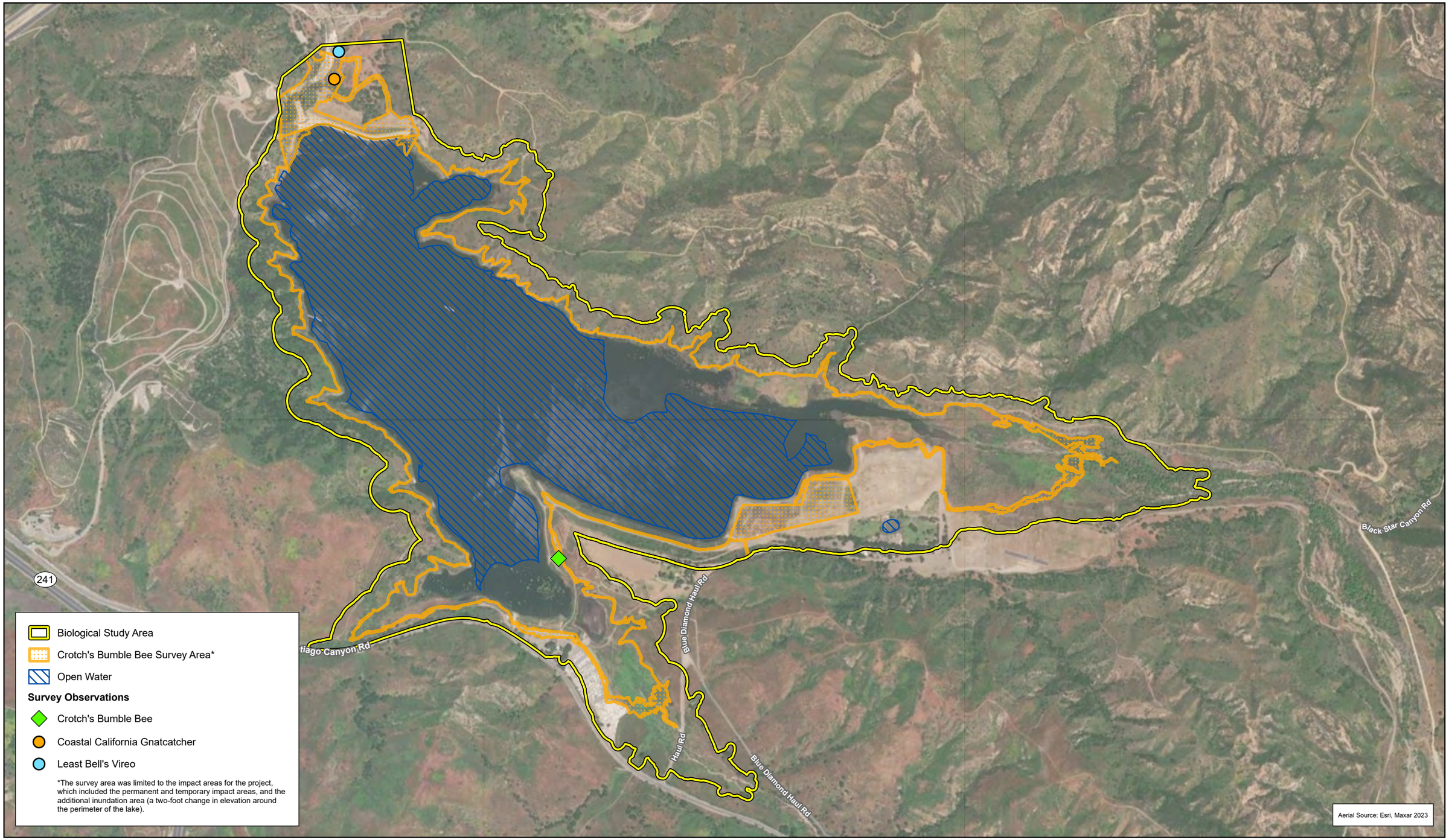
Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 9-16-2024 PLO) R:\Projects\IRW_IRWD\3IRW010204\Graphics\CBB\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB.aprx\ex_USGS



D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB.aprx\ex_Survey_Area

Crotch's Bumble Bee Survey Area and Results

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

0 600 1,200 Feet

PSOMAS

(Rev: 9-16-2024 PLO) R:\Projects\IRW_IRWD\3IRW010204\Graphics\CBB\ex_Survey_Area.pdf

ATTACHMENT A

REPRESENTATIVE PHOTOGRAPHS

July 17, 2024. Male Crotch's bumble bee observed upstream of Santiago Dam during the second focused survey. Note that the bumble bee was chilled during the photo and was released unharmed once it warmed up.

July 17, 2024. Overview of nectar resources (leafy California buckwheat) at the Crotch's bumble bee location.

D:\Projects\3IRW\SantiagoCreek\Graphics\CBB\ex_SP1.ai

Representative Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

June 20, 2024. Black-tailed bumble bee observed downstream of the Santiago Dam during the first focused survey.

June 20, 2024. Overview of nectar resources (leafy California buckwheat and white sage) at the black-tailed bumble bee location.

D:\Projects\3IRW\SantiagoCreek\Graphics\CBB\ex_SP2.ai

Representative Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(09/16/2024 PLO) R:\Projects\IRW_IRWD\3IRW010204\Graphics\CBB\ex_SP.pdf

July 17, 2024. Yellow-faced bumble bee observed upstream of the Santiago Dam during the second focused survey.

July 21, 2024. California bumble bee observed upstream of the Santiago Dam during the first focused survey.

D:\Projects\3IRW\SantiagoCreek\Graphics\CBB\ex_SP3.ai

Representative Photographs

Attachment A-3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

July 21, 2024. Overview of nectar resources (leafy California buckwheat and deerweed) at the yellow-faced bumble bee and California bumble bee location.

June 20, 2024. Overview of the large mowed area within survey area, downstream of Santiago Dam.

D:\Projects\3IRW\SantiagoCreek\Graphics\CBB\ex_SP4.ai

Representative Photographs

Attachment A-4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(09/16/2024 PLO) R:\Projects\IRW_IRWD\3IRW010204\Graphics\CBB\ex_SP.pdf

ATTACHMENT B

SURVEY DATASHEETS

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: 5-18281000A-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam	Downstream of Dam

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
20	06	2024	66 / 80	1-4 / 1-2	0 / 0

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying ~~(min)~~ Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area ~~(m^2)~~ Acres	Total Site Area ~~(m^2)~~ (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	6.0	9:00	3:00	14.9	19.0

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.797794	-117.725419	33.798922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10-14 spp 15+ spp	Mowing of grassland + ruderal areas	Access roads Vehicle tracks through open areas

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
—	—

Bumble Bee Survey Field Data Sheet Page 2 of 2	Unique Survey ID: Date: 6/20/2024	Transect ID (if applicable) —
Were *Bombus* present? (Y) or N	Are Honey Bees (*Apis*) present? (Y) or N	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than (1:1)*

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Bombus melanopygus	1	0	0	Salvia apiana	A	100	—
Flowering Plants:							Native
Herschfeldia incana							N
Brassica nigra							N
Asclepias fascicularis							Y
Salvia apiana							Y
Salvia mellifera							Y
Acmispon glaber							Y
Eriogonum fasciculatum var. foliolosum							Y
Cardus pycnocephalus ssp. pycnocephalus							N

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					*B. crotchii* Capture Point (Decimal degrees)		*Distance Sampling only*
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
B. crotchii	—	—	—	—	—	—	—
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: S-19281000 4-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messette psomas.com	Santiago creek Dam	Upstream of Dam

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
21	06	2024	68 / 76	0-1 / 4-5	0 / 0

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying ~~(min)~~ Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area ~~(m^2)~~ Acres	Total Site Area ~~(m^2)~~ (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	7.08	8:10	3:15	34.8	36.8

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.774224	-117.714404	33.784438	33.769492	-117.723532	-117.712182

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10-14 spp 15+ spp	Mowing of grassland + ruderal areas	access roads vehicle tracks through open areas. Fire dept. fishing/drills.

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
—	—

Bumble Bee Survey Field Data Sheet Page 2 of 2	Unique Survey ID: Date: 6/21/2024	Transect ID (if applicable) —
Were *Bombus* present? (Y) or N	Are Honey Bees (*Apis*) present? (Y) or N	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1*

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Bombus californicus	2	0	0	Acmispon glaber	A	100	—
Bombus vosnesenskii	5	0	0	Acmispon glaber	A	100	—
Flowering Plants:							Native
Acmispon glaber							Y
Hirshfeldia incana							N
Salvia melifera							Y
Asclepias fascicularis							Y
Brassica nigra							N
Tamarix ramosissima							N
Eriogonum fasciculatum var. foliolosum							Y

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					*B. crotchii* Capture Point (Decimal degrees)		*Distance Sampling only*
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
B. crotchii	—	—	—	—	—	—	—
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: S-18281000 4 - 20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam	Downstream of dam

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
16	07	2024	68 / 81	0-1 / 3-4	10 / 0

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying ~~(min)~~ Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area ~~(m^2)~~ Acres	Total Site Area ~~(m^2)~~ (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	5.83	9:00	2:50	14.9	19.0

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787794	-117.725419	33.788922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10-14 spp 15+ spp	Mowing of grassland + ruderal areas	access roads vehicle tracks through open areas

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)

Bumble Bee Survey Field Data Sheet Page 2 of 2	Unique Survey ID: Date: 7/16/2024	Transect ID (if applicable) —
Were *Bombus* present? Y or (N)	Are Honey Bees (*Apis*) present? (Y) or N	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than (1:1)*

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Flowering Plants:							Native
Eriogonum fasciculatum var. foliolosum							Y
Hirshfeldia incana							N
Nicotiana glauca							N
Madia exigua							Y
Datura wrightii							Y
Pseudognaphalium californicum							Y
Malosma laurina							Y

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					*B. crotchii* Capture Point (Decimal degrees)		*Distance Sampling only*
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
B. crotchii	—	—	—	—	—	—	—
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: 3-18281000A-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam	Upstream of Dam

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
17	07	2024	71 | 80	1-2 | 1-2	75 | 30

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying ~~(min)~~ Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area ~~(m^2)~~ Acres	Total Site Area (~~m^2~~) (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	7.75	8:00	3:45	31.8	36.8

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.774226	-117.714404	33.784438	33.769492	-117.723532	-117.712182

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10-14 spp 15+ spp	Mowing of grassland + ruderal areas	access roads vehicle tracks through open areas Fire dept. fishing drills

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
—	—

Bumble Bee Survey Field Data Sheet Page 2 of 2	Unique Survey ID: Date: 7/17/2024	Transect ID (if applicable) –
Were *Bombus* present? (Y) or N	Are Honey Bees (*Apis*) present? (Y) or N	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1*

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Bombus wsnesenskii	4	0	0	Eriogonum fasciculatum var. foliolosum	A	100	–
Flowering Plants:							Native
Eriogonum fasciculatum var foliolosum							Y
Hirshfeldia incana							N
Helminthotheca echioides							N
Carduus pycnocephalos ssp. pycnocephalos							N
Eriophyllum ~~lanceolatum~~ confertiflorum							Y
Asclepias fascicularis							Y
Madia exigua							Y
Acmispon glaber							Y

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					*B. crotchii* Capture Point (Decimal degrees)		*Distance Sampling only*
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
B. crotchii	0	1	0	Eriogonum fasciculatum var. foliolosum	33.771007	-117.715966	–
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MAU: 5-18281 0004-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam	Downstream of Dam

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
05	08	2024	80 / 92	1-2 / 1-2	0 / 0

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying ~~(min)~~ Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (~~m^2~~) Acres	Total Site Area (~~m^2~~) (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	3.83	9:00	12:50	14.9	19.0

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787794	-117.725419	33.788922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water DevelopedPark Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever.Forest ~~Shrubland~~ Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species ~~1-4 species~~ 5-9 species 10-14 spp 15+ spp	Mowing of grassland + ruderal areas	access roads vehicle tracks through open areas.

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)

Bumble Bee Survey Field Data Sheet Page 2 of 2	Unique Survey ID: Date: 8/5/2024	Transect ID (if applicable) —
Were *Bombus* present? Y or (N)	Are Honey Bees (*Apis*) present? (Y) or N	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1*

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Flowering Plants:							Native:
Eriogonum fasciculatum				var. foliosum			Y
Hirshfeldia incana							N
Datura wrightii							Y
Trichostema lanceolatum							Y
Heterotheca grandiflora							Y
Eriophyllum confertiflorum				var confertiflorum			Y
Lepidospartum squamatum							Y

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					*B. crotchii* Capture Point (Decimal degrees)		*Distance Sampling only*
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
B. crotchii	—	—	—	—	—	—	—
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

Mail: S-18281C0004-20009-001

Permittee/Surveyor Name(s)	Email Address	Project Name	Site Name
Lindsay Messett	lindsay.messett@psomas.com	Santiago Creek Dam	Upstream of Dam

Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)
06	08	2024	71/80	0-1 / 1-2	0/0

Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying ~~(min)~~ Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area ~~(m^2)~~ Acres	Total Site Area ~~(m^2)~~ (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	6.75	825	245	34.8	36.8

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787794	-117.725419	33.788922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water Developed Park Developed-Low/Med/High Barren Land Decid. Forest	Mixed Forest Ever. Forest Shrubland Grassland Pasture/Hay Cultivated Crop Woody wetland Herb. wetland Other	<10% 10-24% 25-49% 50-75% >75%	0 species 1-4 species 5-9 species 10-14 spp 15+ spp	Mowed areas of grassland + ruderal	access roads vehicle tracks fire dept. drills fishing

File/folder names of representative survey area photograph(s)	Supporting map file/folder name(s)
—	—

Bumble Bee Survey Field Data Sheet Page 2 of 2	Unique Survey ID: Date: 8/6/2024	Transect ID (if applicable) —
Were *Bombus* present? Y or (N)	Are Honey Bees (*Apis*) present? (Y) or N	*Bombus to Apis Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1* (1:1)

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Flowering Plants							Native
Tamarix ramosissima							N
Enogonum fasciculatum				var foliolosum			Y
Datura wrightii							Y
Hirshfeldia incana							N

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for *B. crotchii* (Enter each *B. crotchii* capture point as separate row)					*B. crotchii* Capture Point (Decimal degrees)		*Distance Sampling only*
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
B. crotchii	—	—	—	—	—	—	—
B. crotchii							
B. crotchii							
B. crotchii							
B. crotchii							

File Names of Photographs and Map Files:

ATTACHMENT C

CNDDB FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES24F0008
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Bombus crotchii*

Common name: Crotch's bumble bee

Date of field work (mm-dd-yyyy): 07-17-2024

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person: Confirmed by taxonomist

Other: Familiarity with the species, and hold a MOU for handling the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Observed during focused surveys.

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	other
1				

Age class comment: Individual was an adult male.

Site use description: Site provides nectar, pollen and nesting habitat.

What was the observed behavior? The individual was observed foraging in a small patch of leafy California buckwheat (Eriogonum fasciculatum var. foliolosum).

Describe any evidence of reproduction: The site provides abundant small rodent burrows that are suitable for nest locations.

SITE INFORMATION

Habitat description: Disturbed sagebrush scrub

Slope: Landowner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Irvine Lake, open space within the NCCP Reserve and Irvine Regional Park

Visible disturbances: Human activities: fishing, hiking, motor vehicles driving on surrounding access roads

Threats: Non-native vegetation

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	793	33.77100	-117.71596	433705	3736996	11
1	**Public Land Survey**	**Feature Comment**						
	S T05S R08W 4	Crotch's bumble bee (male)						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPhone Avenza Maps

Mapping notes: The mapped point represents one individual male bumble bee.

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES24F0010
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Polioptila californica californica*

Common name: coastal California gnatcatcher

Date of field work (mm-dd-yyyy): 06-20-2024

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation: Individuals were heard calling then subsequently observed foraging within sagebrush scrub vegetation.

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidentally observed during focused Crotch's bumble bee surveys

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	other
1	1			

Age class comment: Adult male traveling with one fledgling

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other (foraging, fly-over, etc.)**

Site use description: Used for nesting and foraging

What was the observed behavior? Adult male was observed traveling and foraging with one fledgling

Describe any evidence of reproduction: The presence of a fledgling indicates successful breeding occurred in the immediate vicinity.

SITE INFORMATION

Habitat description: Sagebrush scrub

Slope: Landowner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

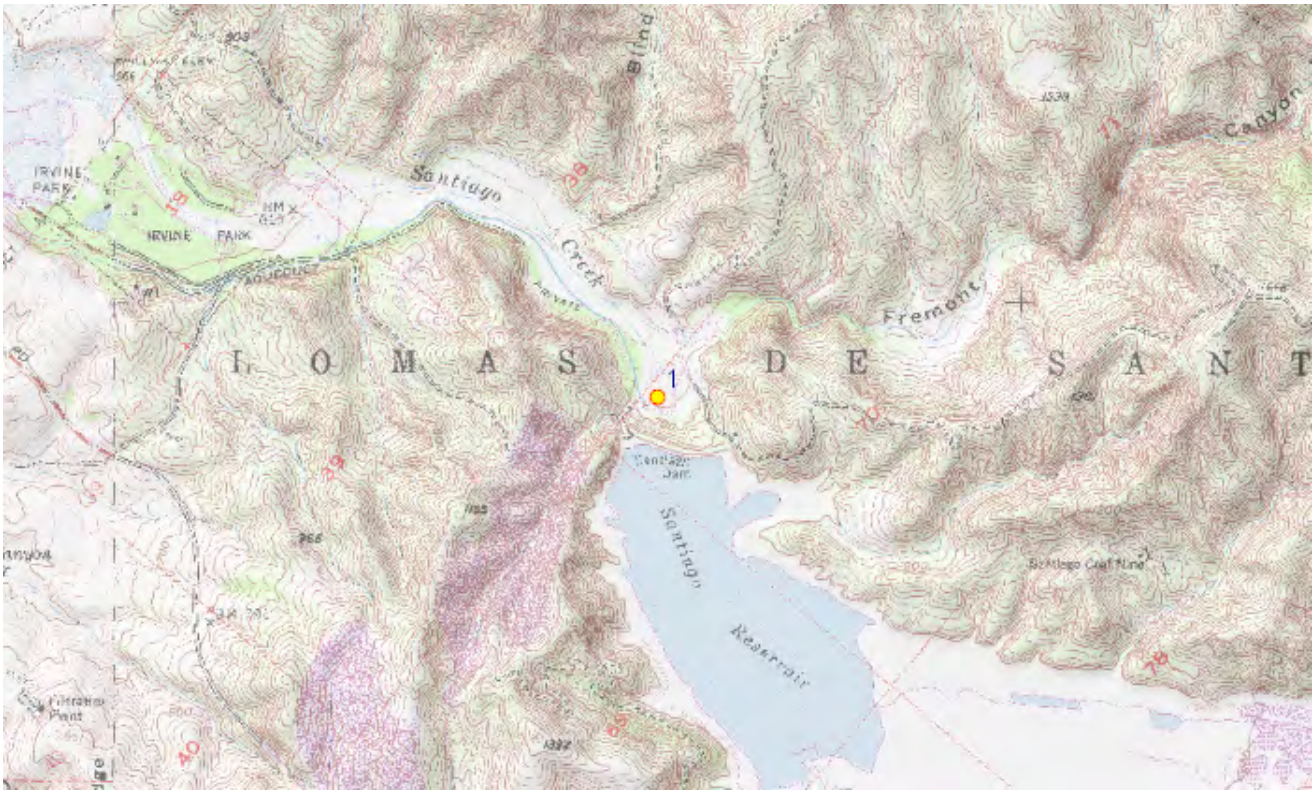
Immediate & surrounding land use: Irvine Lake, open space in NCCP Reserve and Irvine Regional Park

Visible disturbances: Non-native vegetation

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	675	33.78814	-117.72594	432794	3738903	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	CAGN (male with fledgling)						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPhone Avenza Maps

Mapping notes: Mapped point represents an adult male with one fledgling.

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES24F0009
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Vireo bellii pusillus*

Common name: least Bell's vireo

Date of field work (mm-dd-yyyy): 06-20-2024

Comment about field work date(s): Also observed during subsequent surveys on July 16, and August 5, 2024.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidentally observed during focused Crotch's bumble bee surveys

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	other
2	2			

Age class comment: Family group consisting of a pair with two fledglings

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other (foraging, fly-over, etc.)**

Site use description:

What was the observed behavior? The pair was traveling through mulefat scrub vegetation with two fledglings and was observed feeding them on multiple occasions.

Describe any evidence of reproduction: Yes, two fledglings were observed indication that successful nesting had occurred.

SITE INFORMATION

Habitat description: Mulefat scrub and disturbed mulefat scrub

Slope: Landowner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

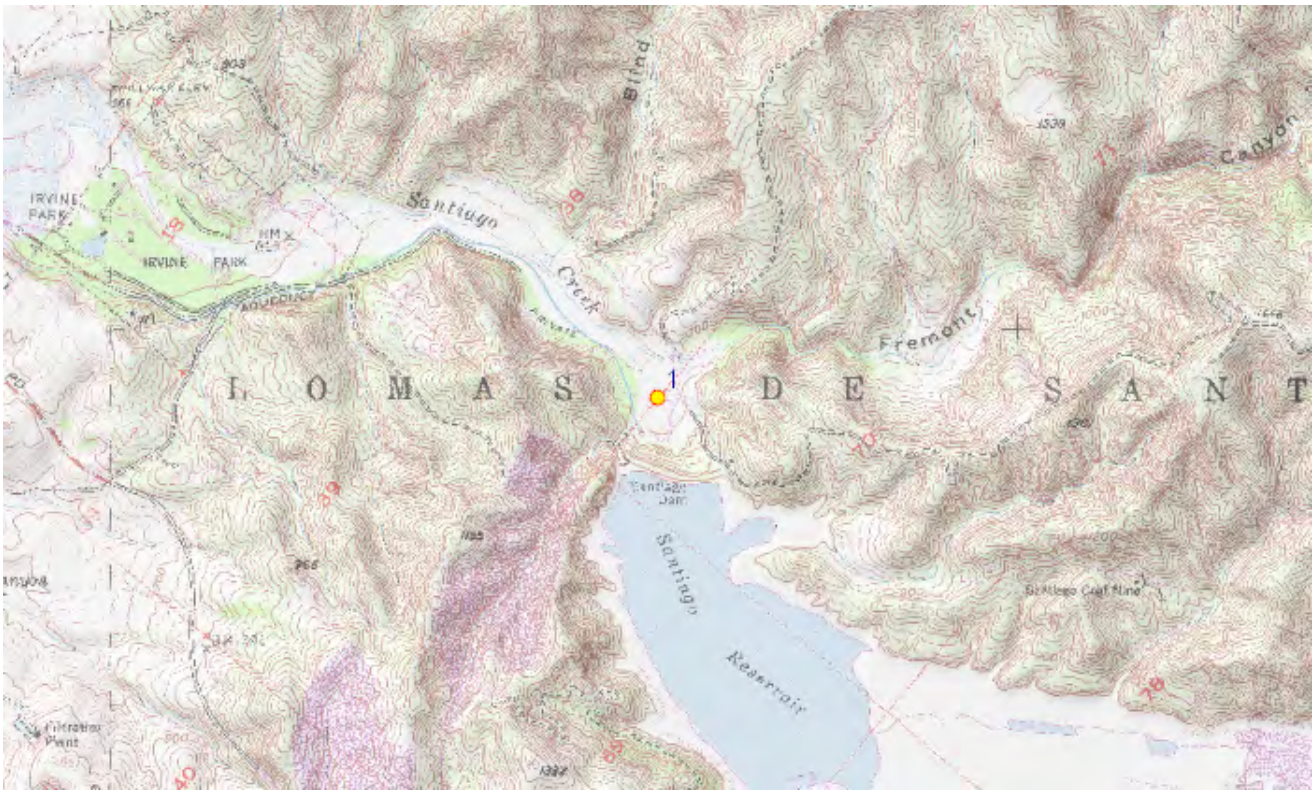
Immediate & surrounding land use: Irvine Lake, open space in NCCP Reserve, Irvine Regional Park

Visible disturbances:

Threats: Non-native vegetation

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	667	33.78913	-117.72576	432811	3739013	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	Least Bell's Vireo (Family Group)						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPhone Avenza Maps

Mapping notes: Mapped point represents a family group consisting of a pair traveling with 2 fledglings. The family group was also observed a various locations during subsequent surveys: 33.788656, -117.726633 and 33.786843, -117.724584

Location/directions comments:

Attachment(s):

APPENDIX H

ARROYO TOAD SURVEYS

August 18, 2020

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL AND MAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused diurnal and nocturnal surveys to determine the presence or absence of the arroyo toad (*Anaxyrus californicus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "Project") located in Orange County, California (Exhibit 1).

PROJECT DESCRIPTION AND LOCATION

The Irvine Ranch Water District and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left (west) abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The Project is currently in the early design phase.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The survey area is located northeast of State Route (SR) 261 and southeast of State Route 241 (SR-241). The survey area is depicted on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 635 to 898 feet above mean sea level (msl). Santiago Creek, a blueline stream, occurs in the survey area. Santiago Creek travels roughly northwest, and a tributary from Fremont Canyon joins it from the east. Fremont Canyon is characterized by very steep slopes, shallow soils, and watercourses contained within bedrock channels. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Nature Preserve is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

The survey area for the arroyo toad surveys included all suitable habitat along Santiago Creek extending 0.62 mile (1 kilometer) upstream of the project survey area, which includes a tributary from Fremont Canyon (Exhibit 3). The following vegetation types and other areas occur within the project survey area: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed. Representative site photos are included in Attachment A.

SPECIES BACKGROUND

The arroyo is a federally listed Endangered species and a California Species of Special Concern. At the time of listing, the arroyo toad was considered a subspecies of southwestern arroyo toad (*Bufo microscaphus*) until genetic studies (Gergus 1998) separated the arroyo toad (*B. californicus*) from the Arizona toad (*B. microscaphus*). Recent research (Frost et al. 2006) places both species in the genus *Anaxyrus*.

The arroyo toad is a small, olive green or gray to tan toad with warty skin and dark spots. It has a light-colored V-shaped stripe across the head between and including the eyelids, and a light spot on each sacral hump and in the middle of its back. It normally lacks a mid-dorsal stripe (i.e., a stripe down the center of its back). The underside of the arroyo toad is usually buff-colored and unspotted. The parotid glands are oval-shaped, widely separated, and pale toward the front; and the cranial crests are absent or weak. Reproductive adult toads typically range from 2.2 to 2.6 inches snout to vent length for males and 2.6 to 3.3 inches for females (USFWS 1999). Its movement consists of hopping rather than walking (USFWS 1994). Arroyo toads are nocturnal (i.e., active at night). Adults feed primarily on ants but will also consume beetles, spiders, larvae, caterpillars, and other invertebrates (USFWS 2009). Males become sexually mature in one to two years, and females become sexually mature in two to three years; arroyo toads can live up to five years (Sweet 1992, 1993).

Tadpoles are black in coloration at hatching and develop a tan coloration on the upper side; gold and dark crossbars on the tail; and an opaque, white venter on the underside before metamorphosing (Sweet 1992; USFWS 1999). Tadpoles typically metamorphose at a length of 1.1 to 1.6 inches (USFWS 1999). Juveniles have a white-gray-tan coloring with dark spots on the upper side and a white underside. The V-shaped line on the head is visible on juveniles, but the parotid glands are typically not yet visible (Sweet 1992; Sanders 1950). Juveniles usually grow to about 1.2 to 1.6 inches their first year (sometimes up to 2.0 inches) and then do not grow again until the following spring (Sweet 1992).

The arroyo toad population is currently distributed in coastal drainages and along the desert slopes of the Transverse and Peninsular Ranges from approximately 1,000 feet to 4,600 feet above mean sea level; however, the species has been recorded from sea level to 8,000 feet above msl in Baja California (Patten and Myers 1992; Jennings and Hayes 1994; Welsh 1988; Beaman et al. 1995; USFWS 1999). It occurs in intermittent washes/streams and perennial streams. In the northern portion of their range, they generally occur in third- to sixth-order[1] or greater streams; however, in the southern portion of their range, they can occur in first- and second-order streams (USFWS 1999; Griffin et al. 1999; USFWS 2009). “Episodic flooding is critical to keeping the low stream terraces relatively vegetation free and soils friable enough for juveniles and adults to create burrows” (Jennings and Hayes 1994). The most favorable breeding habitat for arroyo toad consists of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces.

Outside the breeding season, arroyo toads are essentially terrestrial, using a variety of upland habitats, including sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grasslands (Holland 1995; Griffin et al. 1999; USFWS 2009). Adult toads burrow into sandy terraces where they shelter during the day when the surface is damp or during longer periods during the dry season (Sweet 1989). During the non-breeding season (i.e., August–January), arroyo toad will aestivate (a state of

[1] Stream order is a relative size of streams. The smallest tributaries are referred to as first-order streams. Two first-order streams combine to create a second-order stream, and so on (Sweet 1992).

dormancy similar to hibernation) to prevent dehydration during hot or dry times of the year (Ramirez 2003).

Adult male arroyo toads will sometimes travel 1.2 to 1.9 miles along a stream course, often becoming more sedentary once reaching a large size. Females are more sedentary, typically maintaining an area of movement less than 330 feet. Adult and subadult arroyo toads can range widely into the uplands, commonly 0.3 mile, with some movements up to 1.2 miles from the stream (USFWS 1999).

During the breeding season, typically from February to July, males will make advertisement vocalizations above water from shallow areas along the creek margins. The advertisement call is a soft, high, whistling trill that lasts from 4 to 9 seconds in duration and is audible up to approximately 985 feet under ideal conditions (Gergus et al. 1997). Two parallel egg strings of 2,000 to 10,000 eggs are deposited in shallow water (i.e., usually less than 4 inches in depth with an average of 1.4 inches) on fine sediment with very low current (0.2 foot per second) and little or no emergent vegetation (Sweet 1992; USFWS 1999). These eggs hatch four to six days later (Sweet 1992). Streams where arroyo toad occur must have water from approximately late March through mid-June to allow tadpoles to develop (Sweet 1989). The tadpole stage usually lasts about ten weeks (USFWS 2009). Tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms from just beneath the surface layer of fine sediments or within the interstices of gravel deposits; they do not forage on macroscopic vegetation (Sweet 1992; Jennings and Hayes 1994; USFWS 2009). After metamorphosis in June or July, the juveniles remain on the adjacent gravel bars or sandy stream terraces for 8 to 12 weeks (depending on site conditions and rainfall), where they forage for insects (Sweet 1992; USFWS 1994).

On February 9, 2011, the USFWS published the Revised Critical Habitat for the arroyo toad. The Revised Critical Habitat designated 98,366 acres of critical habitat for the arroyo toad in portions of Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California (USFWS 2011). The survey area is not located in designated Critical Habitat for this species.

This species is a Conditionally Covered Species in the Central Coastal Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The NCCP/HCP states that “within the subregion, arroyo toad may occur in Limestone Canyon, Boxer Canyon (in the Santiago Canyon drainage), and the Silverado watershed… None of these areas have been thoroughly surveyed for arroyo toad” (County of Orange 1996). The NCCP/HCP also states that the Transportation Corridor Agency conducted surveys in the Santiago Creek area and have not identified the presence of the species (County of Orange 1996). The records in the California Natural Diversity Database match those reported from the NCCP/HCP; there is a 1974 record from Limestone Canyon and a record with no date from a tributary of Silverado Canyon (CDFW 2020). There have been no recent observations of the species reported in the vicinity.

SURVEY METHODS

The USFWS’ 1999 Arroyo Toad Protocol requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population was documented, recorded with a Global Positioning System unit, and mapped on an aerial

photograph. The number of individuals were noted on each subsequent visit, and data were collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the USFWS-established survey methodology described above. The survey area included all suitable habitat along Santiago Creek, including a tributary from Fremont Canyon. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on April 17 and 24; May 15 and 22; and June 12 and 19, 2020.

Diurnal surveys were conducted from approximately 5:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 10:30 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the creek, and for foraging individuals in the adjacent riparian and upland areas. Surveyors moved in an upstream direction during the surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided. Survey dates, times, and weather data are shown in Table 1. Survey conditions and results were documented in field notes.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR ARROYO TOAD

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
1	4/17/2020	Diurnal	Aguayo, Messett	5:00 PM–7:20 PM	6–7	4–5	63	60	70%
		Nocturnal		8:15 PM–10:20 PM	4–5	4–5	59	57	50%
2	4/24/2020	Diurnal	Aguayo, Messett	4:50 PM–7:10 PM	6–7	4–5	93	86	40%
		Nocturnal		8:15 PM–10:15 PM	3–4	3–4	82	79	70%
3	5/15/2020	Diurnal	Aguayo, Messett	5:15 PM–7:40 PM	4–5	0–1	73	68	clear
		Nocturnal		8:30 PM–10:20 PM	0–1	2–3	66	64	clear
4	5/22/2020	Diurnal	Aguayo, Messett	5:25 PM–7:20 PM	4–5	3–4	70	64	clear
		Nocturnal		8:30 PM–10:15 PM	2–3	2–3	61	59	clear
5	612/2020	Diurnal	Aguayo, Messett	5:35 PM–7:40 PM	2–3	4–5	73	64	clear
		Nocturnal		8:40 PM–10:30 PM	3–4	1–2	63	61	clear
6	6/19/2020	Diurnal	Aguayo, Messett	5:40 PM–7:45 PM	3–4	4–5	72	67	clear
		Nocturnal		8:40 PM–10:20 PM	4–5	4–5	63	62	clear

°F: degrees Fahrenheit.

SURVEY RESULTS

No arroyo toad was observed or detected within the survey area during the focused surveys.

Other amphibian species detected during surveys include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), and Baja California treefrog (*Pseudacris hypochondriaca*). Representative photos of the frogs observed are included in Attachment A. A complete list of all wildlife species detected during the surveys is provided in Attachment B.

OTHER OBSERVATIONS

Two-striped garter snake (*Thamnophis hammondii*), a California Species of Special Concern, was observed during the survey conducted on May 15, 2020 (Exhibit 4). A California Natural Diversity Database (CNDDB) form documenting this observation is included in Attachment C and will be submitted online to the California Department of Fish and Wildlife (CDFW) by Mr. Aguayo.

A male coastal California gnatcatcher (*Polioptila californica californica*), a federally listed Threatened species and a California Species of Special Concern, was detected during the survey conducted on May 15, 2020. Coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), a Species of Special Concern, was detected on multiple surveys. CNDDB forms documenting these species will be included with the Results of Coastal California Gnatcatcher Survey Report and will be submitted online by Ms. Messett.

American peregrine falcon (*Falco peregrinus anatum*), a CDFW Fully Protected species, was detected during the survey conducted on April 24, 2020 (Exhibit 4). The American peregrine falcon was not observed nesting in the survey area; therefore, a CNDDB form was not prepared for this species.

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please call Amber Heredia at 714.751.7373.

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager

Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – California Natural Diversity Database Forms

cc: Jo Ann Corey, corey@irwd.com
Jacob Moeder, Moeder@irwd.com

REFERENCES

Beaman, K.R., S.J. Meyers, and C. McGaugh. 1995. Report on Surveys for Arroyo Toads on Deep Creek. Contract report to USDA, Forest Service, San Bernardino National Forest.

California Department of Fish and Wildlife (CDFW). 2020 (August 13, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Corona South, Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

County of Orange. 1996 (July 17). Natural Community Conservation Plan & Habitat Conservation Plan, County of Orange, Parts I and II: NCCP/HCP, Final (Administrative Record Copy). Prepared by R.J. Meade Consulting. La Jolla, CA.

Frost, D.R. et al. 2006. The Amphibian Tree of Life. *Bulletin of the American Museum of Natural History* 297:1–370. New York, NY: American Museum of Natural History.

Gergus, E.W.A., B.K. Sullivan, and K.B. Malmos. 1997. Call Variation in the *Bufo microscaphus* Complex: Implications for Species Boundaries and the Evolution of Mate Recognition. *Ethology* 103: 979–989. Maldon, MA: John Wiley & Sons, Inc.

Gergus, E.W.A. 1998. Systematics of the *Bufo microscaphus* complex: Allozyme evidence. *Herpetologica* 54:317–325. Salt Lake City, UT: Society for the Study of Amphibians and Reptiles.

Griffin, P.C., T.J. Case, and R.N. Fisher. 1999. *Radio Telemetry Study of Bufo californicus, Arroyo Toad Movement Patterns and Habitat Preferences Contract Report to the California Department of Transportation Southern Biology Pool.* Sacramento, CA: Western Ecological Research Center.

Holland, D.C. 1995. Sensitive Species Hydroecological Evaluation – Santa Margarita River: Arroyo Southwestern Toad (*Bufo microscaphus californicus*) Camp. Camp Pendleton. 14 pp.

Jennings, M.R. and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.

Patten, M.A., and S.J. Myers. 1992. Geographic distribution. *Bufo microscaphus californicus* (arroyo toad). *Herpetological Review*, 23(4):122.

Psomas. 2020 [in preparation]. *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

Ramirez, R.S., Jr. 2003. Arroyo toad (*Bufo californicus*) hydrogeomorphic habitat baseline analysis/radio telemetry study - Rancho Las Flores San Bernardino County, California. Final report to Rancho Las Flores Limited Partnership by Cadre Environmental, Carlsbad, California. vi + 101 pp.

Sanders, R.M. 1950. A herpetological survey of Ventura County, California. Master's thesis. Stanford University, Stanford, California. 140 pp.

Sweet, S.S. 1993. *Second Report on the Biology and Status of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California* (Report to United States

Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, California). Goleta, CA: USDA.

———. 1992. *Ecology and Status of the Arroyo Toad* (Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California, with Management Recommendations* (Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest). Goleta, CA: USDA.

———. 1989. Observations on the biology and status of the arroyo toad, *Bufo microscaphus californicus*, with a proposal for additional research. Department of Biological Sciences, University of California, Santa Barbara, California. Unpublished report. 23 pp.

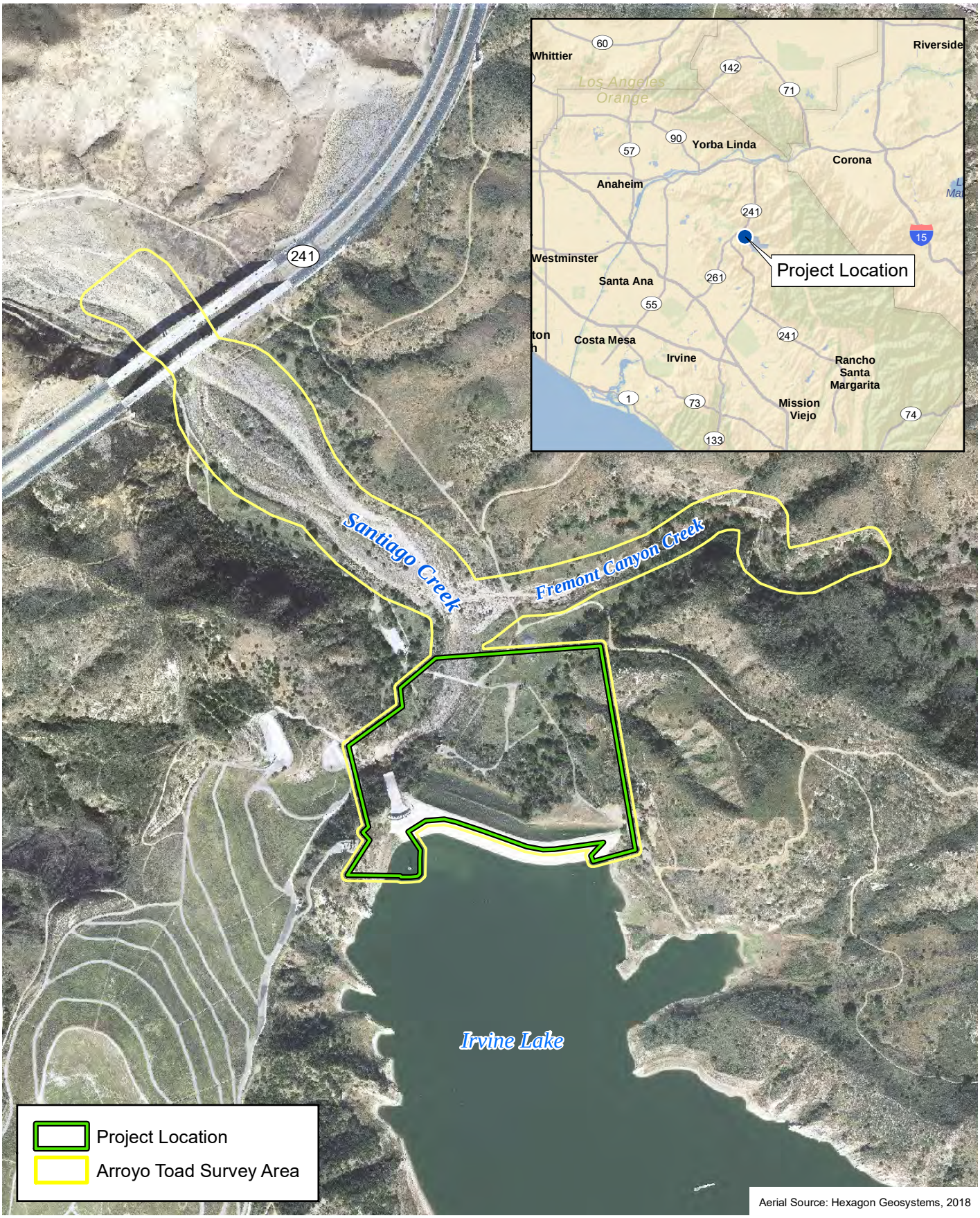
U.S. Fish and Wildlife Service (USFWS). 2011 (February 9). Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. *Federal Register* 76(27): 7245–7467. Washington, D.C.: USFWS.

———. 2009. Arroyo toad (*Anaxyrus californicus*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, California.

———. 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf.

———. 1994 (December 16). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Arroyo Southwestern Toad. *Federal Register* 59(241): 64859–64867. Washington, D.C.: USFWS.

Welsh, H.H., Jr. 1988. An ecogeographic analysis of the herpetofauna of the Sierra San Pedro Mártir region, Baja California: With a contribution to the biogeography of Baja California herpetofauna. Proceedings of the California Academy of Sciences, 4th series, 46:1-72.



Aerial Source: Hexagon Geosystems, 2018

D:\Projects\3IRW\00905\MXD\ARTO\ex_Project_Location_20200805.mxd

Project Location

Exhibit 1

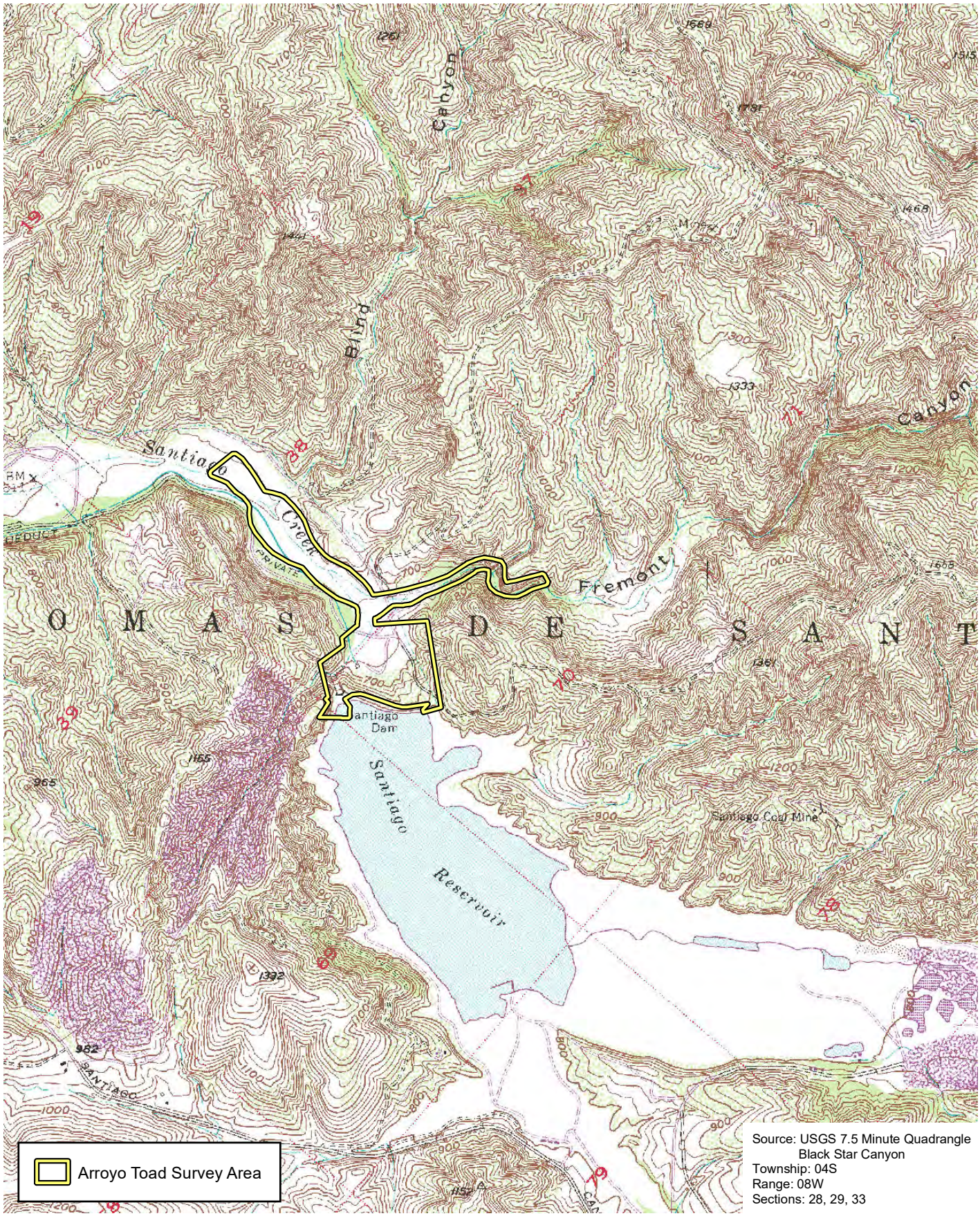
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

850 425 0 850 Feet

PSOMAS

(Rev: 8-18-2020 MMD) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\ex_Project_Location.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S
Range: 08W
Sections: 28, 29, 33

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 8-18-2020 MMD) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\ex_USGS.pdf

D:\Projects\3IRW\00905\MXD\ARTO\ex_USGS_20200805.mxd

Aerial Source: Hexagon Geosystems 2018

D:\Projects\3IRW000905\MXD\ARTO\ex_SurveyArea_20200806.mxd

Survey Area

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

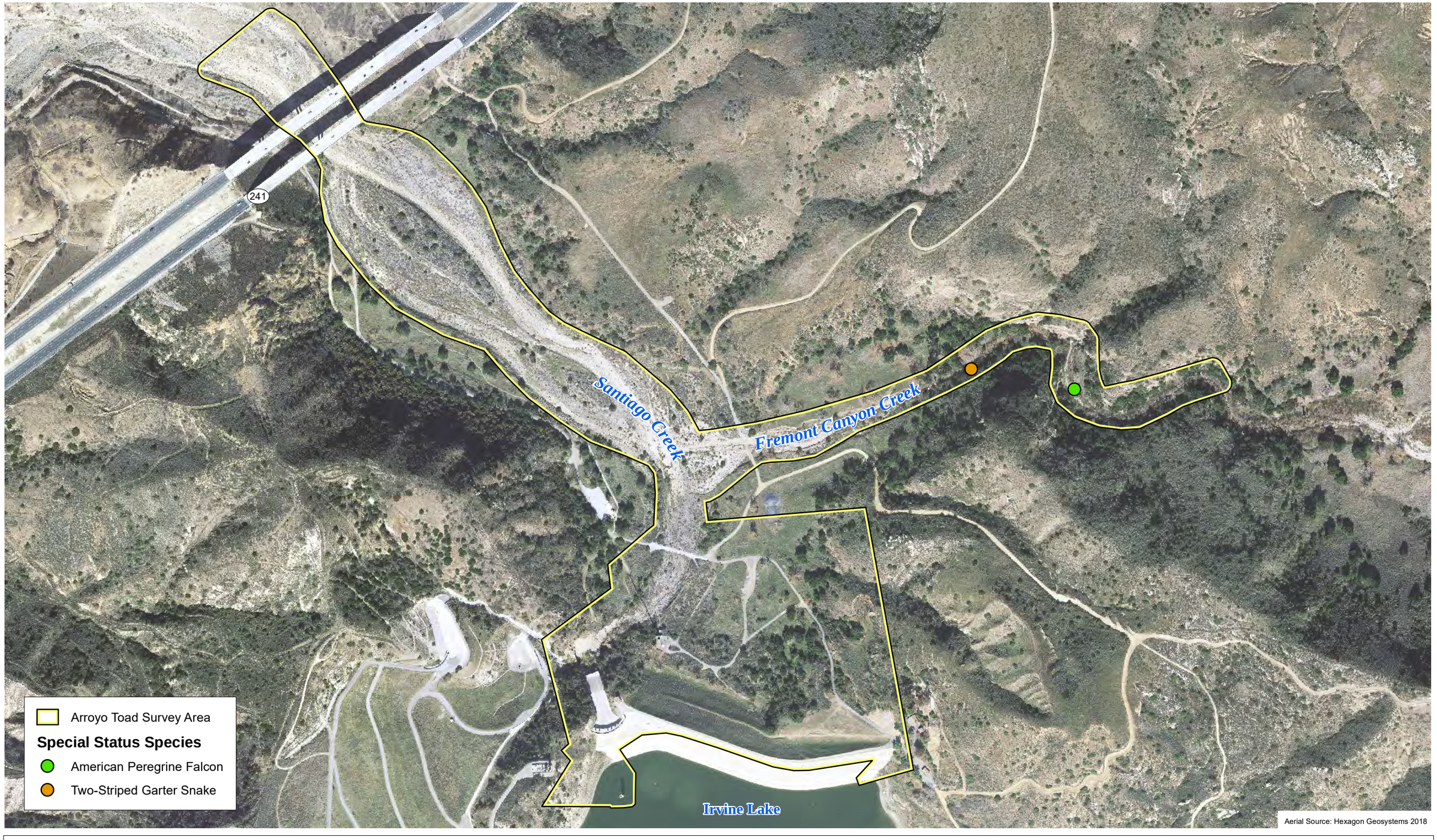
N W E S

450 225 0 450

Feet

PSOMAS

(Rev: 08/18/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\ex_SurveyArea.pdf



Aerial Source: Hexagon Geosystems 2018

D:\Projects\3IRW000905\MXD\ARTO\ex_SpecialStatusSpeciesObserved_20200808.mxd

Special Status Species Observed

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

450 225 0 450

Feet

PSOMAS

(Rev: 08/18/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\ex_SpecialStatusSpeciesObserved.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1: View of suitable habitat along Santiago Creek located in the northwestern portion of the survey area.

Photo 2: View of suitable habitat along the tributary from Fremont Canyon in the middle portion of the survey area.

D:\Projects\3IRW\00905\GRAPHICS\ARTO\AttA-1_SitePhotographs.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/06/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\AttA_SitePhotographs.pdf

Photo 3: View of suitable habitat along the tributary from Fremont Canyon in the eastern portion of the survey area.

Photo 4: View of western toad egg strings found along the tributary from Fremont Canyon.

D:\Projects\3IRW\00905\GRAPHICS\ARTO\AttA-2_SitePhotographs.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/06/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\AttA_SitePhotographs.pdf

Photo 5: View of a western toad found along the tributary from Fremont Canyon.

Photo 6: View of a California treefrog found along the tributary from Fremont Canyon.

D:\Projects\3IRW\00905\GRAPHICS\ARTO\AttA-3_SitePhotographs.ai

Site Photographs

Attachment A-3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE COMPENDIUM

Scientific Name	Common Name
AMPHIBIANS	
BUFONIDAE – TRUE TOAD FAMILY	
Anaxyrus boreas	western toad
HYLIDAE – TREEFROG FAMILY	
Pseudacris cadaverina	California treefrog
Pseudacris hypochondriaca	Baja California treefrog
LIZARDS	
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY	
Sceloporus occidentalis	western fence lizard
Uta stansburiana	common side-blotched lizard
SNAKES	
NATRICIDAE – HARMLESS LIVE-BEARING SNAKE FAMILY	
Thamnophis hammondii	two-striped garter snake
BIRDS	
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY	
Branta canadensis	Canada goose
Anas platyrhynchos	mallard
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY	
Callipepla californica	California quail
COLUMBIDAE – PIGEON AND DOVE FAMILY	
Zenaida macroura	mourning dove
CAPRIMULGIDAE – NIGHTJAR FAMILY	
Chordeiles acutipennis	lesser nighthawk
Phalaenoptilus nuttallii	common poorwill
APODIDAE – SWIFT FAMILY	
Aeronautes saxatalis	white-throated swift
TROCHILIDAE – HUMMINGBIRD FAMILY	
Calypte anna	Anna's hummingbird
Selasphorus sasin	Allen's hummingbird
PHALACROCORACIDAE – CORMORANT FAMILY	
Phalacrocorax auratus	double-crested cormorant
ARDEIDAE – HERON FAMILY	
Ardea Herodias	great blue heron
Ardea alba	great egret
CATHARTIDAE – NEW WORLD VULTURE FAMILY	
Cathartes aura	turkey vulture
ACCIPITRIDAE – HAWK FAMILY	
Buteo jamaicensis	red-tailed hawk
TYTONIDAE – BARN OWL FAMILY	
Tyto alba	barn owl
STRIGIDAE – TYPICAL OWL FAMILY	
Megascops kennicottii	western screech-owl
Bubo virginianus	great horned owl
PICIDAE – WOODPECKER FAMILY	
Melanerpes formicivorus	acorn woodpecker

WILDLIFE COMPENDIUM

Scientific Name	Common Name
FALCONIDAE – FALCON FAMILY	
Falco sparverius	American kestrel
Falco peregrinus	peregrine falcon
PSITTACIDAE – PARROT FAMILY	
*Amazona viridigenalis**	red-crowned parrot*
TYRANNIDAE – TYRANT FLYCATCHER FAMILY	
Empidonax difficilis	pacific-slope flycatcher
Sayornis nigricans	black phoebe
Myiarchus cinerascens	ash-throated flycatcher
Tyrannus vociferans	Cassin's kingbird
CORVIDAE – JAY AND CROW FAMILY	
Aphelocoma californica	California scrub-jay
Corvus corax	common raven
PARIDAE – TITMOUSE FAMILY	
Baeolophus inornatus	oak titmouse
AEGITHALIDAE – BUSHTIT FAMILY	
Psaltriparus minimus	bushtit
TROGLODYTIDAE – WREN FAMILY	
Troglodytes aedon	house wren
Thryomanes bewickii	Bewick's wren
Campylorhynchus brunneicapillus	cactus wren
POLIOPTILIDAE – GNATCATCHER FAMILY	
Polioptila caerulea	blue-gray gnatcatcher
Polioptila californica	California gnatcatcher
SYLVIIDAE – SILVIID WARBLERS FAMILY	
Chamaea fasciata	wrentit
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY	
Toxostoma redivivum	California thrasher
STURNIDAE – STARLING FAMILY	
*Sturnus vulgaris**	European starling*
PTILOGONATIDAE – SILKY-FLYCATCHER FAMILY	
Phainopepla nitens	phainopepla
FRINGILLIDAE – FINCH FAMILY	
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
PARULIDAE – WOOD-WARBLER FAMILY	
Cardellina pusilla	Wilson's warbler
EMBERIZIDAE – SPARROW FAMILY	
Pipilo maculatus	spotted towhee
Melozone crissalis	California towhee
Melospiza melodia	song sparrow
ICTERIDAE – BLACKBIRDS AND ORIOLES	
Icterus cucullatus	hooded oriole
CARDINALIDAE – CARDINALS, GROSBEAKS, AND ALLIES FAMILY	
Piranga ludoviciana	western tanager
Pheucticus melanocephalus	black-headed grosbeak

WILDLIFE COMPENDIUM

Scientific Name	Common Name
MAMMALS	
SCIURIDAE – SQUIRREL FAMILY	
Otospermophilus beecheyi	California ground squirrel
CRICETIDAE – NEW WORLD RATS AND MICE FAMILY	
Peromyscus sp.	mouse
LEPORIDAE – HARE AND RABBIT FAMILY	
Sylvilagus audubonii	desert cottontail
VESPERTILIONIDAE – VESPERTILIONID BAT FAMILY	
Order *Chiroptera*	bat
FELIDAE – CAT FAMILY	
Puma concolor	mountain lion (tracks)
CANIDAE – CANID FAMILY	
Canis latrans	coyote
CERVIDAE – CERVID FAMILY	
Odocoileus hemionus	southern mule deer
* Non-native species	

ATTACHMENT C

CALIFORNIA NATURAL DIVERSITY DATABASE FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU20F0012
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Thamnophis hammondii*

Common name: two-striped gartersnake

Date of field work (mm-dd-yyyy): 05-15-2020

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Jonathan Aguayo
Affiliation: Psomas
Address: 6292 San Harco Circle , Buena Park, CA 90620
Email: jonathan.aguayo@psomas.com
Phone: (805) 204-6986

Other observers: Lindsay Messett

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with California snake species through research, workshops and/or training

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidental observation during arroyo toad survey

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Site use description:

What was the observed behavior? Swimming in Fremont Canyon creek

Describe any evidence of reproduction: None

SITE INFORMATION

Habitat description: Southern willow scrub along Fremont Canyon Creek

Slope: Land owner/manager: Private; Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Undeveloped open space.

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	680	33.79152	-117.72137	433220	3739274	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	two-striped garter snake						

The mapped feature is accurate within: 10 m

Source of mapped feature: Ipad - Avenza Maps

Mapping notes:

Location/directions comments:

Attachment(s):

August 23, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL AND MAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused diurnal and nocturnal surveys to determine the presence or absence of the arroyo toad (*Anaxyrus californicus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California (Exhibit 1). The purpose of the surveys was to determine the presence or absence of the arroyo toad upstream of Santiago Creek Dam/Irvine Lake. Focused surveys were conducted downstream of Santiago Creek Dam in Spring 2020 (Psomas 2020). Surveys were conducted by a Biologist with the necessary experience and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS).

PROJECT DESCRIPTION AND LOCATION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Biological Study Area. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level (msl).

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

The Biological Study Area is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Focused surveys were conducted along Santiago Creek upstream of the lake to determine whether arroyo toad is present or absent adjacent to the proposed staging areas on the east side of the lake.

SURVEY AREA

The arroyo toad survey area included all suitable habitat along Santiago Creek, extending 0.62 mile (1 kilometer) from the most upstream project impact on the east side of Irvine Lake (Exhibit 3). The following vegetation types and other areas occur within the arroyo toad survey area: sagebrush scrub, ruderal, riparian herb, disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and coast live oak woodland. Site photographs of representative habitat in the survey area are provided in Attachment A.

SPECIES BACKGROUND

The arroyo is a federally listed Endangered species and a California Species of Special Concern. At the time of listing, the arroyo toad was considered a subspecies of southwestern arroyo toad (*Bufo microscaphus*) until genetic studies (Gergus 1998) separated the arroyo toad (*B. californicus*) from the Arizona toad (*B. microscaphus*). Recent research (Frost et al. 2006) places both species in the genus *Anaxyrus*.

The arroyo toad is a small, olive green or gray to tan toad with warty skin and dark spots. It has a light-colored V-shaped stripe across the head between and including the eyelids, and a light spot on each sacral hump and in the middle of its back. It normally lacks a mid-dorsal stripe (i.e., a stripe down the center of its back). The underside of the arroyo toad is usually buff-colored and unspotted. The parotid glands are oval-shaped, widely separated, and pale toward the front; and the cranial crests are absent or weak. Reproductive adult toads typically range from 2.2 to 2.6 inches snout to vent length for males and 2.6 to 3.3 inches for females (USFWS 1999). Its movement consists of hopping rather than walking (USFWS 1994). Arroyo toads are nocturnal (i.e., active at night). Adults feed primarily on ants but will also consume beetles, spiders, larvae, caterpillars, and other invertebrates (USFWS 2009). Males become sexually mature in one to two years, and females become sexually mature in two to three years; arroyo toads can live up to five years (Sweet 1992, 1993).

[1] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Tadpoles are black in coloration at hatching and develop a tan coloration on the upper side; gold and dark crossbars on the tail; and an opaque, white venter on the underside before metamorphosing (Sweet 1992; USFWS 1999). Tadpoles typically metamorphose at a length of 1.1 to 1.6 inches (USFWS 1999). Juveniles have a white-gray-tan coloring with dark spots on the upper side and a white underside. The V-shaped line on the head is visible on juveniles, but the parotid glands are typically not yet visible (Sweet 1992; Sanders 1950). Juveniles usually grow to about 1.2 to 1.6 inches their first year (sometimes up to 2.0 inches) and then do not grow again until the following spring (Sweet 1992).

The arroyo toad population is currently distributed in coastal drainages and along the desert slopes of the Transverse and Peninsular Ranges from approximately 1,000 feet to 4,600 feet above msl; however, the species has been recorded from sea level to 8,000 feet above msl in Baja California (Patten and Myers 1992; Jennings and Hayes 1994; Welsh 1988; Beaman et al. 1995; USFWS 1999). It occurs in intermittent washes/streams and perennial streams. In the northern portion of their range, they generally occur in third- to sixth-order[2] or greater streams; however, in the southern portion of their range, they can occur in first- and second-order streams (USFWS 1999; Griffin et al. 1999; USFWS 2009). "Episodic flooding is critical to keeping the low stream terraces relatively vegetation free and soils friable enough for juveniles and adults to create burrows" (Jennings and Hayes 1994). The most favorable breeding habitat for arroyo toad consists of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces.

Outside the breeding season, arroyo toads are essentially terrestrial, using a variety of upland habitats, including sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grasslands (Holland 1995; Griffin et al. 1999; USFWS 2009). Adult toads burrow into sandy terraces where they shelter during the day when the surface is damp or during longer periods during the dry season (Sweet 1989). During the non-breeding season (i.e., August–January), arroyo toad will aestivate (a state of dormancy similar to hibernation) to prevent dehydration during hot or dry times of the year (Ramirez 2003).

Adult male arroyo toads will sometimes travel 1.2 to 1.9 miles along a stream course, often becoming more sedentary once reaching a large size. Females are more sedentary, typically maintaining an area of movement less than 330 feet. Adult and subadult arroyo toads can range widely into the uplands, commonly 0.3 mile, with some movements up to 1.2 miles from the stream (USFWS 1999).

During the breeding season, typically from February to July, males will make advertisement vocalizations above water from shallow areas along the creek margins. The advertisement call is a soft, high, whistling trill that lasts from 4 to 9 seconds in duration and is audible up to approximately 985 feet under ideal conditions (Gergus et al. 1997). Two parallel egg strings of 2,000 to 10,000 eggs are deposited in shallow water (i.e., usually less than 4 inches in depth with an average of 1.4 inches) on fine sediment with very low current (0.2 foot per second) and little or no emergent vegetation (Sweet 1992; USFWS 1999). These eggs hatch four to six days later (Sweet 1992). Streams where arroyo toad occur must have water from approximately late March through mid-June to allow tadpoles to develop (Sweet 1989). The tadpole stage usually lasts about ten weeks (USFWS 2009). Tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms from just beneath the surface layer of fine sediments or within the interstices of gravel deposits; they do not forage on macroscopic vegetation (Sweet 1992; Jennings and Hayes 1994; USFWS 2009). After metamorphosis in June or July, the juveniles remain on the adjacent gravel bars or sandy stream terraces for 8 to 12 weeks (depending on site conditions and rainfall), where they forage for insects (Sweet 1992; USFWS 1994).

---

[2] Stream order is a relative size of streams. The smallest tributaries are referred to as first-order streams. Two first-order streams combine to create a second-order stream, and so on (Sweet 1992).

On February 9, 2011, the USFWS published the Revised Critical Habitat for the arroyo toad. The Revised Critical Habitat designated 98,366 acres of critical habitat for the arroyo toad in portions of Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California (USFWS 2011). The survey area is not located in designated Critical Habitat for this species.

This species is a Conditionally Covered Species in the Central Coastal NCCP/HCP. The NCCP/HCP states that "within the subregion, arroyo toad may occur in Limestone Canyon, Boxer Canyon (in the Santiago Canyon drainage), and the Silverado watershed… None of these areas have been thoroughly surveyed for arroyo toad" (County of Orange 1996). The NCCP/HCP also states that the Transportation Corridor Agency conducted surveys in the Santiago Creek area and have not identified the presence of the species (County of Orange 1996). The records in the California Natural Diversity Database (CNDDB) match those reported from the NCCP/HCP; there is a 1974 record from Limestone Canyon and a record with no date from a tributary of Silverado Canyon (CDFW 2022). There have been no recent observations of the species reported in the vicinity.

SURVEY METHODS

The USFWS' 1999 Arroyo Toad Protocol requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population would be documented, recorded with a Global Positioning System unit, and mapped on an aerial photograph. The number of individuals would be noted on each subsequent visit, and data collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the USFWS-established survey methodology described above. The survey area included all suitable habitat along Santiago Creek. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on March 25; April 1 and 8; May 27; and June 10 and 23, 2022.

Diurnal surveys were conducted from approximately 4:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the creek, and for foraging individuals in the adjacent riparian and upland areas. Surveyors moved in an upstream direction during the surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided. Survey dates, times, and weather data are shown in Table 1. Survey conditions and results were documented in field notes.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR ARROYO TOAD

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
1	3/25/2022	Diurnal	Aguayo, Messett	4:20 PM–6:55 PM	6	4	75	71	30–20%
		Nocturnal		7:42 PM–10:48 PM	4	3	69	58	10%
2	4/1/2022	Diurnal	Aguayo, Messett	3:45 PM–7:07 PM	4	8	69	59	clear
		Nocturnal		8:10 PM–10:49 PM	6	3	57	53	clear
3	4/8/2022	Diurnal	Aguayo, Messett	3:54 PM–7:16 PM	8	4	94	81	20%–clear
		Nocturnal		8:10 PM–10:36 PM	4	3	78	72	clear
4	5/27/2022	Diurnal	Aguayo, Messett	4:40 PM–7:43 PM	6	6	68	61	40%
		Nocturnal		8:39 PM–10:55 PM	5	4	60	57	50%
5	6/10/2022	Diurnal	Aguayo, Messett	4:50 PM–7:52 PM	7	5	80	71	clear
		Nocturnal		8:33 PM–10:42 PM	4	3	68	63	clear
6	6/23/2022	Diurnal	Aguayo, Messett	4:48 PM–7:04 PM	7	5	87	82	clear
		Nocturnal		8:42 PM–10:39 PM	3	1	76	70	clear

°F: degrees Fahrenheit.

SURVEY RESULTS

No arroyo toad was observed or detected in the survey area during the focused surveys.

Other amphibian species detected during surveys include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), and the non-native American bullfrog (*Lithobates catesbeianus*). Representative photos of the frogs/toad observed are included in Attachment A. A complete list of all wildlife species detected during the surveys is provided in Attachment B.

OTHER OBSERVATIONS

Two-striped garter snake (*Thamnophis hammondii*), a California Species of Special Concern, was observed during the surveys. Three individuals were observed during the survey conducted on April 8, 2022 (Exhibit 3). A CNDDB form documenting this observation is included in Attachment C and will be submitted online to the California Department of Fish and Wildlife by Mr. Aguayo.

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please contact Amber Heredia at Amber.Heredia@psomas.com or 714.481.8049.

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager, Resource Management

Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–3
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – California Natural Diversity Database Form

cc: Jacob Moeder, Moeder@irwd.com

R:\Projects\IRW_IRWD\3IRW010200\Documentation\ARTO\Santiago Arroyo Toad Report-082322.docx

REFERENCES

Beaman, K.R., S.J. Meyers, and C. McGaugh. 1995. Report on Surveys for Arroyo Toads on Deep Creek. Contract report to USDA, Forest Service, San Bernardino National Forest.

California Department of Fish and Wildlife (CDFW). 2022 (August 17, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Corona South, Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

County of Orange. 1996 (July 17). Natural Community Conservation Plan & Habitat Conservation Plan, County of Orange, Parts I and II: NCCP/HCP, Final (Administrative Record Copy). Prepared by R.J. Meade Consulting. La Jolla, CA.

Frost, D.R. et al. 2006. The Amphibian Tree of Life. *Bulletin of the American Museum of Natural History* 297:1–370. New York, NY: American Museum of Natural History.

Gergus, E.W.A., B.K. Sullivan, and K.B. Malmos. 1997. Call Variation in the *Bufo microscaphus* Complex: Implications for Species Boundaries and the Evolution of Mate Recognition. *Ethology* 103: 979–989. Maldon, MA: John Wiley & Sons, Inc.

Gergus, E.W.A. 1998. Systematics of the *Bufo microscaphus* complex: Allozyme evidence. *Herpetologica* 54:317–325. Salt Lake City, UT: Society for the Study of Amphibians and Reptiles.

Griffin, P.C., T.J. Case, and R.N. Fisher. 1999. *Radio Telemetry Study of Bufo californicus, Arroyo Toad Movement Patterns and Habitat Preferences Contract Report to the California Department of Transportation Southern Biology Pool.* Sacramento, CA: Western Ecological Research Center.

Holland, D.C. 1995. Sensitive Species Hydroecological Evaluation – Santa Margarita River: Arroyo Southwestern Toad (*Bufo microscaphus californicus*) Camp. Camp Pendleton. 14 pp.

Jennings, M.R. and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.

Patten, M.A., and S.J. Myers. 1992. Geographic distribution. *Bufo microscaphus californicus* (arroyo toad). *Herpetological Review*, 23(4):122.

Psomas. 2020 (August 18). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas. Santa Ana, CA: Psomas.

Ramirez, R.S., Jr. 2003. Arroyo toad (*Bufo californicus*) hydrogeomorphic habitat baseline analysis/radio telemetry study - Rancho Las Flores San Bernardino County, California. Final report to Rancho Las Flores Limited Partnership by Cadre Environmental, Carlsbad, California. vi + 101 pp.

Sanders, R.M. 1950. A herpetological survey of Ventura County, California. Master's thesis. Stanford University, Stanford, California. 140 pp.

Sweet, S.S. 1993. *Second Report on the Biology and Status of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California* (Report to United States

Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, California). Goleta, CA: USDA.

———. 1992. *Ecology and Status of the Arroyo Toad* (Bufo microscaphus californicus*) on the Los Padres National Forest of Southern California, with Management Recommendations* (Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest). Goleta, CA: USDA.

———. 1989. Observations on the biology and status of the arroyo toad, *Bufo microscaphus californicus*, with a proposal for additional research. Department of Biological Sciences, University of California, Santa Barbara, California. Unpublished report. 23 pp.

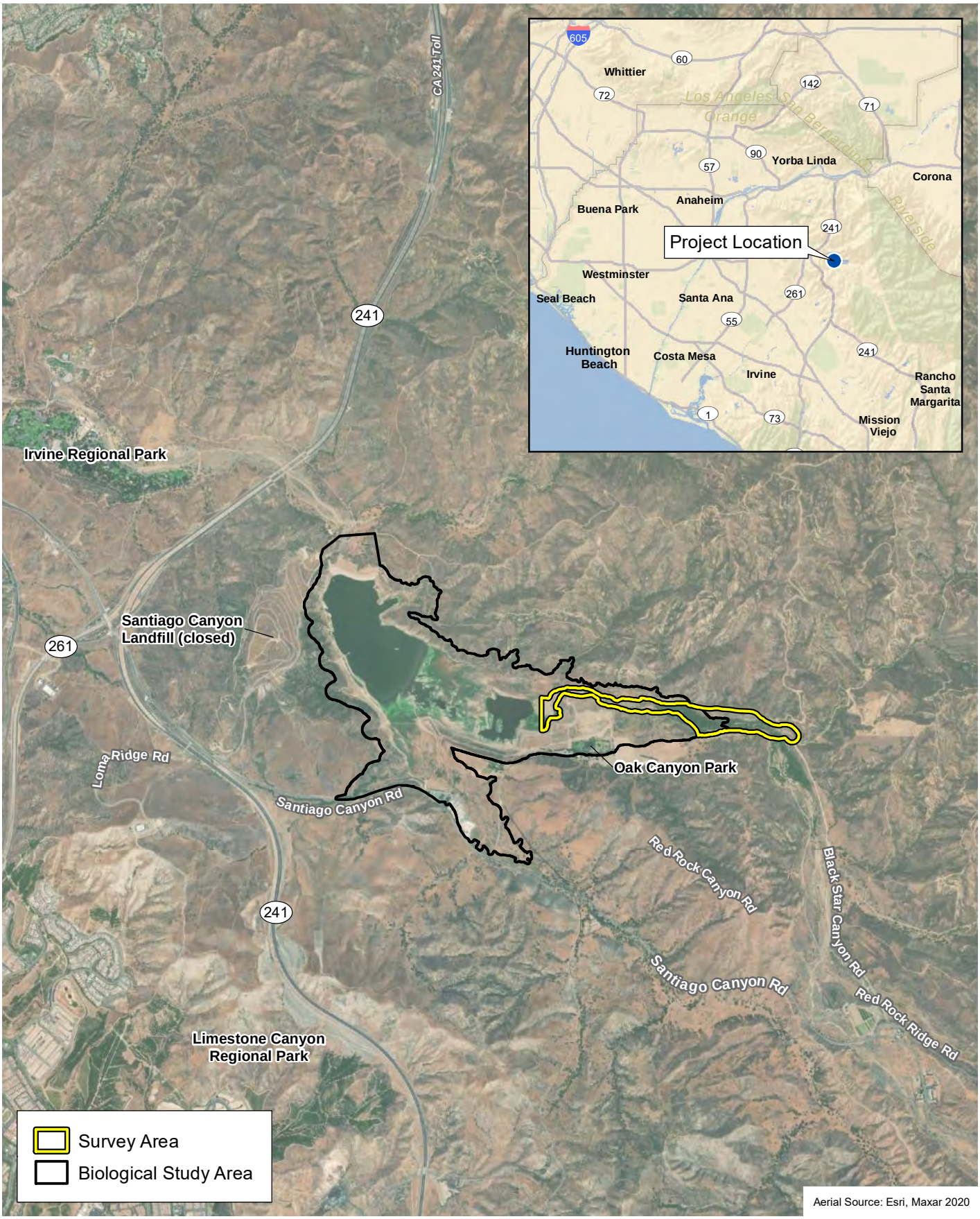
U.S. Fish and Wildlife Service (USFWS). 2011 (February 9). Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. *Federal Register* 76(27): 7245–7467. Washington, D.C.: USFWS.

———. 2009. Arroyo toad (*Anaxyrus californicus*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, California.

———. 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf.

———. 1994 (December 16). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Arroyo Southwestern Toad. *Federal Register* 59(241): 64859–64867. Washington, D.C.: USFWS.

Welsh, H.H., Jr. 1988. An ecogeographic analysis of the herpetofauna of the Sierra San Pedro Mártir region, Baja California: With a contribution to the biogeography of Baja California herpetofauna. Proceedings of the California Academy of Sciences, 4th series, 46:1-72.



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\ARTO\ex_ProjectLocation_20220819.mxd

Project Location

Exhibit 1

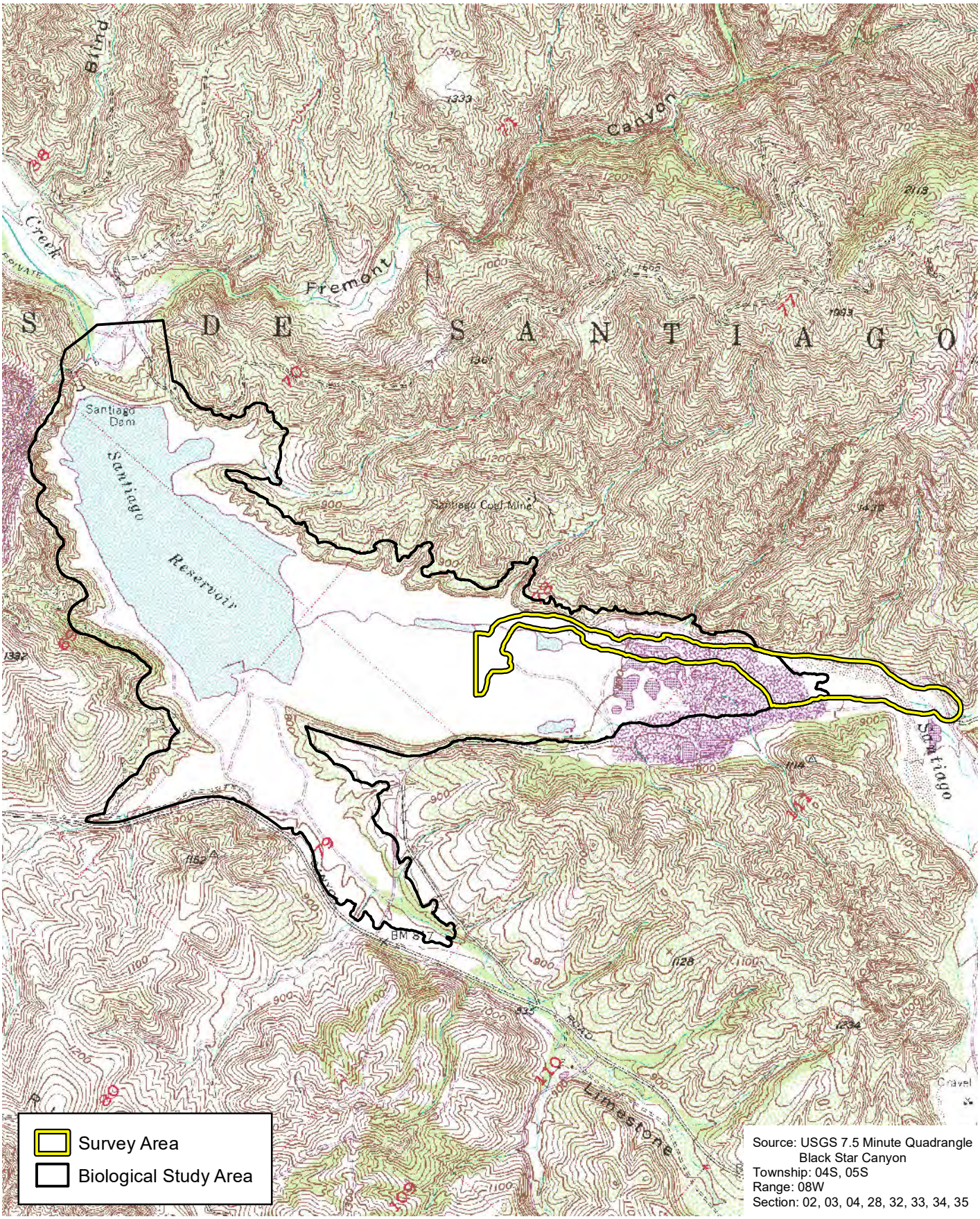
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

4,000 2,000 0 4,000 Feet

PSOMAS

(Rev: 08/19/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\ARTO\ex_ProjectLocation.pdf



D:\Projects\3IRW\010200\MXD\ARTO\ex_USGS_20220819.mxd

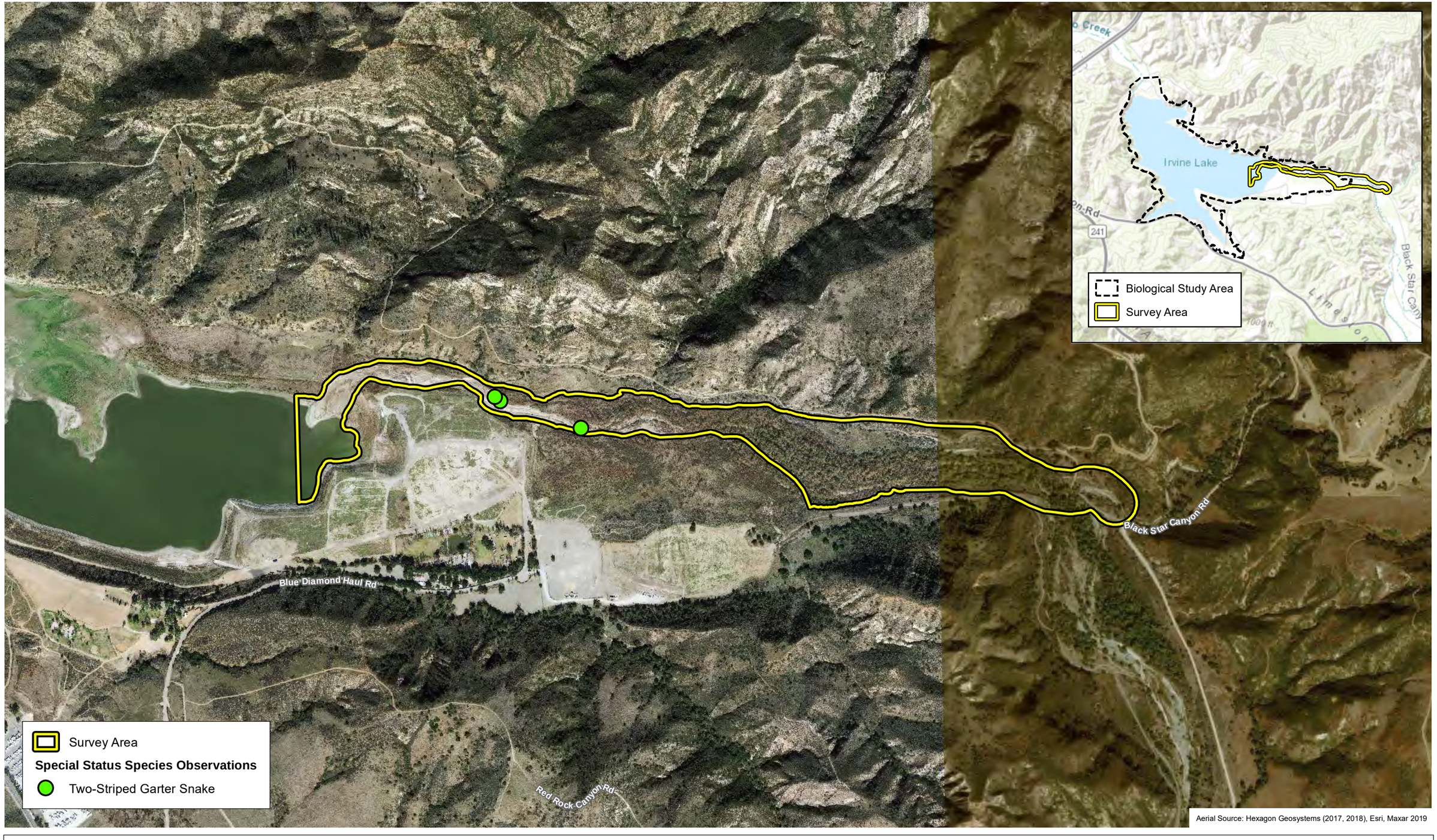
U.S. Geological Survey 7.5-Minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 8-19-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\ARTO\ex_SurveyArea_USGS.pdf



Aerial Source: Hexagon Geosystems (2017, 2018), Esri, Maxar 2019

D:\Projects\3IRW\010200\MXD\ARTO\ex_SS_Species_20220819.mxd

Arroyo Toad Survey Area and Results

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

840 420 0 840

Feet

PSOMAS

(Rev: 08/19/2022 JVR)R:\Projects\IRW_IRWD\3IRW010200\Graphics\ARTO\ex_SS_Species.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

View of suitable habitat along Santiago Creek located in the western portion of the survey area.

View of suitable habitat along Santiago Creek in the middle portion of the survey area.

D:\Projects\3IRW\010200\GRAPHICS\ARTO\Att_SP1_20220817.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/17/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\ARTO\Att_SP.pdf

View of suitable habitat along Santiago Creek in the eastern portion of the survey area.

View of western toad tadpoles found along Santiago Creek.

D:\Projects\3IRW\010200\GRAPHICS\ARTO\Att_SP2_20220817.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/17/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\ARTO\Att_SP.pdf

View of a western toad found along Santiago Creek.

View of a Baja California treefrog found along Santiago Creek.

D:\Projects\3IRW\010200\GRAPHICS\ARTO\Att_SP3_20220817.ai

Site Photographs

Attachment A-3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

View of a California treefrog found along Santiago Creek.

View of a two-striped garter snake found along Santiago Creek.

D:\Projects\3IRW\010200\GRAPHICS\ARTO\Att_SP4_20220817.ai

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE COMPENDIUM

Scientific Name	Common Name
AMPHIBIANS	
BUFONIDAE – TRUE TOAD FAMILY	
Anaxyrus boreas	western toad
RANIDAE – TRUE FROG FAMILY	
*Lithobates catesbeianus**	American bullfrog
HYLIDAE – TREEFROG FAMILY	
Pseudacris cadaverina	California treefrog
Pseudacris hypochondriaca	Baja California treefrog
LIZARDS	
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY	
Sceloporus occidentalis	western fence lizard
SNAKES	
NATRICIDAE – HARMLESS LIVE-BEARING SNAKE FAMILY	
Thamnophis hammondii	two-striped garter snake
BIRDS	
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY	
Anas platyrhynchos	mallard
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY	
Callipepla californica	California quail
COLUMBIDAE – PIGEON AND DOVE FAMILY	
Zenaida macroura	mourning dove
CAPRIMULGIDAE – NIGHTJAR FAMILY	
Chordeiles acutipennis	lesser nighthawk
Phalaenoptilus nuttallii	common poorwill
TROCHILIDAE – HUMMINGBIRD FAMILY	
Calypte anna	Anna’s hummingbird
CHARADRIIDAE – PLOVER FAMILY	
Charadrius vociferus	killdeer
SCOLOPACIDAE – SANDPIPER FAMILY	
Gallinago delicata	Wilson’s snipe
CATHARTIDAE – NEW WORLD VULTURE FAMILY	
Cathartes aura	turkey vulture
ACCIPITRIDAE – HAWK FAMILY	
Buteo jamaicensis	red-tailed hawk
STRIGIDAE – TYPICAL OWL FAMILY	
Bubo virginianus	great horned owl
PICIDAE – WOODPECKER FAMILY	
Melanerpes formicivorus	acorn woodpecker
Picoides nuttallii	Nuttall’s woodpecker
FALCONIDAE – FALCON FAMILY	
Falco sparverius	American kestrel
TYRANNIDAE – TYRANT FLYCATCHER FAMILY	
Sayornis nigricans	black phoebe
Myiarchus cinerascens	ash-throated flycatcher
Tyrannus vociferans	Cassin’s kingbird

WILDLIFE COMPENDIUM

Scientific Name	Common Name
CORVIDAE – JAY AND CROW FAMILY	
Aphelocoma californica	California scrub-jay
Corvus corax	common raven
PARIDAE – TITMOUSE FAMILY	
Baeolophus inornatus	oak titmouse
AEGITHALIDAE – BUSHTIT FAMILY	
Psaltriparus minimus	bushtit
TROGLODYTIDAE – WREN FAMILY	
Troglodytes aedon	house wren
Thryomanes bewickii	Bewick's wren
TURDIDAE – THRUSH FAMILY	
Turdus migratorius	American robin
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY	
Toxostoma redivivum	California thrasher
FRINGILLIDAE – FINCH FAMILY	
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
PARULIDAE – WOOD-WARBLER FAMILY	
Cardellina pusilla	Wilson's warbler
EMBERIZIDAE – SPARROW FAMILY	
Chondestes grammacus	lark sparrow
Melospiza melodia	song sparrow
Pipilo maculatus	spotted towhee
Melozone crissalis	California towhee
ICTERIDAE – BLACKBIRDS AND ORIOLES	
Icterus cucullatus	hooded oriole
MAMMALS	
SCIURIDAE – SQUIRREL FAMILY	
Otospermophilus beecheyi	California ground squirrel
LEPORIDAE – HARE AND RABBIT FAMILY	
Sylvilagus audubonii	desert cottontail
VESPERTILIONIDAE – VESPERTILIONID BAT FAMILY	
Order *Chiroptera*	bat
FELIDAE – CAT FAMILY	
Lynx rufus	bobcat (tracks)
Puma concolor	mountain lion (tracks)
CANIDAE – CANID FAMILY	
Canis latrans	coyote (scat)
CERVIDAE – CERVID FAMILY	
Odocoileus hemionus	southern mule deer
* Non-native species	

ATTACHMENT C

CALIFORNIA NATURAL DIVERSITY DATABASE FORM

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0018
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Thamnophis hammondii*

Common name: two-striped gartersnake

Date of field work (mm-dd-yyyy): 04-08-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers: Lindsay Messett

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with California snakes through research, workshops and/or training

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidental observation during arroyo toad surveys.

Total number of individuals: 3

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
3				

Age class comment:

Site use description:

What was the observed behavior? Swimming in Santiago Creek

Describe any evidence of reproduction: None

SITE INFORMATION

Habitat description: The following vegetation types and other areas occur within the survey area: sagebrush scrub, ruderal, riparian herb, disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and coast live oak woodland along Santiago Creek.

Slope:

Land owner/manager: Private; Irvine Ranch

Aspect:

Site condition + population viability: Good

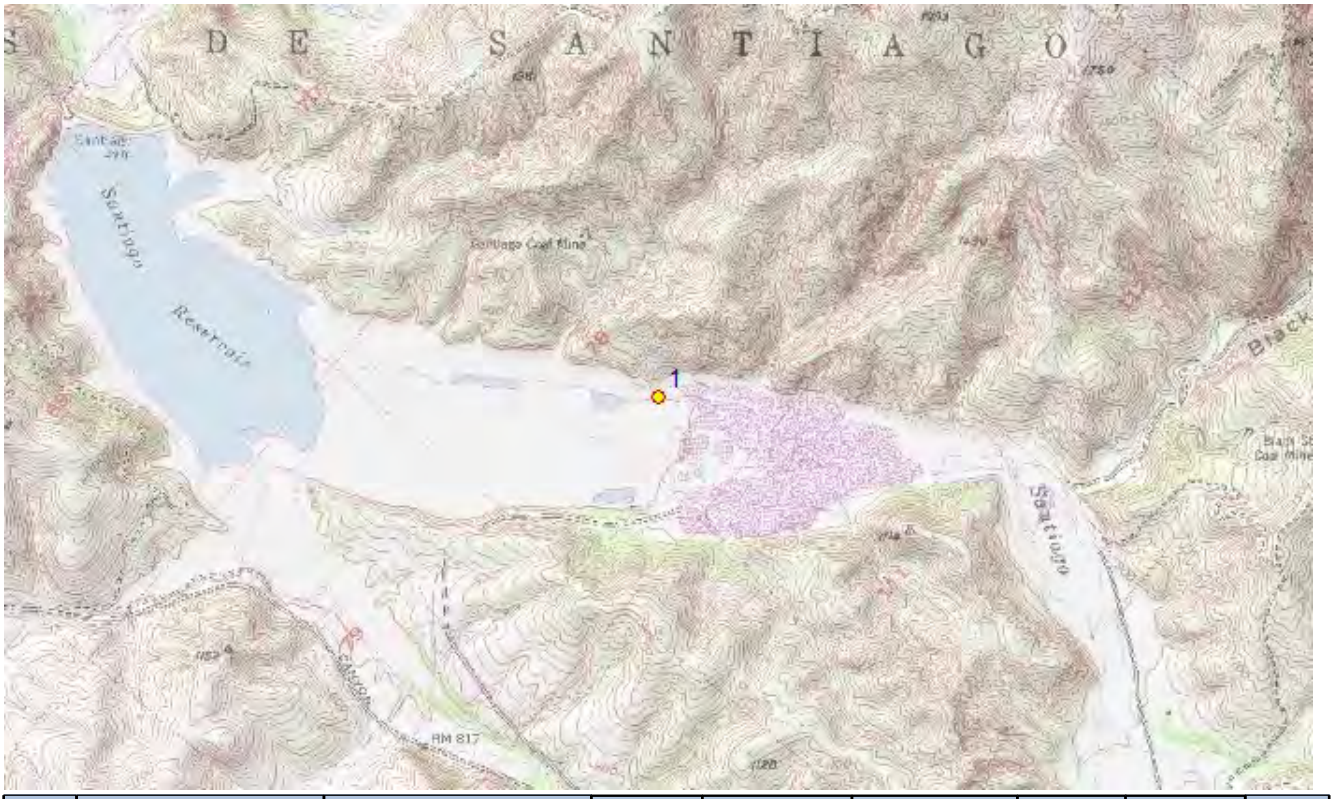
Immediate & surrounding land use: Undeveloped open space

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	787	33.77594	-117.70023	435165	3737534	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	Two-striped gartersnake						

The mapped feature is accurate within: 10 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: #1: 33.775943, -117.700302; #2: 33.775883, -117.700213; and #3: 33.775168, -117.697781

Location/directions comments:

Attachment(s):

APPENDIX I

SOUTHWESTERN POND TURTLE SURVEYS

October 21, 2024

Jennifer Pareti
Senior Environmental Scientist, Specialist
California Department of Fish and Wildlife
South Coast Region
3030 Old Ranch Parkway, Suite 400
Seal Beach, California 90740

VIA EMAIL
Jennifer.Pareti@wildlife.ca.gov

Kyle Rice
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
Kyle.Rice@wildlife.ca.gov

Chad Hirano
Scientific Collecting Permit (SCP) Coordinator
California Department of Fish and Wildlife
1010 Riverside Parkway
West Sacramento, California 95605

VIA EMAIL
Chad.Hirano@wildlife.ca.gov

Subject: Results of Visual Survey and Trapping Program for Southwestern Pond Turtle for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California

Dear Jennifer Pareti, Kyle Rice, and Chad Hirano:

This Letter Report presents the results of the visual survey and trapping program for the southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]) conducted at the Santiago Creek Dam Outlet Tower and Spillway Improvements Project (hereinafter referred to as the "Project site") located in Orange County, California. The purpose of this program was to assess the presence or absence of this species on or adjacent to the Project site. A qualified Biologist with the necessary experience and a California Department of Fish and Wildlife (CDFW) Scientific Collecting Permit conducted the surveys.

PROJECT LOCATION AND DESCRIPTION

The Project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area (BSA) includes Santiago Creek Dam, downstream areas of Santiago Creek; Irvine Lake; and upstream areas along Santiago Creek. The BSA is located south of State Route (SR) 261, east of SR-241, and north of Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago

Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The BSA is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north, and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the BSA in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the dam. Elevations in the BSA range from approximately 657 to 996 feet above mean sea level.

The BSA is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD) is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

IRWD is proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, structural improvements will also be made to the dam spillway and dam. Staging areas are currently planned to be placed north (downstream) of the existing dam and in disturbed areas on the southeast side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Visual surveys and a trapping program have been conducted to determine the presence or absence of southwestern pond turtles in suitable habitat within the BSA. Representative site photographs are included in Attachment A.

SPECIES BACKGROUND

The southwestern pond turtle is a California Species of Special Concern and a U.S. Forest Service Sensitive Species. In 2015, the U.S. Fish and Wildlife Service (USFWS) published a finding that the listing of this species may be warranted and requested that information on this species be submitted to the USFWS for review (USFWS 2015). In 2023, the USFWS proposed to list the southwestern pond turtle as Threatened under the Endangered Species Act (USFWS 2023); a final decision is pending.

Historically, this species was known as the western pond turtle (*Emys marmorata*) or Pacific pond turtle (*Clemmys marmorata*), but its taxonomy has been revised multiple times in recent years due to genetic studies. The species has alternated between the genera *Emys* and *Actinemys*. Current nomenclature recognizes two distinct species: the southwestern pond turtle (*Actinemys pallida*) and the northwestern pond turtle (*Actinemys marmorata*).

The southwestern pond turtle is a relatively flat, dark turtle of moderate size, with a carapace (shell) length that rarely exceeds 10 inches (Spinks et al. 2003). They are cryptically colored

brown, olive brown, or dark brown (USGS 2006b). The carapace is usually brown or blackish in color with a series of darker spots, lines, or dashes that radiate out from the center of each shield (Stebbins and McGinnis 2012). Their head and body have a mottled appearance (USGS 2006b). Males tend to have thicker tails, while females have thinner tails. Males tend to have concave plastrons (i.e., shells), while females tend to have flat or slightly convex plastrons; the carapaces of females are also taller to allow room for eggs. The cloacal opening (i.e., opening for digestive, urinary, and reproductive tracts) is also further back in males than in females (USGS 2006b). They typically reach sexual maturity when they are approximately 4 inches and four to six years of age (USGS 2006b).

The southwestern pond turtle is found in southern California, ranging from Monterey County south through Los Angeles, Riverside, and San Diego counties into northern Baja California, Mexico (USFWS 2023). It inhabits ponds, lakes, marshes, reservoirs, seasonal standing or slow-moving streams, canals, sloughs, vernal pools, and occasionally in brackish water (Germano and Bury 2001). Sufficient cover (e.g., vegetation, undercut banks) and basking sites are important components of suitable habitat (Spinks et al. 2003). Suitable basking sites include partially submerged logs, rocks, floating vegetation, and open mud banks (CDFW 2000). Adults are often observed basking on logs or other objects protruding out of the water or floating in the warmer surface water. They have both good hearing and eyesight and are easily disturbed; they are often heard splashing into the water to take cover before being seen (USGS 2006b). Their omnivorous diet primarily consists of aquatic invertebrates, but they also consume carrion, small fish, frogs, and plants (USGS 2006b).

Breeding typically occurs from April to May, although timing varies depending on location and seasonal conditions (Jennings and Hayes 1994). Females move from the water to adjacent upland habitats to lay eggs, usually sometime in late May to early July, although movement could occur as early as April or as late as August (Ernst et al. 1994). Nest site selection favors unshaded slopes that may be at least in part south-facing, likely to ensure that substrate temperatures will be high enough to incubate the eggs (Rathbun et al. 2002). The southwestern pond turtle can nest in a variety of soil conditions, but the soil must be at least 4 inches deep and have relatively high internal humidity (CDFW 2000). Clutch size varies from 1 to 13 eggs, positively correlated with body size; they can sometimes double-clutch (i.e., have more than one nest per year) (Goodman 1997a, 1997b; Lovich and Meyer 2002; Holland 1991, 1994; Hays et al. 1999; Pires 2001). Most hatchlings emerge in the early fall, while some may over-winter in the nest (Holland 1994).

Adults may remain active in the water year-round if conditions are suitable (i.e., enough water, warm temperatures) (USGS 2006b). Basking behavior may also be witnessed year-round due to warmer year-round temperatures (USGS 2006b). However, during the coldest months (i.e., October to April), this species will often seek upland refugia (i.e., shelter with appropriate temperature and moisture conditions) and enter a period of aestivation. Aestivation is a period of inactivity and decreased metabolic rate in response to seasonal temperature changes (similar to hibernation); it occurs more frequently in more temperate, high-elevation areas of the species' range (Holland and Goodman 1996). Terrestrial refugia are typically covered with dense leaf litter produced by a thick overstory of woody vegetation, such as in dense riparian thickets of willows (Rathbun et al. 2002). Southwestern pond turtles may choose sites where they can bask in direct sunlight or may bury themselves deep into leaf litter and duff (Rathbun et al. 2002). Winter refugia are often found in the same upland habitats as nesting sites. Southwestern pond turtles can also hibernate underwater in bottom mud (CDFW 2000).

The southwestern pond turtle faces several ongoing threats, including habitat loss, worsening drought conditions, and predation by invasive species. Urban development, especially for flood control, and agricultural expansion have led to significant habitat fragmentation and population declines (Spinks et al. 2003). Invasive, non-native plant species such as tamarisk (*Tamarix ramosissima*) and giant reed (*Arundo donax*) have altered stream morphology, reduced plant diversity, and eliminated basking sites (Lovich et al. 1994). The introduction of non-native turtle species, such as the red-eared slider (*Trachemys scripta elegans*) and western painted turtle (*Chrysemys picta bellii*), leads to competition for resources. These invasive turtles often have higher reproductive rates, which can result in them outcompeting the native southwestern pond turtle (Spinks et al. 2003; Lovich & Meyer 2002). As the southwestern pond turtle is the only native freshwater turtle in its historic range, it may lack competitive advantages against these invasive species. Additionally, the invasive American bullfrog (*Lithobates catesbeianus*) is a voracious predator that will eat any live animal it can swallow, and American bullfrog predation of hatchling and young western pond turtles has been recorded (Holland 1994). The intensity of American bullfrog predation is severe enough to eliminate recruitment in some southwestern pond turtle populations (Overtree and Collings 1997).

USGS (2004) conducted a Habitat Assessment and Baseline Surveys for the Western Spadefoot (*Spea hammondii*) and the Western Pond Turtle (*Emys marmorata*) on the Irvine Ranch Land Reserve. This survey effort included trapping of Irvine Lake for a total of 80 trap days[1] from September 29–October 3, 2003. No southwestern pond turtles were observed in Irvine Lake during this effort (USGS 2004).

SURVEY METHODS

Visual Survey

There is currently no standardized USFWS protocol in place for the southwestern pond turtle; therefore, surveys generally followed the Visual Survey Protocol for the Southcoast Ecoregion (USGS 2006a). Survey methods were focused on the detection of southwestern pond turtle adults and juveniles through visual observation; the visual surveys did not include dip netting or seining. Any southwestern pond turtles observed would have been documented and recorded using a Global Positioning System (GPS) or iPad to map the location on an aerial photograph.

Psomas Senior Biologist Jonathan Aguayo conducted visual surveys across all potentially suitable habitats for the southwestern pond turtle within the BSA. He walked slowly up the stream channel, either in the water or immediately adjacent to the water, visually searching for pond turtles with and without binoculars, concentrating on pools, surface water, banks, and suitable basking sites within the BSA. He searched aquatic habitat with and without binoculars for the presence of basking or underwater pond turtles. He observed open pools or possible basking areas from a distance and then approached slowly and quietly to help prevent disturbing basking turtles. He listened for the splash of water, which could indicate possible unseen turtles entering the water. If a splash was heard, he spent additional time observing the area for a turtle to resurface. Visual surveys were performed on August 20 and 30, 2024, during weather conditions favorable for turtle activity (Table 1).

[1] Trap days are the total number of traps used multiplied by the number of days the site was trapped. In this case, the site was trapped for four days using 20 traps for a total of 80 trap days.

The USGS (2006a) Visual Survey Protocol describes assessing habitat by stream segment in order to determine areas suitable for trapping. As all habitat along Santiago Creek and within Irvine Lake were considered suitable for southwestern pond turtle, and areas suitable for trapping had already been determined based on previous field surveys of the BSA, visual survey methods for the current survey did not include an assessment of habitat by stream segment.

TABLE 1
SUMMARY OF SURVEY CONDITIONS FOR THE
SOUTHWESTERN POND TURTLE VISUAL SURVEYS

Survey Number	Date	Time (Start/End)	Biologist	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	August 20, 2024	8:00 AM/2:30 PM	Aguayo	72/96	2/6	0/0
2	August 30, 2024	9:20 AM/3:40 PM	Aguayo	67/81	1/5	80/0

°F: Fahrenheit; mph: miles per hour; %: percent.

Turtle Trapping

Trapping surveys follow the methodology outlined in the Western Pond Turtle Trapping Survey Protocol for the Southcoast Ecoregion (USGS 2006b). A five-day/four-night trapping program was conducted in August 2024. Nylon mesh hoop traps and floating basking traps were placed in suitable locations in Irvine Lake, baited with cans of sardines in oil to attract turtles. Traps were set near habitat features likely to be used by pond turtles (possible basking areas, areas with underwater refugia). The hoop traps measured 2.5 feet in diameter by 6 feet long with 1-inch square mesh and featured a one-way funnel entrance. Floating basking traps measured 20 inches wide by 28 inches long and 13 inches deep, with two 13-inch wings. Both hoop and basking traps were equipped with floats and securely fastened to immovable objects to prevent submersion to allow for captured turtles (and other animals) to surface for air.

Traps were left in place for a maximum of 24 hours before being checked by Biologists to retrieve captured turtles and other aquatic species (e.g. fish, frogs, invertebrates). General weather data (i.e., ambient air temperature, sky conditions, wind speed) and water temperature were recorded at the start and end of each trapping session. Two trapping sessions, one on the west side of Irvine Lake and another on the east side of Irvine Lake, were required to adequately cover Irvine Lake. As described above, Santiago Creek was surveyed visually because it was not deep enough for trap placement.

Mr. Aguayo (Scientific Collecting Permit [SCP] ID: S-190310010-20076-001) and Senior Biologist Lindsay Messett (SCP ID: S-182810004-20009-001) were the Principal Investigators for the trapping sessions, with assistance from Psomas Biologists Trevor Bristle, Jack Underwood, Cristina Juran, and Tyler Glaser. Both Mr. Aguayo and Ms. Messett are knowledgeable about the southwestern pond turtle and hold the necessary CDFW authorization to trap and handle the species. All traps were tagged with Mr. Aguayo's CDFW SCP number, under which the live trapping was conducted.

Trapping sessions were conducted from August 19–23, 2024, on the west side of Irvine Lake and from August 26–30, 2024, on the east side of Irvine Lake. Surveys were conducted during weather conditions favorable for turtle activity (Tables 2 and 3). A total of 24 hoop traps and 3 basking traps were set in Irvine Lake. Trap locations were selected based on suitable habitat with traps spaced 820 feet (i.e., 250 meters) apart. The number of traps set was proportionate to the overall size of the lake. Trap locations were recorded with a GPS unit and mapped on an aerial photograph (Table 4, Exhibit 3).

TABLE 2
SUMMARY OF SURVEY DATA AND CONDITIONS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE WEST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Surveying Biologists	Start/End Time	Water Temperature (°F)		Wind (mph)		Temperature (°F)		Cloud Cover (%)
				Start	End	Start	End	Start	End	
1	8/19/2024	Aguayo, Bristle	9:36 AM/3:33 PM	81.2	84.0	2	6	72	89	0
2	8/20/2024	Messett, Bristle	8:00 AM/10:35 AM	80.5	81.6	1	1	65	87	0
3	8/21/2024	Messett, Bristle	7:00 AM/11:00 AM	79.6	Thermometer broke	1	1	64	86	0
4	8/22/2024	Aguayo, Bristle	7:15 AM/10:25 AM	78.5	80.1	1	1	60	77	0
5	8/23/2024	Aguayo, Messett, Underwood	6:48 AM/10:56 AM	79.7	80.2	4	7	62	75	100

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

TABLE 3
SUMMARY OF SURVEY DATA AND CONDITIONS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE EAST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Surveying Biologists	Start/End Time	Water Temperature (°F)		Wind (mph)		Temperature (°F)		Cloud Cover (%)
				Start	End	Start	End	Start	End	
1	8/26/2024	Aguayo, Bristle, Juran	7:58 AM/9:08 AM	79.2	81.3	1	2	64	88	0
2	8/27/2024	Aguayo, Bristle	7:08 AM/9:08 AM	78.9	79.2	1	2	62	70	0
3	8/28/2024	Aguayo, Bristle	6:52 AM/9:05 AM	78.5	79.0	2	3	61	70	100
4	8/29/2024	Aguayo, Bristle	6:42 AM/8:49 AM	78.8	79.2	1	1	60	65	100
5	8/30/2024	Aguayo, Bristle, Glaser	6:37 AM/9:25 AM	78.8	78.6	2	3	60	68	100

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

TABLE 4
TRAP LOCATIONS

Trap Number	Trap Locations (UTM)
West Side of Irvine Lake Session	
Hoop Trap 1	432668, 3738686
Hoop Trap 2	432552, 3738413
Hoop Trap 3	432612, 3738174
Hoop Trap 4	432740, 3737889
Hoop Trap 5	432842, 3737634
Hoop Trap 6	433033, 3737511
Hoop Trap 7	433223, 3737184
Hoop Trap 8	433416, 3736912
Hoop Trap 9	433614, 3737009
Basking Trap 10	433494, 3737392
Hoop Trap 11	433790, 3737230
Hoop Trap 12	434032, 3737122
Hoop Trap 13	434324, 3737106
Hoop Trap 14	434461, 3737263
Hoop Trap 15	434687, 3737382
Hoop Trap 16	434589, 3737554

TABLE 4
TRAP LOCATIONS

Trap Number	Trap Locations (UTM)
East Side of Irvine Lake of Dam	
Hoop Trap 17	434425, 3737594
Hoop Trap 18	434127, 3737633
Hoop Trap 19	433951, 3737854
Hoop Trap 20	433724, 3737956
Hoop Trap 21	433514, 3738092
Hoop Trap 22	433345, 3738187
Hoop Trap 23	433155, 3738335
Hoop Trap 24	433370, 3738467
Hoop Trap 25	433115, 3738586
Basking Trap 26	433847, 3737582
Basking Trap 27	434030, 3737445
UTM: Universal Transver Mercator coordinates	

SURVEY RESULTS

Habitat Description

Irvine Lake is a man-made reservoir with fluctuating water levels. The banks primarily consist of clay and silt. Riparian vegetation is present along the eastern and southeastern shoreline and is dominated by willows (*Salix* sp.) and mule fat (*Baccharis salicifolia* ssp. *salicifolia*) with emergent vegetation and aquatic plants present in shallow lake areas. Banks in these areas provide suitable upland nesting sites (e.g., sandy or loose soil) and basking opportunities (e.g., open mud banks). In contrast, the western side of the lake lacks emergent vegetation and riparian canopy cover. It provides limited upland habitat for nesting pond turtles due to steep cliffs and compacted soils from heavy foot traffic associated with recreational fishing. While large rocks, boulders, or logs are absent within the lake, some floating vegetation provides basking opportunities for turtles. Irvine Lake is regularly stocked with fish, and a significant number were observed during the surveys. The presence of non-native fish poses a threat to southwestern pond turtles by competing for food and preying on hatchlings.

Downstream of the dam, Santiago Creek consists of an alluvial wash with braided channels. The creek bed varies in width from 15 to 300 feet wide with substrate that consists primarily of sand and cobble. Topography is relatively flat, with low stream grade and flow velocity. During the surveys in late summer, the creek was almost entirely dry, with only a small amount of shallow water present in Fremont Canyon Creek, upstream of its confluence with Santiago Creek. No pools were present along Santiago Creek downstream of the dam during the surveys; therefore, there was no suitable basking habitat. Riparian vegetation downstream of Santiago Dam consists of sparse mule fat scrub scattered across a broad alluvial wash. Due to the limited water/pools, areas downstream of the dam along Santiago Creek would have limited potential to provide upland nesting habitat to turtles using Irvine Lake.

Upstream of the lake, Santiago Creek is a meandering perennial stream with braided channels. The creek varies in width from 15 to 650 feet wide with substrate that consists primarily of gravel, sand, and cobble, although some areas contain a mix of clay and silt. Topography is relatively flat, with low stream grade and flow velocity. Where the creek flows into Irvine Lake, stream morphology is characterized by shallow pools, slow-flowing water, and broad alluvial washes. Further upstream, Santiago Creek includes alternating sections of riffles, runs, and shallow pools (depths ranging from approximately one to three feet). These pools provide aquatic refugia with submerged vegetation and roots, and mats of algae. Riparian vegetation along Santiago Creek upstream of the lake is dominated by willows, mule fat, Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), and western sycamore (*Platanus racemosa*). Multiple red-swamp crayfish (*Procambarus larkia*) and small non-native fish were observed during the survey. Red-swamp crayfish pose a threat to southwestern pond turtles by preying on their eggs and competing for food.

Visual Survey

No southwestern pond turtles were observed during the visual surveys.

Turtle Trapping

Over the course of the trapping effort, 108 trap days were completed (i.e., 27 traps multiplied by four days of trapping each). No southwestern pond turtles were captured during the trapping effort. Aquatic species captured during the trapping included 3 red-eared sliders, 3 channel catfish (*Ictalurus punctatus*), and 10 bluegill (*Lepomis macrochirus*) (Tables 5 and 6). Other species observed during the trapping included red-swamp crayfish, California treefrog (*Pseudacris cadaverina*), and Baja California treefrog (*Pseudacris hypochondriaca*).

Representative photographs of the turtle trapping effort and the species captured during the sessions are included in Attachment B. Survey data sheets are provided in Attachment C.

TABLE 5
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE WEST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Number	Trap Results
1	8/19/2024	Installation of Hoop Trap 1	N/A
		Installation of Hoop Trap 2	N/A
		Installation of Hoop Trap 3	N/A
		Installation of Hoop Trap 4	N/A
		Installation of Hoop Trap 5	N/A
		Installation of Hoop Trap 6	N/A
		Installation of Hoop Trap 7	N/A
		Installation of Hoop Trap 8	N/A
		Installation of Hoop Trap 9	N/A
		Installation of Basking Trap 10	N/A
		Installation of Hoop Trap 11	N/A
		Installation of Hoop Trap 12	N/A
		Installation of Hoop Trap 13	N/A
		Installation of Hoop Trap 14	N/A
		Installation of Hoop Trap 15	N/A
		Installation of Hoop Trap 16	N/A
2	8/20/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	No animals captured
		Hoop Trap 5	No animals captured
		Hoop Trap 6	No animals captured
		Hoop Trap 7	2 bluegill
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured
		Basking Trap 10	No animals captured
		Hoop Trap 11	No animals captured
		Hoop Trap 12	Out of water (unknown reason)
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured
3	8/21/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	3 bluegill
		Hoop Trap 5	1 bluegill
		Hoop Trap 6	No animals captured
		Hoop Trap 7	No animals captured
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured

TABLE 5
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE WEST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Number	Trap Results
		Basking Trap 10	No animals captured
		Hoop Trap 11	1 bluegill
		Hoop Trap 12	1 bluegill
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured
4	8/22/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	No animals captured
		Hoop Trap 5	No animals captured
		Hoop Trap 6	1 bluegill
		Hoop Trap 7	1 channel catfish
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured
		Basking Trap 10	No animals captured
		Hoop Trap 11	No animals captured
		Hoop Trap 12	No animals captured
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured
5	8/23/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	No animals captured
		Hoop Trap 5	No animals captured
		Hoop Trap 6	No animals captured
		Hoop Trap 7	No animals captured
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured
		Basking Trap 10	No animals captured
		Hoop Trap 11	No animals captured
		Hoop Trap 12	No animals captured
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured

TABLE 6
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE EAST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Numbers	Trap Results
1	8/26/2024	Installation of Hoop Trap 17	N/A
		Installation of Hoop Trap 18	N/A
		Installation of Hoop Trap 19	N/A
		Installation of Hoop Trap 20	N/A
		Installation of Hoop Trap 21	N/A
		Installation of Hoop Trap 22	N/A
		Installation of Hoop Trap 23	N/A
		Installation of Hoop Trap 24	N/A
		Installation of Hoop Trap 25	N/A
		Installation of Basking Trap 26	N/A
		Installation of Basking Trap 27	N/A
2	8/27/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	No animals captured
		Hoop Trap 20	No animals captured
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	No animals captured
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured
3	8/28/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	1 red-eared slider
		Hoop Trap 20	No animals captured
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	No animals captured
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured

TABLE 6
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE EAST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Numbers	Trap Results
4	8/29/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	No animals captured
		Hoop Trap 20	1 red-eared slider
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	1 channel catfish
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured
5	8/30/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	1 red-eared slider/1 bluegill
		Hoop Trap 20	No animals captured
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	1 channel catfish
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please contact Amber Heredia at Amber.Heredia@psomas.com.

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager, Resource Management

Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–3
Attachment A – Site Photographs
Attachment B – Turtle Trapping Photographs
Attachment C – Survey Data Sheets

cc: Stacey Love (stacey_love@fws.gov)
Will Miller (william_b_miller@fws.gov)
Laura Patterson (laura.patterson@wildlife.ca.gov)
Katherine Baumberger (kbaumberger@usgs.gov)
Andy Uk (uk@irwd.com)
Fiona Sanchez (Sanchezf@irwd.com)
WildlifeResearchPermits@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW010205\Documentation\Pond Turtle\Santiago_Pond Turtle Report-102124.docx

REFERENCES

California Department of Fish and Wildlife (CDFW). 2000. Biogeographic Data Branch (CDFW BDB). California Wildlife Habitat Relationships System (CWHR). Western Pond Turtle (*Actinemys marmorata*). By: S. Morey. California Interagency Wildlife Task Group. Sacramento, CA: CDFW BDB. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2657&inline=1.

Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. *Turtles of the United States and Canada*. Washington, D.C.: Smithsonian Press.

Germano, D.J., and R.B. Bury. 2001. Western Pond Turtles (*Clemmys marmorata*) in the Central Valley of California: Status and Population Structure. *2001 Transactions of the Western Section of the Wildlife Society.* 37:22–36. Rancho Cordova, CA: The Wildlife Society, Western Section.

Goodman, R.H., Jr. 1997a. The Biology of the Southwestern Pond Turtle (*Clemmys marmorata pallida*) in the Chino Hills State Park and the West Fork of the San Gabriel River. (Masters Thesis). Pomona, CA: California State Polytechnic University, Pomona.

———. 1997b. Occurrence of double clutching in the southwestern pond turtle, *Clemmys marmorata pallida*, in the Los Angeles Basin. *Chelonian Conservation and Biology* 2:419-420.

Hayes, D.W., K.R. McAllister, S.A. Richardson, and D.W. Stinson. 1999. *Washington state recovery plan for the western pond turtle*. Olympia, WA: Washington Department of Fish and Wildlife.

Holland, D.C. 1994. *The Western Pond Turtle: Habitat and History*. Portland, OR: U.S. Department of Energy, Bonneville Power Administration.

———. 1991. *Status and reproductive dynamics of a population of western pond turtles* (Clemmys marmorata) *in Klickitat County, Washington in 1990*. Unpublished report. Olympia, WA: Washington Department of Wildlife.

Holland, D.C., and R.H. Goodman, Jr. 1996. *Clemmys marmorata* (western pond turtle) Terrestrial Habitat Use. *Herpetological Review* 27:198–199. Salt Lake City, UT: Society for the Study of Amphibians and Reptiles.

Jennings, M.R., and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.

Lovich, J., and K. Meyer. 2002. The western pond turtle (*Clemmys marmorata*) in the Mojave River, California, U.S.A.: highly adapted survivor or tenuous relict? *Journal of Zoology*, London, 256:537-545.

Lovich, J.E., T.B. Egan, and R.C. de Gouvenain. 1994. Tamarisk Control on Public Lands in the Desert of Southern California: Two Case Studies. 46th Annual California Weed Conference, California Weed Science Society.

Overtree, L., and G. Collings. 1997. Western Pond Turtles in the Kern Valley Region. *The Tortuga Gazette* 33:1–2. Van Nuys, CA: California Turtle and Tortoise Club.

Pires, M.N. 2001. Allocation of reproductive output in the western pond (*Clemmys marmorata*) in southern California. M.S. Thesis, California State Polytechnic University, Pomona.

Rathbun, G.B., N.J. Scott, Jr., and T.G. Murphey. 2002. Terrestrial Habitat Use by Pacific Pond Turtles in a Mediterranean Climate. *The Southwestern Naturalist* 47(2): 225–235. Lubbock, TX: Southwestern Association of Naturalists.

Spinks, P.Q., G.B. Pauly, J.J. Crayon, and H.B. Shaffer. 2003. "Survival of the western pond turtle (*Emys marmorata*) in an urban California environment." US Geological Survey Staff -- Published Research. University of Nebraska: USGS. 526.http://digitalcommons.unl.edu/usgsstaffpub/526.

Stebbins, R.C., and S.M. McGinnis. 2012. *Field Guide to Amphibians and Reptiles of California*. Berkeley, CA: University of California Press.

United States Fish and Wildlife Service (USFWS). 2023. "U.S. Fish and Wildlife Service proposes federal protections for both species of western pond turtle under the Endangered Species Act." U.S. Fish and Wildlife Service. https://www.fws.gov/press-release/2023-09/us-fish-and-wildlife-service-proposes-federal-protections-both-species

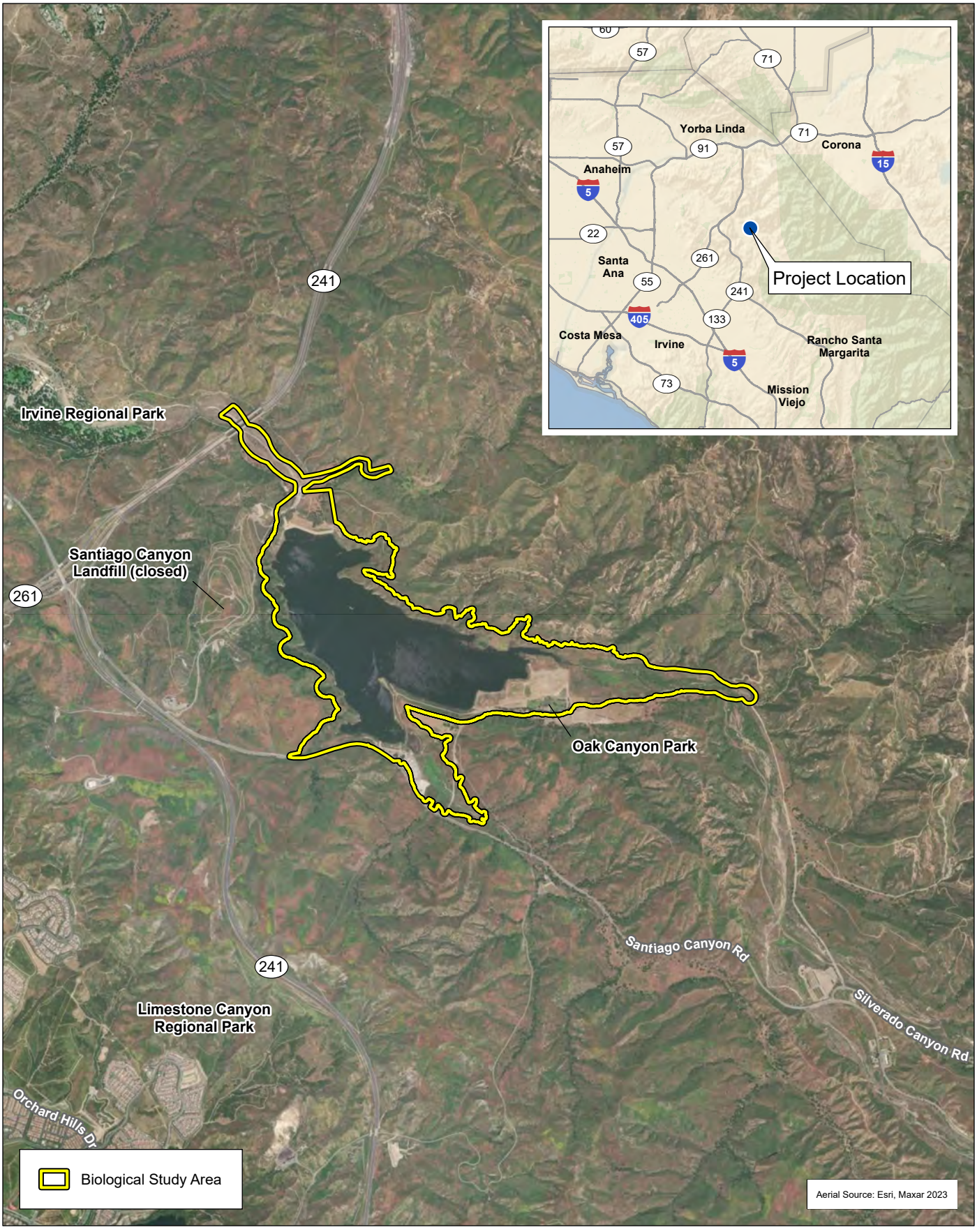
———. 2018. ECOS Environmental Conservation Online System. Species Profile for Western Pond Turtle (*Actinemys marmorata*). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C06B.

———. 2015 (April 10). 90-Day Findings on 10 Petitions. *Federal Register* 80 (69). Pp 19259-19263.

U.S. Department of the Interior, U.S. Geological Survey (USGS). 2006a. Draft USGS Western Pond Turtle (*Emys marmorata*) Visual Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.

———. 2006b. Draft USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.

———. 2004. Habitat Assessment and Baseline Surveys for the Western Spadefoot (*Spea hammondii*) and the Western Pond Turtle (*Emys marmorata*) on the Irvine Ranch Land Reserve. San Diego, CA: USGS.



D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_Turtle\Santiago_Dam_Turtle.aprx\ex_RL_LV_Aerial

Regional Location and Local Vicinity

Exhibit 1

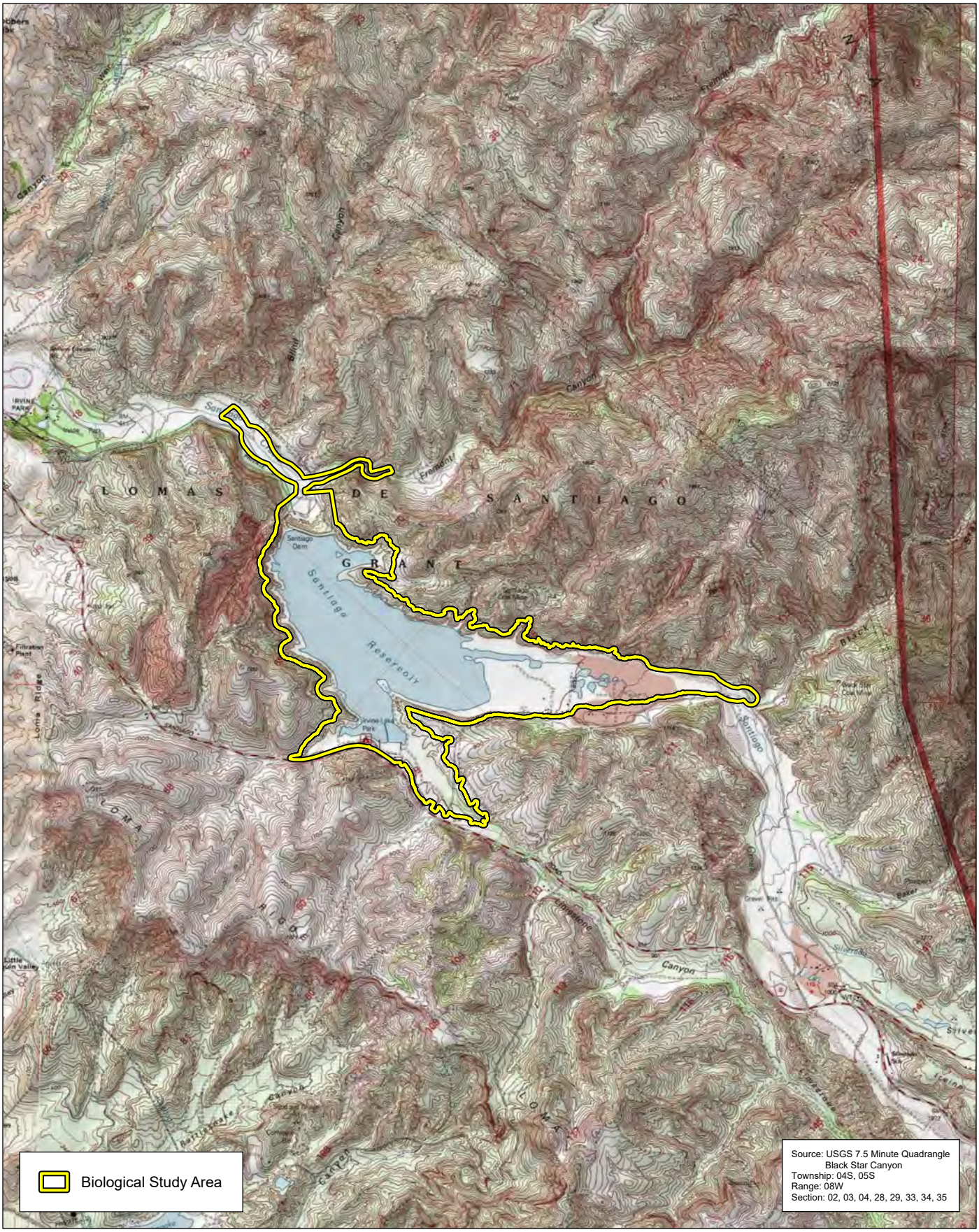
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

N W E S

0 2,000 4,000 Feet

PSOMAS

(Rev: 10-10-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Turtle_Report\ex_RL_LV.pdf



U.S. Geological Survey 7.5-Minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

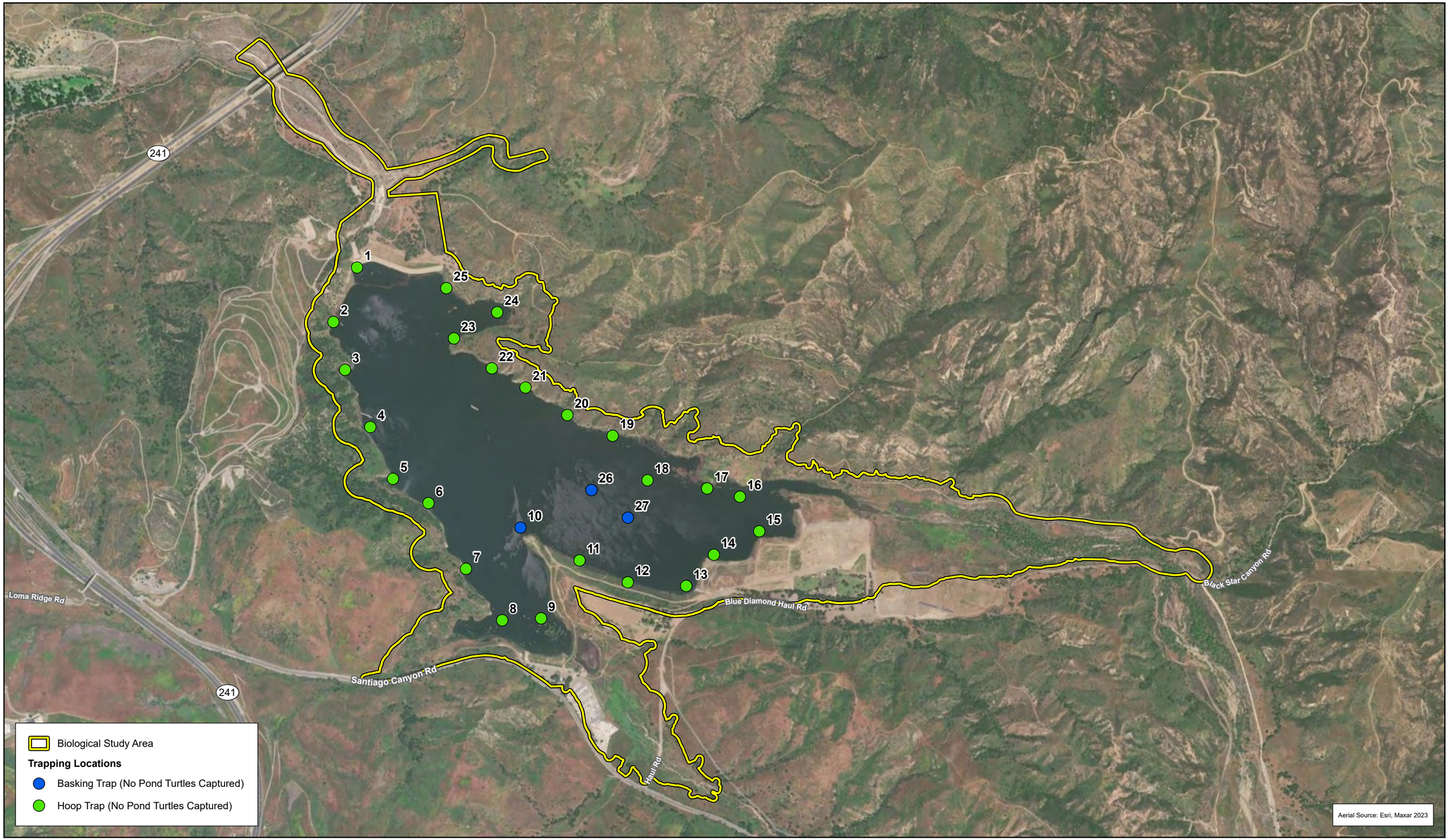
N
W E
S

0 2,000 4,000
Feet

PSOMAS

(Rev: 10-10-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Turtle_Report\ex_USGS.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_Turtle\Santiago_Dam_Turtle.aprx\ex_USGS



D:\Projects\3IRW\SantiagoCreek\PRO\Santiago_Dam_Turtle\Santiago_Dam_Turtle.aprx\ex_Trapping_Results

Southwestern Pond Turtle Trapping Results

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

N W E S

0 750 1,500 Feet

PSOMAS

(Rev: 10-10-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Turtle_Report\ex_Trapping_Results.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1. View of suitable habitat at Irvine Lake in the middle portion of the survey area, upstream of Santiago Creek Dam.

Photo 2. View of suitable shallow pool in the southwestern portion of the survey area.

D:\Projects\3IRW\SantiagoCreek\Graphics\Turtle_Report\SP\ex_SP1.ai

Photo 3. View of suitable habitat along Santiago Creek in the eastern portion of the survey area, upstream of Santiago Creek Dam and Irvine Lake.

Photo 4. View of suitable habitat along the tributary from Fremont Canyon in the western portion of the survey area, downstream of Santiago Creek Dam.

D:\Projects\3IRW\SantiagoCreek\Graphics\Turtle_Report\SP\ex_SP2.ai

(09/19/2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Turtle_Report\ex_SP.pdf

ATTACHMENT B

TURTLE TRAPPING PHOTOGRAPHS

Photo 1. View of installed Hoop Trap #5 on the west side of Irvine Lake.

Photo 2. View of installed Basking Trap #10 on the west side of Irvine Lake.

D:\Projects\3IRW\SantiagoCreek\Graphics\Turtle_Report\Turtle_Trapping\ex_TP1.ai

Turtle Trapping Photographs

Attachment B-1

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(09/19/2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Turtle_Report\ex_TP.pdf

Photo 3. View of installed Hoop trap #17 on the east side of Irvine Lake.

Photo 4. View of installed Basking Trap #26 on the east side of Irvine Lake.

D:\Projects\3IRW\SantiagoCreek\Graphics\Turtle_Report\Turtle_Trapping\ex_TP2.ai

Turtle Trapping Photographs

Attachment B-2

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

PSOMAS

(09/19/2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Turtle_Report\ex_TP.pdf

Photo 5. View of channel catfish caught from Hoop Trap #7 (August 22, 2024) on the west side of Irvine Lake.

Photo 6. View of red-eared slider caught from Hoop Trap #19 (August 28, 2024) on the east side of Irvine Lake.

D:\Projects\3IRW\SantiagoCreek\Graphics\Turtle_Report\Turtle_Trapping\ex_TP3.ai

Photo 7. View of red-eared slider caught from Hoop Trap #20 (August 29, 2024) on the east side of Irvine Lake.

Photo 8. View of red-eared slider caught from Hoop Trap #19 (August 30, 2024) on the east side of Irvine Lake.

D:\Projects\3IRW\SantiagoCreek\Graphics\Turtle_Report\Turtle_Trapping\ex_TP4.ai

ATTACHMENT C

SURVEY DATA SHEETS

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/20/24	Survey Name	Frame Lake			Survey Completed	(Y) N
Project Code	33AV	Observer1	L. Mossett	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	T. Brath	Obsv2 Task	observer/recorder/processor	Site	
Start Time	1800	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	Y (N)
End Time	1035	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	
Start Elev		End Elev	
Datum		Drainage	
Site			
Length			

Weather:

Air Temp (°C)	0700 - 65°F / 1140 - 87°F
Water Temp (°C)	0935 - 80.5°F / 1040 - 81.6°F
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	~~<1~~ calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, ~~25-31~~ strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/~~trap~~/vis	1	Funnel		33.786183 -117.732489	0837	NA	
2	audio/hand/~~trap~~/vis	2	Funnel		33.783716 -117.728510	0841		
3	audio/hand/~~trap~~/vis	3	Funnel		33.781564 -117.727847	0840		
4	audio/hand/~~trap~~/vis	4	Funnel		33.778007 -117.726449	0855		
5	audio/hand/~~trap~~/vis	5	Funnel		33.776706 -117.725312	0906		
6	audio/hand/~~trap~~/vis	6	Funnel		33.775611 -117.723460	0913		
7	audio/hand/~~trap~~/vis	7	Funnel		33.772570 -117.721171	0925		
8	audio/hand/~~trap~~/vis	8	Funnel		33.770234 -117.718074	0948		
9	audio/hand/~~trap~~/vis	9	Funnel		33.771120 -117.716243	0954		
10	audio/hand/~~trap~~/vis	10	Solar		33.774508 -117.718748	1003		
11	audio/hand/~~trap~~/vis	11	Funnel		33.773126 -117.715052	1008		
12	audio/hand/~~trap~~/vis	12	Funnel		33.772164 -117.712133	1016		

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag		Type of Shell Damage	Other ID Markings		
1					Y	N		Y	N	
2					Y	N		Y	N	
3					Y	N		Y	N	
4					Y	N		Y	N	
5					Y	N		Y	N	
6					Y	N		Y	N	
7					Y	N		Y	N	
8					Y	N		Y	N	
9					Y	N		Y	N	
10					Y	N		Y	N	
11					Y	N		Y	N	
12					Y	N		Y	N	

8/20/14

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
12	Funnel		33.771018, -117.70[illegible]	1029	NA	
14	Funnel		33.773459, -117.71[illegible]	1027	"	
15	Funnel		33.774651, -117.70[illegible]	1034	"	
16	Funnel		33.776117, -117.705770	1038	"	
					—	

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: 2 bluegill caught in trap #7. No other fish caught. Trap #12 was out of the water upon arrival. Unknown reason.

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/21/24	Survey Name	Frome Lake			Survey Completed	Y / N
Project Code	3	Observer1	L. Mueller	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	T. Brush	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0700	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	Y / N
End Time	1100	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat			
Start Long		End Long		Site	
Start Elev		End Elev		Length	
Datum		Drainage			

Weather:

Air Temp (°C)	0700 - 64°F / 1050 - 86°F
Water Temp (°C)	0750 - 78.6°F / thermometer broke
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	~~<1 calm, 2~~ 3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	1	Funnel		See Day 1	0747	NA	
2	audio/hand/trap/vis	2	Funnel			0758		
3	audio/hand/trap/vis	3	Funnel			0804		
4	audio/hand/trap/vis	4	Funnel			0817		
5	audio/hand/trap/vis	5	Funnel			0827		
6	audio/hand/trap/vis	6	Funnel			0831		
7	audio/hand/trap/vis	7	Funnel			0841		
8	audio/hand/trap/vis	8	Funnel			0847		
9	audio/hand/trap/vis	9	Funnel			0855		
10	audio/hand/trap/vis	10	Solar			0904		
11	audio/hand/trap/vis	11	Funnel			0912		
12	audio/hand/trap/vis	12	Funnel			0924		

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag		Type of Shell Damage	Other ID Markings		
1					Y	N		Y	N	
2					Y	N		Y	N	
3					Y	N		Y	N	
4					Y	N		Y	N	
5					Y	N		Y	N	
6					Y	N		Y	N	
7					Y	N		Y	N	
8					Y	N		Y	N	
9					Y	N		Y	N	
10					Y	N		Y	N	
11					Y	N		Y	N	
12					Y	N		Y	N	

8/21/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
13	Funnel		See Day 1	0939	NA	
14	Funnel		↓	0936	↓	
15	Funnel			0948		
16	Funnel			0945		
				—		

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: Trap #4 - x3 Bluegill Trap #5 - x1 Bluegill, Trap #11 - x1 Bluegill, Trap #12 - x1 Bluegill. No catch at other traps

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/21/14	Survey Name	Irvine Lake			Survey Completed	(Y) N
Project Code	3	Observer1	T. Alvarez	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	T. Brindle	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0715	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	(Y) N
End Time	1025	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	Site
Start Elev		End Elev	Length
Datum		Drainage	

Weather:

Air Temp (°C)	0715 - 60°F / 1025 - 77°F
Water Temp (°C)	0725 - 78.5°F / 0932 - 80.1°F
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	1	Funnel		See Page 1	0735	N/A	
2	audio/hand/trap/vis	2	Funnel			0743		
3	audio/hand/trap/vis	3	Funnel			0750		
4	audio/hand/trap/vis	4	Funnel			0756		
5	audio/hand/trap/vis	5	Funnel			0801		
6	audio/hand/trap/vis	6	Funnel			0806		
7	audio/hand/trap/vis	7	Funnel			0815		
8	audio/hand/trap/vis	8	Funnel			0827		
9	audio/hand/trap/vis	9	Funnel			0834		
10	audio/hand/trap/vis	10	Solar			0841		
11	audio/hand/trap/vis	11	Funnel			0848		
12	audio/hand/trap/vis	12	Funnel			0854		

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag		Type of Shell Damage	Other ID Markings		
1					Y	N		Y	N	
2					Y	N		Y	N	
3					Y	N		Y	N	
4					Y	N		Y	N	
5					Y	N		Y	N	
6					Y	N		Y	N	
7					Y	N		Y	N	
8					Y	N		Y	N	
9					Y	N		Y	N	
10					Y	N		Y	N	
11					Y	N		Y	N	
12					Y	N		Y	N	

8/22/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
13	Funnel		See Day 1	0904	NA	
14	Funnel		"	0912	"	
15	Funnel		"	0918	"	
16	Funnel		"	0922	"	
				-		

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: Trap # 6 - x1 bluegill.
Trap # 7 - x1 catfish
No other catches.

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/23/24	Survey Name	Santiago			Survey Completed	(Y) / N
Project Code		Observer1	S. Underwood	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	S. Parmley	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0648	Observer3	L. Mosher	Obsv3 Task	observer/recorder/processor	Site Photo	Y / (N)
End Time	1056	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	Site
Start Elev		End Elev	Length
Datum		Drainage	

Weather:

Air Temp (°C)	67° F (6:48 AM) - 75° (10:56 AM)
Water Temp (°C)	79.7 F (8:25 AM) - 80.2 F (9:24 AM)
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	1	Funnel		See Dig. 2	n/a	742	
2	audio/hand/trap/vis	2	Funnel				753	
3	audio/hand/trap/vis	3	Funnel				800	
4	audio/hand/trap/vis	4	Funnel				658	
5	audio/hand/trap/vis	5	Funnel				823	
6	audio/hand/trap/vis	6	Funnel				831	
7	audio/hand/trap/vis	7	Funnel				712	
8	audio/hand/trap/vis	8	Funnel				945	
9	audio/hand/trap/vis	9	Funnel				718	
10	audio/hand/trap/vis	10	Solar				722	
11	audio/hand/trap/vis	11	Funnel				735	
12	audio/hand/trap/vis	12	Funnel		↓	↓	746	

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag		Type of Shell Damage	Other ID Markings		
1					Y	N		Y	N	
2					Y	N		Y	N	
3					Y	N		Y	N	
4					Y	N		Y	N	
5					Y	N		Y	N	
6					Y	N		Y	N	
7					Y	N		Y	N	
8					Y	N		Y	N	
9					Y	N		Y	N	
10					Y	N		Y	N	
11					Y	N		Y	N	
12					Y	N		Y	N	

8/23/14

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
13	Funnel		See Page 1	n/a	759	
14	Funnel		↓	↓	807	
15	Funnel				921	
16	Funnel		↓	↓	929	

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: _____

Wind Speed	
ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code	
ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category	
A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition	
R	Release
D	Dead
E	Escape
C	Collected

General	
Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/27/24	Survey Name	Irvine Lake			Survey Completed	Y / N
Project Code	TERR 0101.05	Observer1	J. Agnew	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	T. Bache	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0708	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	Y / N
End Time	0908	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	Site
Start Elev		End Elev	Length
Datum		Drainage	

Weather:

Air Temp (°C)	62°F (07:08 AM) – 70°F (09:08 AM)
Water Temp (°C)	0730 - 78.9°F / 0846 - 79.2°F
Condition	~~clear or few clouds~~, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, ~~2-3 light air movement~~, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	17	Funnel		33.776444, -117.708[illegible]	0738	N/A	
2	audio/hand/trap/vis	18	Funnel		33.776777, -117.711443	0743		
3	audio/hand/trap/vis	19	Funnel		33.778761, -117.713360	0748		
4	audio/hand/trap/vis	20	Funnel		33.779667, -117.715817	0753		
5	audio/hand/trap/vis	21	Funnel		33.780882, -117.718101	0758		
6	audio/hand/trap/vis	22	Funnel		33.782176, -117.719028	0803		
7	audio/hand/trap/vis	23	Funnel		33.783046, -117.721917	0808		
8	audio/hand/trap/vis	24	Funnel		33.784248, -117.719689	0813		
9	audio/hand/trap/vis	25	Funnel		33.785208, -117.722451	0818		
10	audio/hand/trap/vis	26	Solar		33.776308, -117.721946	0840		
11	audio/hand/trap/vis	27	Solar		33.775874, -117.712478	0894		
12	audio/hand/trap/vis							

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag		Type of Shell Damage	Other ID Markings		
1					Y	N		Y	N	
2					Y	N		Y	N	
3					Y	N		Y	N	
4					Y	N		Y	N	
5					Y	N		Y	N	
6					Y	N		Y	N	
7					Y	N		Y	N	
8					Y	N		Y	N	
9					Y	N		Y	N	
10					Y	N		Y	N	
11					Y	N		Y	N	
12					Y	N		Y	N	

8/27/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: No catches (fish/turtle) in any trap.

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/18/24	Survey Name	Irvine Lake			Survey Completed	(Y) N
Project Code	Pth/Ptp305	Observer1	J. Alonzo	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	T. Bostic	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0658	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	(Y) N
End Time	0905	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	Site
Start Elev		End Elev	Length
Datum		Drainage	

Weather:

Air Temp (°C)	61° (6:52 AM) — 70° (9:05 AM)
Water Temp (°C)	0711 - 78.8°F / 0857 - 79.0°F
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	17	Funnel		See Day 1	0717	N/A	
2	audio/hand/trap/vis	18	Funnel			0723		
3	audio/hand/trap/vis	19	Funnel			0752		
4	audio/hand/trap/vis	20	Funnel			0801		
5	audio/hand/trap/vis	21	Funnel			0806		
6	audio/hand/trap/vis	22	Funnel			0811		
7	audio/hand/trap/vis	23	Funnel			0816		
8	audio/hand/trap/vis	24	Funnel			0820		
9	audio/hand/trap/vis	25	Funnel			0827		
10	audio/hand/trap/vis	26	Solar			0834		
11	audio/hand/trap/vis	27	Solar			0851		
12	audio/hand/trap/vis							

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Carapace Length (mm)	Notched		Tissue			Photo	# Photo
1	Red-eared	slider	A,J,Mm,L1,L2,H,Em,U	(R)	D	E	C	M	(F)	U	X	265.88	Y	(N)	Y	(N)	U	(Y/N)	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage		Type of Shell Damage	Other ID Markings	
1	199.38	74.83	247.54	2,816.4	Y	(N)		Y	(N)
2					Y	N		Y	N
3					Y	N		Y	N
4					Y	N		Y	N
5					Y	N		Y	N
6					Y	N		Y	N
7					Y	N		Y	N
8					Y	N		Y	N
9					Y	N		Y	N
10					Y	N		Y	N
11					Y	N		Y	N
12					Y	N		Y	N

8/28/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: No fish caught. x1 red-eared slider caught in Trap #19.

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/29/24	Survey Name	Irvine Lake			Survey Completed	(Y) / N
Project Code	IRVBIO05	Observer1	J. Agundez	Obsv1 Task	observer/recorder/(processor)	Block	
Survey Type	visual/(trapping)	Observer2	T. Beattie	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0642	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	Y / (N)
End Time	0849	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	Site
Start Elev		End Elev	Length
Datum		Drainage	

Weather:

Air Temp (°C)	60° (6:42AM) – 65° (8:49)
Water Temp (°C)	0701 - 78.8°F / 0824 - 79.2°F
Condition	clear or few clouds, partly cloudy or variable, (cloudy or overcast), fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	17	Funnel		See Dup 1	0703	NA	
2	audio/hand/trap/vis	18	Funnel			0708		
3	audio/hand/trap/vis	19	Funnel			0713		
4	audio/hand/trap/vis	20	Funnel			0733		
5	audio/hand/trap/vis	21	Funnel			0737		
6	audio/hand/trap/vis	22	Funnel			0741		
7	audio/hand/trap/vis	23	Funnel			0747		
8	audio/hand/trap/vis	24	Funnel			0752		
9	audio/hand/trap/vis	25	Funnel			0802		
10	audio/hand/trap/vis	26	Solar			0820		
11	audio/hand/trap/vis	27	Solar			0824		
12	audio/hand/trap/vis							

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1	Red-eared slider		A,J,Mm,L1,L2,H,Em,U	(R)	D	E	C	M	(F)	U	X	229.10	Y	(N)	Y	(N)	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag		Type of Shell Damage	Other ID Markings	
1	181.67	101.39	215.44	2,015.6	Y	(N)		Y	(N)
2					Y	N		Y	N
3					Y	N		Y	N
4					Y	N		Y	N
5					Y	N		Y	N
6					Y	N		Y	N
7					Y	N		Y	N
8					Y	N		Y	N
9					Y	N		Y	N
10					Y	N		Y	N
11					Y	N		Y	N
12					Y	N		Y	N

DRAFT

8/12/14

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: x1 red-eared slider caught in Trap #20. One large catfish caught in Trap #25. No other captures

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/30/24	Survey Name	Ivory Cnk			Survey Completed	(Y) N
Project Code	3TRvolunteer	Observer1	J. Aman	Obsv1 Task	observer/recorder/processor	Block	
Survey Type	visual/trapping	Observer2	T. Bright	Obsv2 Task	observer/recorder/processor	Site	
Start Time	0637	Observer3		Obsv3 Task	observer/recorder/processor	Site Photo	(Y) N
End Time	0925	Observer4		Obsv4 Task	observer/recorder/processor	# photos	

Start Lat		End Lat	
Start Long		End Long	Site
Start Elev		End Elev	Length
Datum		Drainage	

Weather:

Air Temp (°C)	60°F (6.37am) — 68° (0920am)
Water Temp (°C)	0717 - 78.8F / 0911 - 78.6F
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

	Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1	audio/hand/trap/vis	17	Funnel		See Day 1	8/1	0722	
2	audio/hand/trap/vis	18	Funnel				0728	
3	audio/hand/trap/vis	19	Funnel				0747	
4	audio/hand/trap/vis	20	Funnel				0819	
5	audio/hand/trap/vis	21	Funnel				0826	
6	audio/hand/trap/vis	22	Funnel				0833	
7	audio/hand/trap/vis	23	Funnel				0841	
8	audio/hand/trap/vis	24	Funnel				0847	
9	audio/hand/trap/vis	25	Funnel				0901	
10	audio/hand/trap/vis	26	Solar				0752	
11	audio/hand/trap/vis	27	Solar				0758	
12	audio/hand/trap/vis							

All Animals (continued):

	Type	Species	Age Category	Disposition				Sex				Length (mm)	Notched		Tissue			Photo	# Photo
1	Red-eared slider		A,J,Mm,L1,L2,H,Em,U	(R)	D	E	C	M	(F)	U	X	146.10	Y	(N)	Y	(N)	U	Y/N	
2			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
3			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
4			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
5			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
6			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
7			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
8			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
9			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
10			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
11			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	
12			A,J,Mm,L1,L2,H,Em,U	R	D	E	C	M	F	U	X		Y	N	Y	N	U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag	Type of Shell Damage	Other ID Markings	
1	114.68	57.12	136.33	490.7	Y (N)		Y (N)	
2					Y N		Y N	
3					Y N		Y N	
4					Y N		Y N	
5					Y N		Y N	
6					Y N		Y N	
7					Y N		Y N	
8					Y N		Y N	
9					Y N		Y N	
10					Y N		Y N	
11					Y N		Y N	
12					Y N		Y N	

8/30/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture		ID #	Location Within Habitat	Animal Behavior
1	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours

Temperature Loggers Form:

Logger ID	Lat/Long

Notes: x1 recaptured Slider in Trap #19
x1 Bluegill in Trap #19.
x1 catfish in Trap #25.
No other catches

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

APPENDIX J

COASTAL CALIFORNIA GNATCATCHER SURVEYS

August 24, 2020

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused surveys for the coastal California gnatcatcher (*Polioptila californica californica*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the coastal California gnatcatcher on or immediately adjacent to the project site. Surveys were conducted by a Biologist who holds the necessary Federal Endangered Species Act survey permit and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on April 8, 2020.

PROJECT LOCATION AND DESCRIPTION

The Irvine Ranch Water District (IRWD) and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the early design phase but would be located within the survey area provided by IRWD.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project site is depicted on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography in the center of the survey area is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 657 to 898 feet above mean sea level (msl). Santiago Creek, a blueline stream, occurs in the survey area. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The following vegetation types and other areas occur within the project site: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed (Exhibit 3).

SURVEY AREA

The survey area for the gnatcatcher surveys includes all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, and disturbed floodplain sagebrush scrub) on the project site and within a 500-foot buffer around the tentative impact footprint. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, coastal California gnatcatcher surveys were conducted in portions of the survey area that contained suitable sagebrush scrub habitat of appropriate size and stature. Sagebrush scrub habitats were distributed throughout the survey area and on the surrounding slopes. These habitat types were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*) as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses. Site photographs of representative habitat in the survey area are provided in Attachment A.

BACKGROUND

The coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds (*Molothrus ater*) and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

Taxonomic studies indicate that the California gnatcatcher consists of four subspecies, which extend from southwestern California to southern Baja California, Mexico. The coastal California gnatcatcher, the northernmost gnatcatcher subspecies, is restricted to lowland areas from central Ventura County through Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties to the Baja California, Mexico, border (Atwood and Lerman 2006; Mellink and Rea 1994). The USFWS has rejected multiple petitions claiming that the coastal California gnatcatcher should be delisted because it is not a valid subspecies (USFWS 2011, 2016).

The coastal California gnatcatcher has been recorded from sea level to approximately 3,000 feet above msl (USFWS 2003); however, more than 90 percent of gnatcatcher records are from between sea level and 820 feet above msl along the coast and between sea level and 1,800 feet above msl inland (Atwood and Bolsinger 1992). USFWS estimates regarding the population size of the coastal California gnatcatcher in Southern California have been about 3,000 pairs (Atwood and Bontrager 2001). In the *5-Year Review: Summary and Evaluation* for the gnatcatcher, the USFWS cited a study estimating that there were approximately 1,324 gnatcatcher pairs over approximately 111,000 acres of public and quasi-public lands in Orange and San Diego Counties (Winchell and Doherty 2008). Because the Winchell and Doherty study covered only a portion of the U.S. range (focusing on the coast and limited to one year), this study cannot extrapolate beyond the sampling region; however, the USFWS states that it is likely more gnatcatchers are in the U.S. portion of the range than was suggested by earlier estimates (USFWS 2010).

The coastal California gnatcatcher typically occurs within coastal and inland sage scrub vegetation types, which often occur in a patchy distribution pattern throughout the gnatcatcher's range. Coastal California gnatcatchers also use chaparral, grassland, and riparian habitats that are in proximity to sage scrub for dispersal and foraging (Atwood et al. 1998; Campbell et al. 1998; USFWS 2003). Availability of these non-sage scrub areas is essential during certain times of the year, particularly during drought conditions or for dispersal, foraging, or nesting (USFWS 2003).

The USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This revised rule designates 197,303 acres of Critical Habitat in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The survey area is not located within the designated critical habitat for the coastal California gnatcatcher.

SURVEY METHODS

The USFWS's survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6 AM and 12 PM, and no more than 100 acres of suitable habitat may be surveyed per visit. Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-3) conducted all focused surveys for coastal California gnatcatcher. Surveys were conducted on April 30, May 27, and June 25, 2020.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [°F]), too hot (i.e., above 95°F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. A summary of weather conditions during each survey is provided in Table 1, below. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and "pishing" sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and "pishing" varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions. All wildlife species detected during the surveys were recorded (Attachment B).

TABLE 1
SUMMARY OF COASTAL CALIFORNIA GNATCATCHER SURVEYS

Survey Number	Date	Time (Start/End)	Surveyor	Weather Conditions			Gnatcatchers Observed and/or Detected
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)	
1	April 30, 2020	0715/1030	Messett	65/70	0–1/0–1	100/50	One male California gnatcatcher was observed
2	May 27, 2020	0815/1140	Messett	65/76	0–1/0–1	10/Clear	A pair of California gnatcatchers was observed incubating a nest
3	June 25, 2020	0650/1000	Messett	68/77	0–1/0–1	90/40	A family group of California gnatcatchers (pair and three fledglings) was observed foraging together

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

SURVEY RESULTS

One California gnatcatcher territory was observed in the survey area (Exhibit 4). A male California gnatcatcher was observed foraging alone in sagebrush scrub located central portion of the survey area during the first survey on April 30, 2020. It briefly responded to recorded playback and continued to forage in the northwestern portion of the survey area. On the second survey, a pair was observed in the northwestern portion of the survey area. During this second survey, a female California gnatcatcher was initially observed foraging alone in the northwest corner of the survey area. Ms. Messett followed the female and after approximately 30 minutes, she observed a nest exchange with the female entering and the male exiting a large scalebroom (*Lepidospartum squamatum*) shrub located just outside of the northern project site boundary. Both the male and female were observed incubating the nest. During the third survey on June 25, 2020, Ms. Messett observed a family group with at least three fledglings foraging together in sagebrush scrub, south of the nest location. The recent fledglings were observed displaying food begging behavior while the adults were observed feeding them. During subsequent focused surveys for least Bell's vireo, the pair was observed foraging in the northwestern portion of the survey area and a juvenile was observed foraging alone in the central portion of the survey area.

OTHER OBSERVATIONS

Two other special status species were observed and/or detected in the survey area during the surveys: southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) and coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) (Exhibit 4). Southern California rufous-crowned sparrow is a California Department of Fish and Wildlife (CDFW) Watch List species and the coastal cactus wren is a California Species of Special Concern. These species are tracked by the CDFW's California Natural Diversity Database (CNDDB). CNDDB forms are included in Attachment C and will be submitted online by Ms. Messett.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.

Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-3)

Attachments: Exhibits 1–4
A – Site Photographs
B – Wildlife Compendium
C – CNDDB Forms

cc: Jo Ann Corey, corey@irwd.com
Jacob Moeder, Moeder@irwd.com
Christine.Beck@wildlife.ca.gov

REFERENCES

Atwood, J.L. 1992. Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look. *Birding* 25: 228–233. Colorado Springs, CO: American Birding Association.

———. 1990. *Status Review of the California Gnatcatcher (Polioptila californica)*. Manomet, MA: Manomet Bird Observatory.

Atwood, J.L. and J.S. Bolsinger. 1992. Elevational Distribution of the California Gnatcatchers in the United States. *Journal of Field Ornithology* 63(2):159–168. Waco, TX: Ornithological Societies of North America.

Atwood, J. L. and D.R. Bontrager. 2001. California Gnatcatcher (*Polioptila californica*). *The Birds of North America, No. 574* (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.

Atwood, J.L., D.R. Bontrager, and A.L. Gorospe. 1998. Use of Refugia by California Gnatcatchers Displaced by Habitat Loss. *Western Birds* 29: 406–412. San Diego, CA: Western Field Ornithologists.

Atwood, J.L. and S.B. Lerman. 2006. Family Polioptilidae (Gnatcatchers) (pp. 350–377). *Handbook of the Birds of the World. Vol. 11: Old World Flycatchers to Old World Warblers* (J. del Hoyo, A. Elliott, and D.A. Christie, Eds.). Barcelona, Spain: Lynx Ediciones.

Campbell, K. F., R.A. Erickson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher Use of Habitats Other Than Coastal Sage Scrub: Conservation and Management Implications. *Western Birds* 29: 421–433. San Diego, CA: Western Field Ornithologists.

Mellink, E. and A.M. Rea. 1994. Taxonomic Status of the California Gnatcatchers of Northwestern Baja California, Mexico. *Western Birds* 25: 50–62. San Diego, CA: Western Field Ornithologists.

Unitt, P. 1984. The Birds of San Diego County (Memoir 13). San Diego, CA: San Diego Society of Natural History.

U.S. Fish and Wildlife Service (USFWS). 2016 (August 31). Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to Delist the Coastal California Gnatcatcher. *Federal Register* 81(169): 59952–59975. Washington, D.C.: USFWS. https://www.gpo.gov/fdsys/pkg/FR-2016-08-31/pdf/2016-20864.pdf.

———. 2011 (October 26). Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to Delist the Coastal California Gnatcatcher as Threatened. *Federal Register* 76(207): 66255–66260. Washington, D.C.: USFWS. http://www.gpo.gov/fdsys/pkg/FR-2011-10-26/pdf/2011-27644.pdf.

———. 2010 (September 29). *Coastal California Gnatcatcher (Polioptila californica californica) 5-Year Review: Summary and Evaluation.* Carlsbad, CA: USFWS, Carlsbad Field Office.

———. 2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.

———. 2003 (April 24). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertibrate Population Segment for the California Gnatcatcher (*Polioptila californica*); Proposed Rule. *Federal Register* 68(79): 20227–20312. Washington, D.C.: USFWS. https://www.fws.gov/policy/library/2003/03-9435.html.

———. 1997a (February 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines.* Washington, D.C.: USFWS.

———. 1997b (July 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Protocol.* Washington, D.C.: USFWS.

Winchell, C.S., and P.F. Doherty. 2008. Using California Gnatcatcher to Test Underlying Models of Habitat Conservation Plans. *Journal of Wildlife Management* 72: 1322–1327. Flagstaff, AZ: The Wildlife Society.

D:\Projects\3IRW\000905\MXD\CAGN\ex_LV_RL_20200818.mxd

Project Location

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

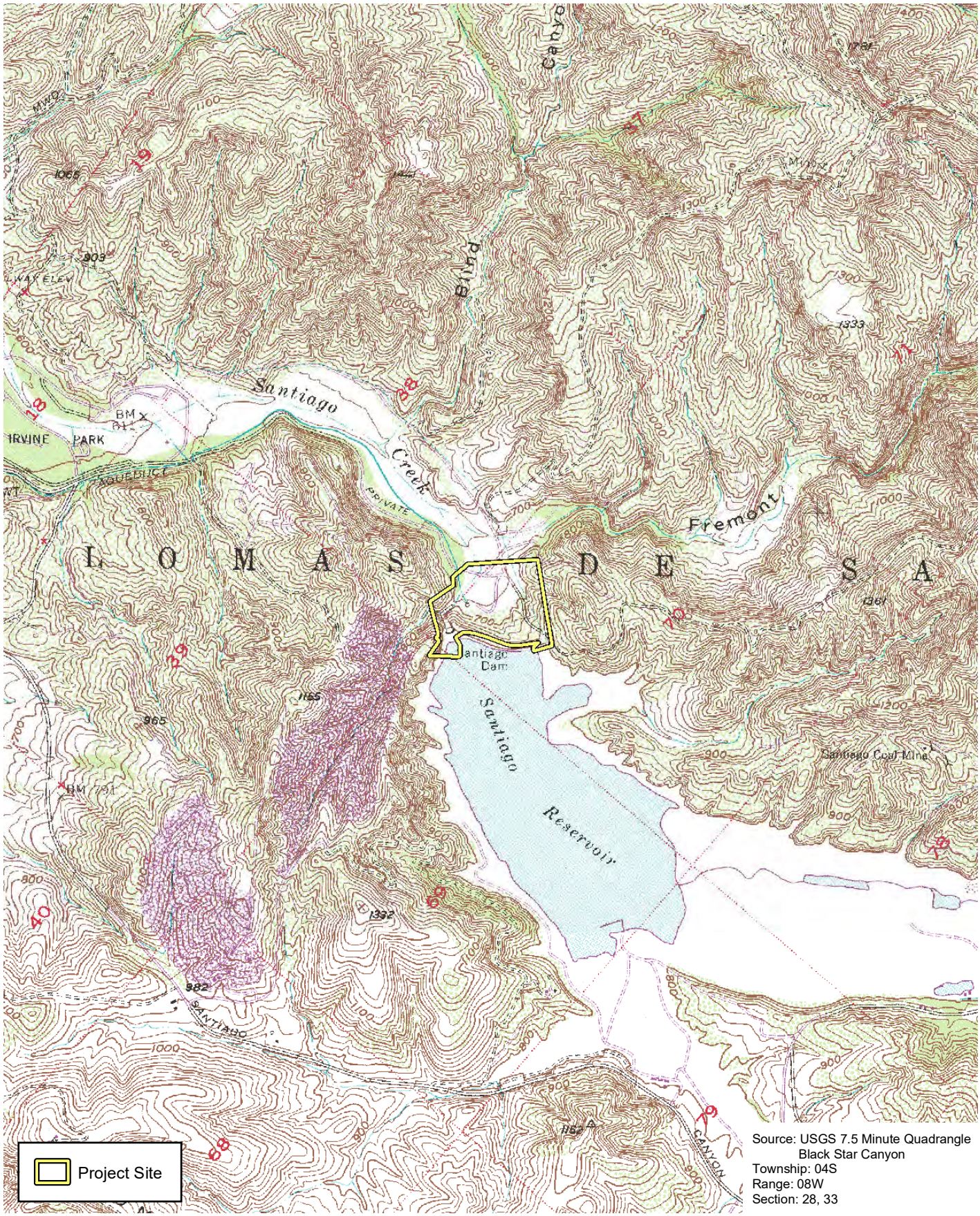
N
W E
S

1,100 550 0 1,100

Feet

PSOMAS

(Rev: 8-18-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\CAGN\ex_LV_RL.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S
Range: 08W
Section: 28, 33

D:\Projects\3IRW\00905\MXD\CAGN\ex_USGS_20200818.mxd

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 2

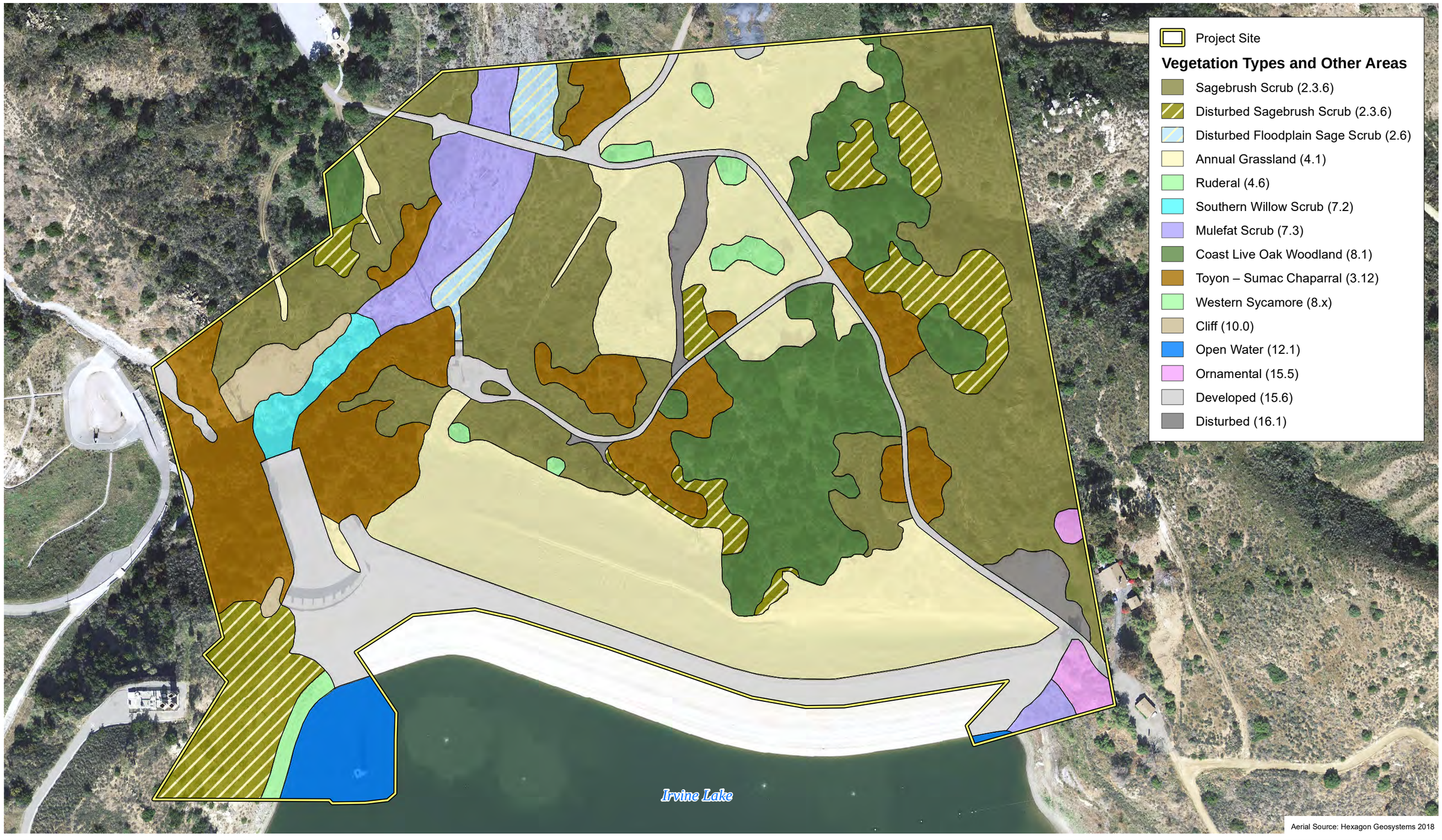
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 8-18-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\CAGN\ex_USGS.pdf



D:\Projects\3IRW000905\MXD\CAGN\ex_Vegetation_20200818.mxd

Vegetation Types and Other Areas

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

175 87.5 0 175 Feet

PSOMAS

(Rev: 08/18/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\CAGN\ex_Vegetation.pdf

D:\Projects\3IRW000905\MXD\CAGN\ex_BiologicalResources_20200818.mxd

Survey Area and Biological Resources

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

250 125 0 250 Feet

PSOMAS

(Rev: 08/24/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\CAGN\ex_SurveyArea_BiologicalResources.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1: Sagebrush scrub located in the eastern portion of the survey area, looking east.

Photo 2: Sagebrush scrub located in the far western portion of the survey area, looking southwest.

D:\Projects\3IRW\00905\GRAPHICS\CAGN\AttA-1_SitePhotographs.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

Photo 3: Sagebrush scrub located in the central portion of the survey area, looking south.

Photo 4: Coastal California gnatcatcher nest location in the northwestern portion of the survey area, looking north. Red circle shows nest location.

D:\Projects\3IRW\00905\GRAPHICS\CAGN\AttA-2_SitePhotographs.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Species	
Scientific Name	**Common Name**
BIRDS	
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY	
Branta canadensis	Canada goose
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY	
Callipepla californica	California quail
COLUMBIDAE - PIGEON AND DOVE FAMILY	
*Columba livia**	rock pigeon
Zenaida macroura	mourning dove
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY	
Geococcyx californianus	greater roadrunner
CAPRIMULGIDAE - NIGHTJAR FAMILY	
Chordeiles acutipennis	lesser nighthawk
TROCHILIDAE - HUMMINGBIRD FAMILY	
Calypte anna	Anna's hummingbird
Selasphorus rufus	rufous hummingbird
CATHARTIDAE - NEW WORLD VULTURE FAMILY	
Cathartes aura	turkey vulture
ACCIPITRIDAE - HAWK FAMILY	
Buteo jamaicensis	red-tailed hawk
STRIGIDAE - TYPICAL OWL FAMILY	
Megascops kennicottii	western screech-owl
Bubo virginianus	great horned owl
PICIDAE - WOODPECKER FAMILY	
Melanerpes formicivorus	acorn woodpecker
PSITTACIDAE - PARROT FAMILY	
*Amazona viridigenalis**	red-crowned parrot*
TYRANNIDAE - TYRANT FLYCATCHER FAMILY	
Myiarchus cinerascens	ash-throated flycatcher
Tyrannus vociferans	Cassin's kingbird
VIREONIDAE - VIREO FAMILY	
Vireo gilvus	warbling vireo
CORVIDAE - JAY AND CROW FAMILY	
Aphelocoma californica	California scrub-jay
Corvus brachyrhynchos	American crow
HIRUNDINIDAE - SWALLOW FAMILY	
Petrochelidon pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
AEGITHALIDAE - BUSHTIT FAMILY	
Psaltriparus minimus	bushtit
TROGLODYTIDAE - WREN FAMILY	
Troglodytes aedon	house wren
Thryomanes bewickii	Bewick's wren
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Species	
Scientific Name	**Common Name**
POLIOPTILIDAE - GNATCATCHER FAMILY	
Polioptila caerulea	blue-gray gnatcatcher
Polioptila californica	California gnatcatcher
SYLVIIDAE - SILVIID WARBLERS FAMILY	
Chamaea fasciata	wrentit
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY	
Toxostoma redivivum	California thrasher
Mimus polyglottos	northern mockingbird
STURNIDAE - STARLING FAMILY	
*Sturnus vulgaris**	European starling*
FRINGILLIDAE - FINCH FAMILY	
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
PASSERELLIDAE - NEW WORLD SPARROW FAMILY	
Pipilo maculatus	spotted towhee
Aimophila ruficeps	rufous-crowned sparrow
Melozone crissalis	California towhee
Melospiza melodia	song sparrow
ICTERIDAE - BLACKBIRDS AND ORIOLES	
Icterus cucullatus	hooded oriole
PARULIDAE - WOOD-WARBLER FAMILY	
Geothlypis trichas	common yellowthroat
Cardellina pusilla	Wilson's warbler
CARDINALIDAE - CARDINALS AND ALLIES	
Piranga ludoviciana	western tanager
Pheucticus melanocephalus	black-headed grosbeak
MAMMALS	
SCIURIDAE - SQUIRREL FAMILY	
Otospermophilus beecheyi	California ground squirrel
LEPORIDAE - HARE AND RABBIT FAMILY	
Sylvilagus audubonii	desert cottontail
* Non-native	

ATTACHMENT C

CNDDB FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES20F0004
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Polioptila californica californica*

Common name: coastal California gnatcatcher

Date of field work (mm-dd-yyyy): 05-27-2020

Comment about field work date(s): Observed a nest location on this day, also observed the pair and fledglings on subsequent surveys.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation: Identified by visual and aural vocalizations

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Focused presence/absence survey

Total number of individuals: 5

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2	3			

Age class comment: Observed the pair incubating on a nest, then later they were observed traveling with recent fledglings and later one juvenile was incidentally observed (assumed to be disbursed from the same family group)

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Used for nesting and foraging

What was the observed behavior? Observed male foraging alone. Observed female foraging alone then observed a nest exchange with the male. Later I observed the pair feeding recent fledglings. During a different survey i also incidentally observed a juvenile foraging alone.

Describe any evidence of reproduction: Observed a nest, as well as fledglings and a juvenile

SITE INFORMATION

Habitat description: sagebrush scrub

Slope:

Land owner/manager: Private- Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam and Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	660	33.78942	-117.72637	432756	3739045	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	coastal California gnatcatcher nest location						

The mapped feature is accurate within: 10 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES20F0005
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Aimophila ruficeps canescens*

Common name: southern California rufous-crowned sparrow

Date of field work (mm-dd-yyyy): 04-30-2020

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Focused presence/absence survey for coastal California gnatcatcher

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
4				

Age class comment:

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? 2 pairs were observed on a slope of sagebrush scrub over the course of 3 focused gnatcatcher surveys. The pairs were observed in the same general areas each survey and were observed carrying either food or nesting material

Describe any evidence of reproduction: Observed carrying food and/or nesting material

SITE INFORMATION

Habitat description: Sagebrush srcub vegetation on a steep, rocky slope

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam and Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	760	33.78824	-117.72326	433043	3738912	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28							

The mapped feature is accurate within: 10 m

Source of mapped feature: iphone avenza maps

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES20F0006
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Campylorhynchus brunneicapillus sandiegensis*

Common name: coastal cactus wren

Date of field work (mm-dd-yyyy): 04-30-2020

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Observed while conducting focused presence/absence survey for coastal California gnatcatcher survey

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☑ **Other**

Site use description: nesting and foraging

What was the observed behavior? perched on top of prickly pear cactus calling

Describe any evidence of reproduction: Observed a nest located just outside of the survey area

SITE INFORMATION

Habitat description: Sagebrush scrub

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	671	33.78923	-117.72678	432717	3739024	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 28	coastal cactus wren						

The mapped feature is accurate within: 10 m

Source of mapped feature: iphone avenza maps

Mapping notes:

Location/directions comments:

Attachment(s):

July 25, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

David Mayer
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
David.Mayer@wildlife.ca.gov

Subject: Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love and Mr. Mayer:

This Letter Report presents the results of focused surveys for the coastal California gnatcatcher (*Polioptila californica californica*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the coastal California gnatcatcher upstream of Santiago Dam. Focused surveys were conducted downstream of Santiago Dam in Spring 2020 (Psomas 2020). Surveys were conducted by a Biologist who holds the necessary Federal Endangered Species Act survey permit and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on March 8, 2022.

PROJECT LOCATION AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the project site. Elevations in the project site range from approximately 657 to 996 feet above mean sea level (msl).

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase but would be located within the survey area provided by IRWD.

SURVEY AREA

A variety of vegetation types occur on the project site, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas (Exhibit 3).

The survey area for the gnatcatcher surveys includes all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, and disturbed floodplain sagebrush scrub) upstream of the Dam on the project site. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, coastal California gnatcatcher surveys were conducted in portions of the survey area that contained suitable sagebrush scrub habitat of appropriate size and stature. Sagebrush scrub habitats were distributed throughout the survey area and on the surrounding slopes. These habitat types were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), and toyon (*Heteromeles arbutifolia*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp.

[1] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

ferocula) as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses. Site photographs of representative habitat in the survey area are provided in Attachment A.

BACKGROUND

The coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds (*Molothrus ater*) and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

Taxonomic studies indicate that the California gnatcatcher consists of four subspecies, which extend from southwestern California to southern Baja California, Mexico. The coastal California gnatcatcher, the northernmost gnatcatcher subspecies, is restricted to lowland areas from central Ventura County through Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties to the Baja California, Mexico, border (Atwood and Lerman 2006; Mellink and Rea 1994). The USFWS has rejected multiple petitions claiming that the coastal California gnatcatcher should be delisted because it is not a valid subspecies (USFWS 2011, 2016).

The coastal California gnatcatcher has been recorded from sea level to approximately 3,000 feet above msl (USFWS 2003); however, more than 90 percent of gnatcatcher records are from between sea level and 820 feet above msl along the coast and between sea level and 1,800 feet above msl inland (Atwood and Bolsinger 1992). USFWS estimates regarding the population size of the coastal California gnatcatcher in Southern California have been about 3,000 pairs (Atwood and Bontrager 2001). In the 2010 *5-Year Review: Summary and Evaluation* for the gnatcatcher, the USFWS cited a study estimating that there were approximately 1,324 gnatcatcher pairs over approximately 111,000 acres of public and quasi-public lands in Orange and San Diego Counties (Winchell and Doherty 2008). Because the Winchell and Doherty study covered only a portion of the U.S. range (focusing on the coast and limited to one year), this study cannot extrapolate beyond the sampling region; however, the USFWS states that it is likely more gnatcatchers are in the U.S. portion of the range than was suggested by earlier estimates (USFWS 2010). The most recent *5-Year Review* concluded that the threats affecting the species have not changed and that the coastal California gnatcatcher should remain a Threatened species (USFWS 2020).

The coastal California gnatcatcher typically occurs within coastal and inland sage scrub vegetation types, which often occur in a patchy distribution pattern throughout the gnatcatcher's range. Coastal California gnatcatchers also use chaparral, grassland, and riparian habitats that are in proximity to sage scrub for dispersal and foraging (Atwood et al. 1998; Campbell et al. 1998; USFWS 2003). Availability of these non-sage scrub areas is essential during certain times of the year, particularly during drought conditions or for dispersal, foraging, or nesting (USFWS 2003).

The USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This revised rule designates 197,303 acres of Critical Habitat in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The survey area is not located within the designated critical habitat for the coastal California gnatcatcher.

SURVEY METHODS

The USFWS's survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6 AM and 12 PM, and no more than 100 acres of suitable habitat may be surveyed per visit. Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) conducted all focused surveys for coastal California gnatcatcher. Surveys were conducted on March 25, April 4, and June 9, 2022.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [°F]), too hot (i.e., above 95°F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. A summary of weather conditions during each survey is provided in Table 1, below. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and "pishing" sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and "pishing" varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions. All wildlife species detected during the surveys were recorded (Attachment B).

TABLE 1
SUMMARY OF COASTAL CALIFORNIA GNATCATCHER SURVEYS

Survey Number	Date	Time (Start/End)	Surveyor	Weather Conditions			Gnatcatchers Observed and/or Detected
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)	
1	March 25, 2022	0700/1300	Messett	55/83	0–1/1–2	100/Clear	One California gnatcatcher was detected through vocalization
2	April 14, 2022	0730/1200	Messett	55/69	0–1/4–5	Clear/20	No California gnatcatchers were observed/detected
3	June 9, 2022	0700/1155	Messett	62/76	1–2/3–4	100/Clear	No California gnatcatchers were observed/detected

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

SURVEY RESULTS

One coastal California gnatcatcher was detected just outside the northern portion of the survey area during the first focused survey on March 25, 2022 (Exhibit 4). It briefly responded to recorded playback and continued moving northeast of the survey area. This individual was detected through vocalization and not directly observed; therefore, the sex and breeding status was undetermined. No additional California gnatcatchers were observed or detected during the remaining focused surveys.

OTHER OBSERVATIONS

Eight other special status species were observed and/or detected in the survey area during the surveys: American white pelican (*Pelecanus erythrorhynchos*, California Species of Special Concern), bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected), least Bell's vireo (*Vireo bellii pusillus*, State Endangered, Federally Endangered), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*, California Species of Special Concern), grasshopper sparrow (*Ammodramus savannarum*, California Species of Special Concern), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*, a California Department of Fish and Wildlife [CDFW] Watch List), yellow-breasted chat (*Icteria virens*, California Species of Special Concern), and yellow warbler (*Setophaga petechia*, California Species of Special Concern) (Exhibit 4). These species are tracked by the CDFW's California Natural Diversity Database (CNDDB). The least Bell's vireo, yellow-breasted chat, and yellow warbler were all observed within riparian habitat; exhibits showing the location of these species and CNDDB forms documenting these species will be included with the Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher Report (Psomas 2022 [in preparation]). CNDDB forms for the remaining species are included in Attachment C and will be submitted online by Ms. Messett.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.

Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-5)

Attachments: Exhibits 1–4
A – Site Photographs
B – Wildlife Compendium
C – CNDDB Forms

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com

REFERENCES

Atwood, J.L. 1992. Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look. *Birding* 25: 228–233. Colorado Springs, CO: American Birding Association.

———. 1990. *Status Review of the California Gnatcatcher (Polioptila californica)*. Manomet, MA: Manomet Bird Observatory.

Atwood, J.L. and J.S. Bolsinger. 1992. Elevational Distribution of the California Gnatcatchers in the United States. *Journal of Field Ornithology* 63(2):159–168. Waco, TX: Ornithological Societies of North America.

Atwood, J. L. and D.R. Bontrager. 2001. California Gnatcatcher (*Polioptila californica*). *The Birds of North America, No. 574* (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.

Atwood, J.L., D.R. Bontrager, and A.L. Gorospe. 1998. Use of Refugia by California Gnatcatchers Displaced by Habitat Loss. *Western Birds* 29: 406–412. San Diego, CA: Western Field Ornithologists.

Atwood, J.L. and S.B. Lerman. 2006. Family Polioptilidae (Gnatcatchers) (pp. 350–377). *Handbook of the Birds of the World. Vol. 11: Old World Flycatchers to Old World Warblers* (J. del Hoyo, A. Elliott, and D.A. Christie, Eds.). Barcelona, Spain: Lynx Ediciones.

Campbell, K. F., R.A. Erickson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher Use of Habitats Other Than Coastal Sage Scrub: Conservation and Management Implications. *Western Birds* 29: 421–433. San Diego, CA: Western Field Ornithologists.

Mellink, E. and A.M. Rea. 1994. Taxonomic Status of the California Gnatcatchers of Northwestern Baja California, Mexico. *Western Birds* 25: 50–62. San Diego, CA: Western Field Ornithologists.

Unitt, P. 1984. The Birds of San Diego County (Memoir 13). San Diego, CA: San Diego Society of Natural History.

Psomas. 2022 [in preparation]. *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

———. 2020. *Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas. Santa Ana, CA: Psomas.

U.S. Fish and Wildlife Service (USFWS). 2020 (June 2). Endangered and Threatened Wildlife and Plants; 5 Year Review for the Coastal California Gnatcatcher. USFWS. https://ecos.fws.gov/docs/tess/species_nonpublish/3451/pdf

———. 2016 (August 31). Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to Delist the Coastal California Gnatcatcher. *Federal Register* 81(169): 59952–59975. Washington, D.C.: USFWS. https://www.gpo.gov/fdsys/pkg/FR-2016-08-31/pdf/2016-20864.pdf.

———. 2011 (October 26). Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to Delist the Coastal California Gnatcatcher as Threatened. *Federal Register* 76(207): 66255–66260. Washington, D.C.: USFWS. http://www.gpo.gov/fdsys/pkg/FR-2011-10-26/pdf/2011-27644.pdf.

———. 2010 (September 29). *Coastal California Gnatcatcher (Polioptila californica californica) 5-Year Review: Summary and Evaluation.* Carlsbad, CA: USFWS, Carlsbad Field Office.

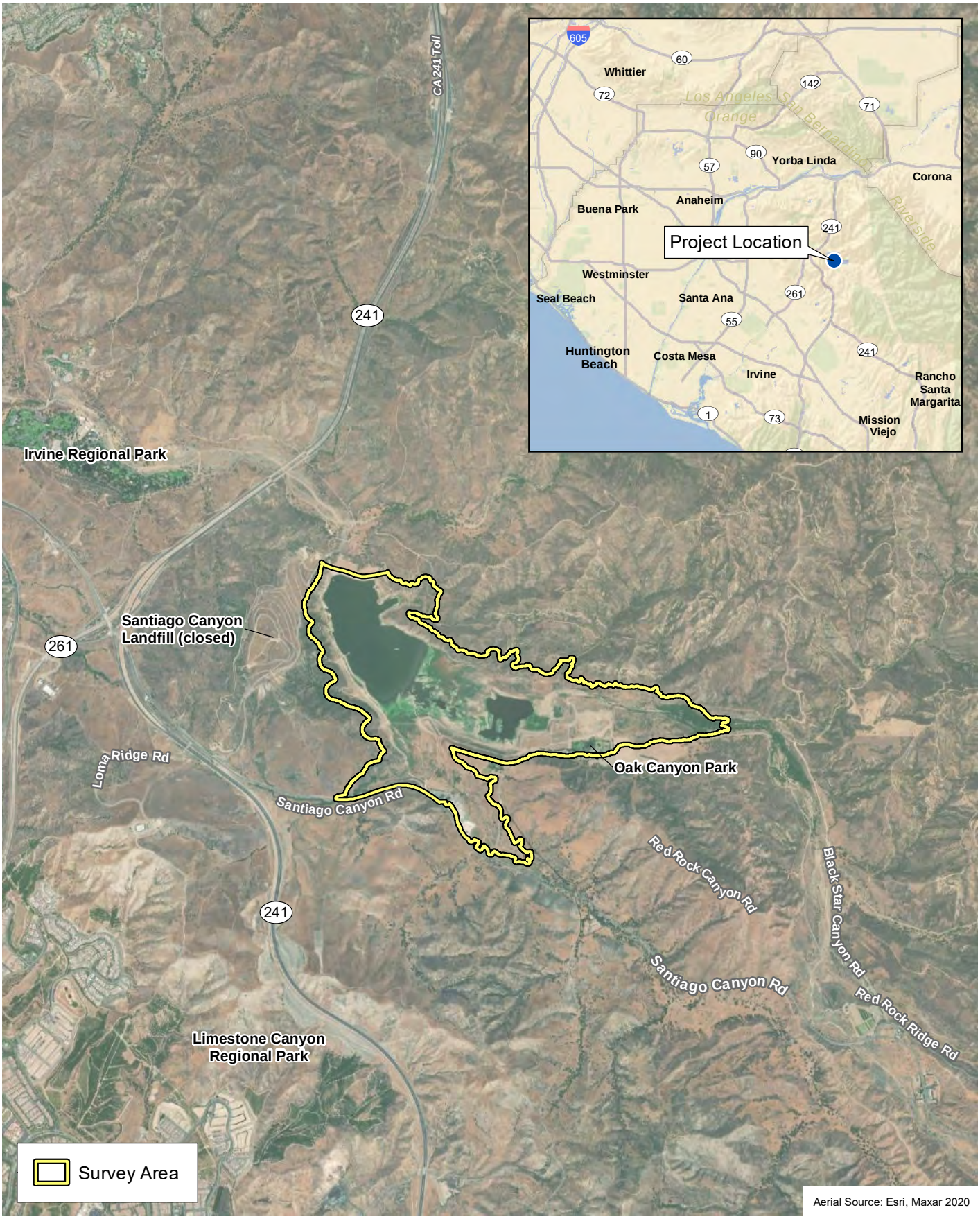
———. 2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.

———. 2003 (April 24). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertibrate Population Segment for the California Gnatcatcher (*Polioptila californica*); Proposed Rule. *Federal Register* 68(79): 20227–20312. Washington, D.C.: USFWS. https://www.fws.gov/policy/library/2003/03-9435.html.

———. 1997a (February 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines.* Washington, D.C.: USFWS.

———. 1997b (July 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Protocol.* Washington, D.C.: USFWS.

Winchell, C.S., and P.F. Doherty. 2008. Using California Gnatcatcher to Test Underlying Models of Habitat Conservation Plans. *Journal of Wildlife Management* 72: 1322–1327. Flagstaff, AZ: The Wildlife Society.



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\CAGN\ex_RL_LV_20220725.mxd

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

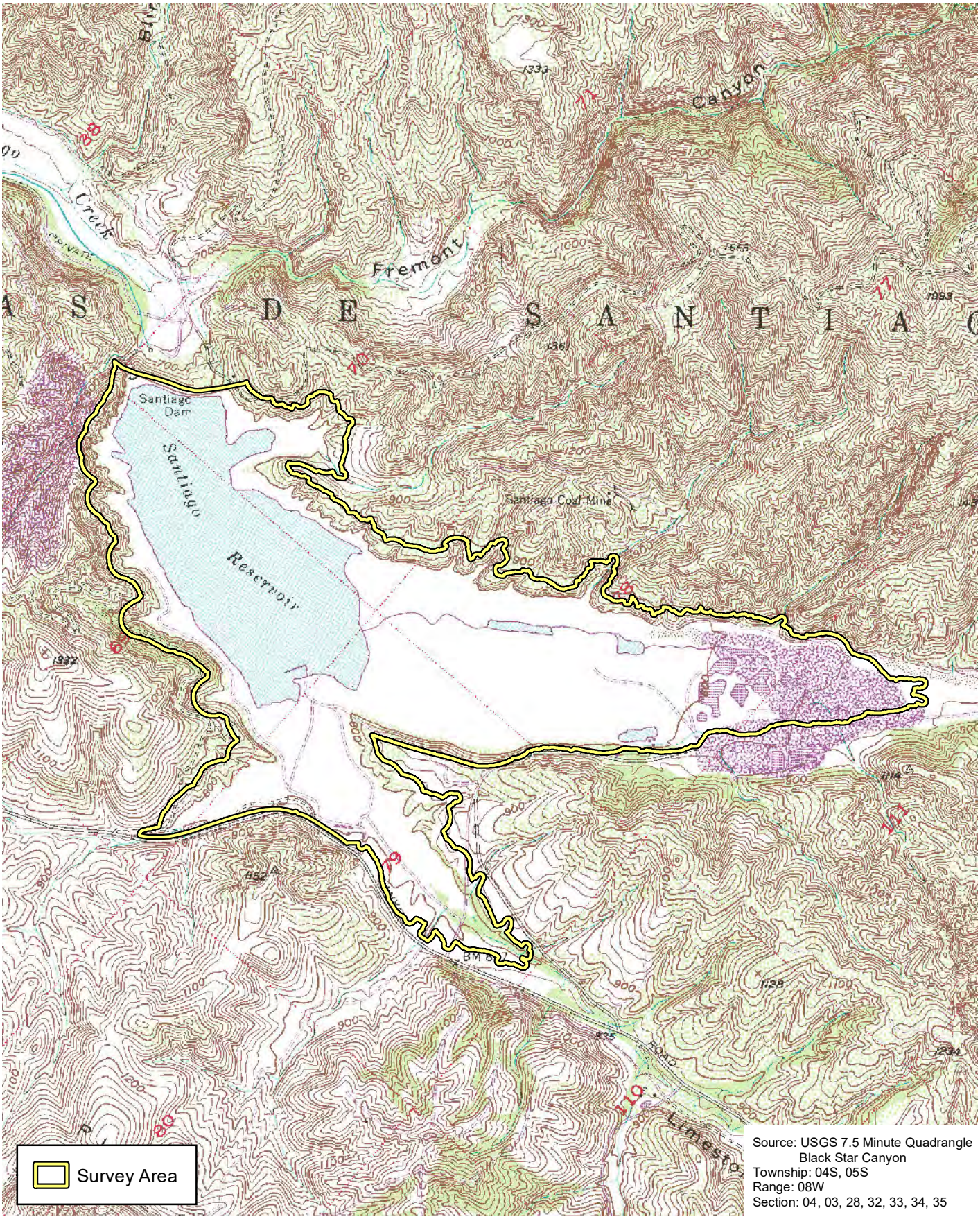
N
W E
S

4,000 2,000 0 4,000

Feet

PSOMAS

(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_RL_LV.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S, 05S
Range: 08W
Section: 04, 03, 28, 32, 33, 34, 35

Coastal California Gnatcatcher Survey Area

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

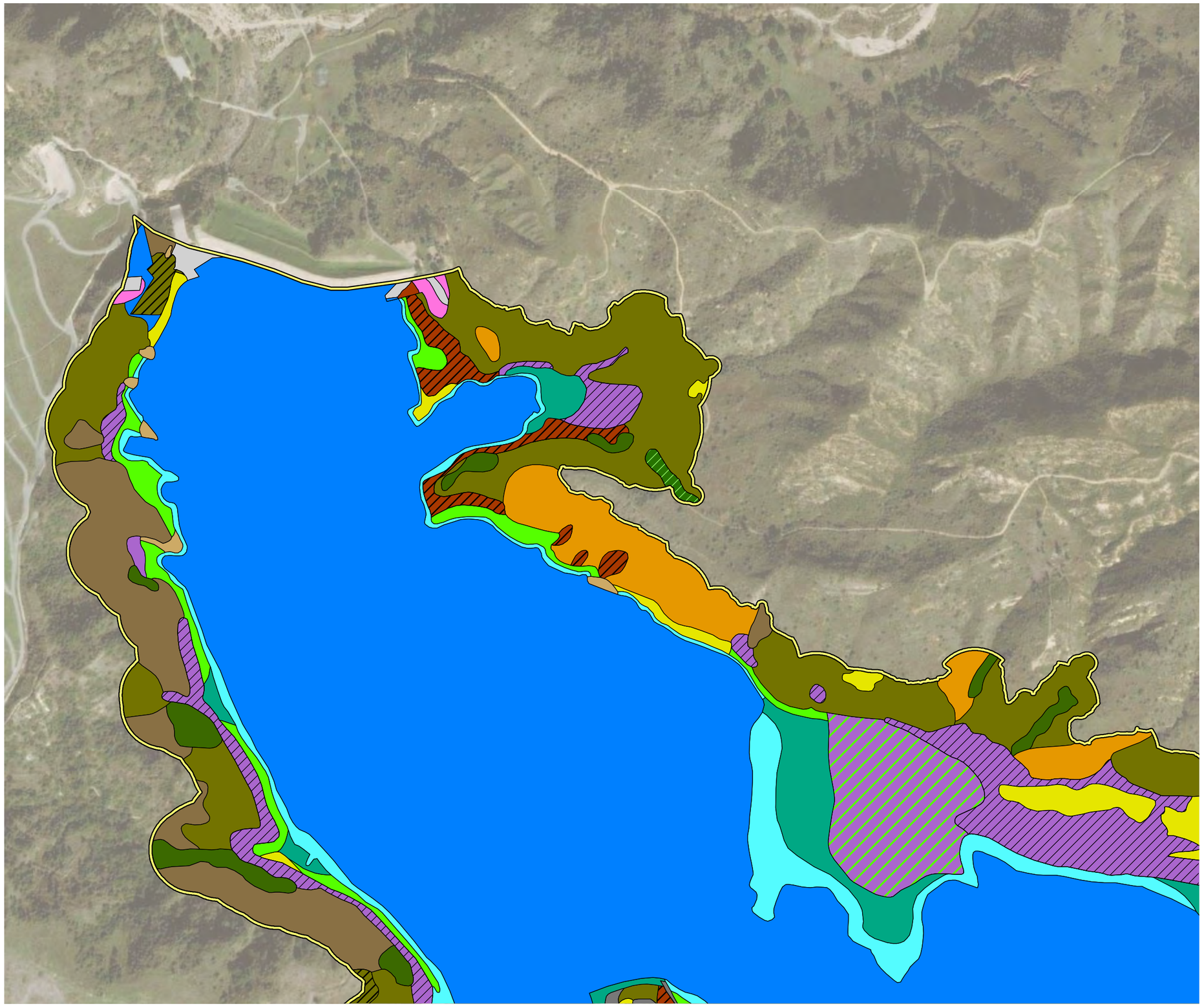
N
W E
S

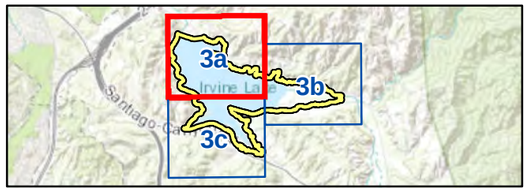
2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 7-25-2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_SurveyArea_USGS.pdf

D:\Projects\3IRW\010200\MXD\CAGN\ex_SurveyArea_USGS_20220725.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600
Feet

Aerial Source: Esri, Maxar 2020

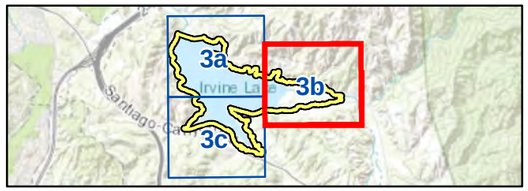
Biological Resources Exhibit 3a

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\CAGN\ex_BioResources_20220720.mxd



Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

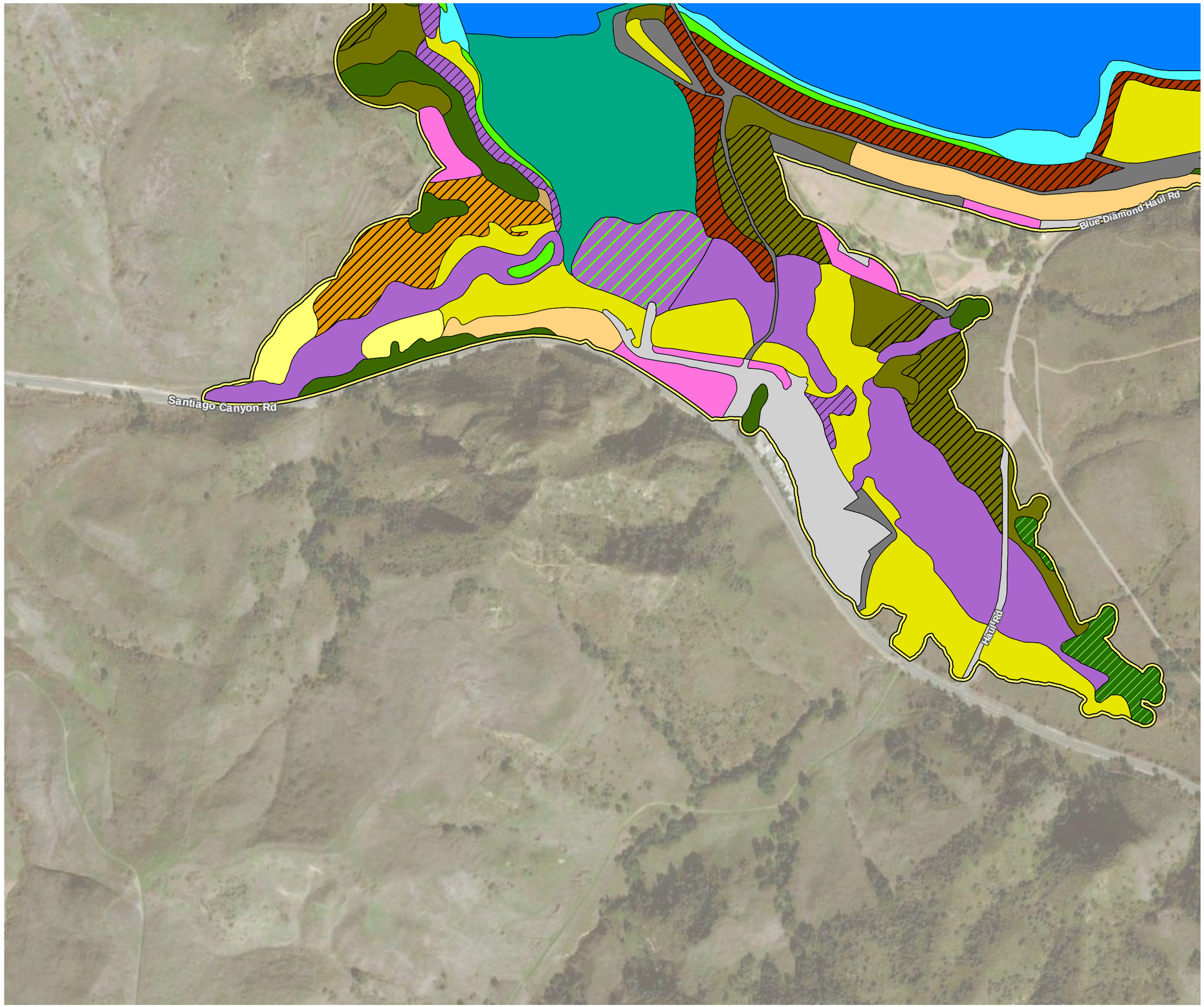
Biological Resources Exhibit 3b

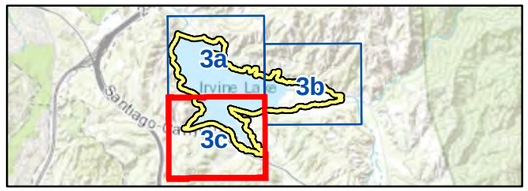
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\CAGN\ex_BioResources_20220720.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

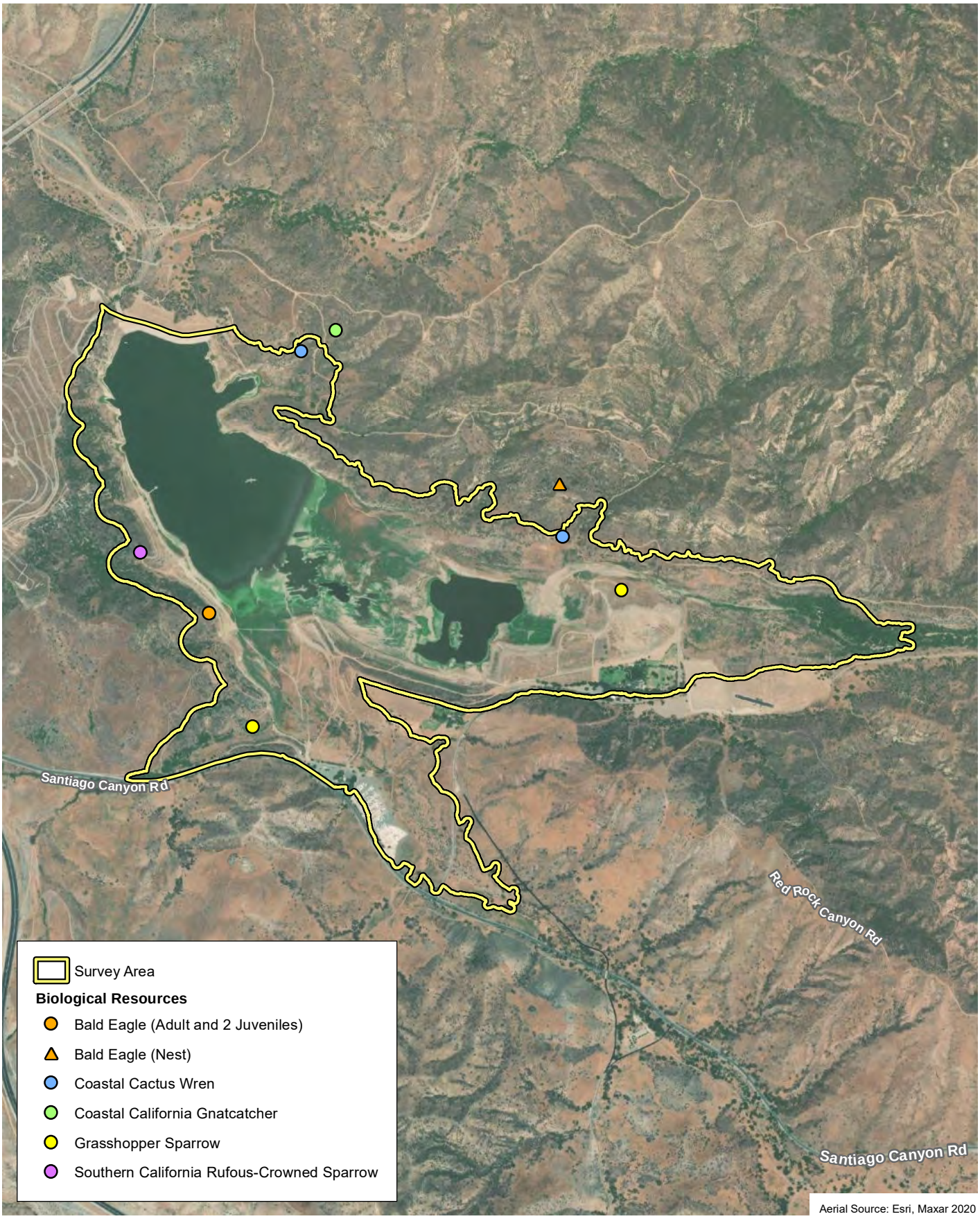
Biological Resources Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\CAGN\ex_BioResources_20220720.mxd



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\CAGN\ex_SurveyArea_Results_20220725.mxd

Survey Area and Results

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

2,000 1,000 0 2,000 Feet

PSOMAS

(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_SurveyArea_Results.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1 – Coastal California gnatcatcher location just outside the northern portion of the survey area, looking northeast.

Photo 2 – Sagebrush scrub located in the eastern portion of the survey area, looking northwest.

D:\Projects\3IRW\010200\GRAPHICS\CAGN\Att_SP1_20220720.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(07/20/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\Att_SP.pdf

Photo 3 – Sagebrush scrub located in the southern portion of the survey area, looking south.

Photo 4 – Sagebrush scrub located in the western portion of the survey area, looking northwest.

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
SNAKES		
COLUBRIDAE – COLUBRID SNAKE FAMILY		
Pituophis catenifer	gopher snake	
BIRDS		
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY		
Branta canadensis	Canada goose	
Anas platyrhynchos	mallard	
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY		
Callipepla californica	California quail	
PODICIPEDIDAE – GREBE FAMILY		
Aechmophorus occidentalis	western grebe	
COLUMBIDAE – PIGEON AND DOVE FAMILY		
Zenaida macroura	mourning dove	
CUCULIDAE – CUCKOO AND ROADRUNNER		
Geococcyx californianus	greater roadrunner	
TROCHILIDAE – HUMMINGBIRD FAMILY		
Calypte anna	Anna's hummingbird	
Selasphorus sasin	Allen's hummingbird	
RALLIDAE – RAIL AND COOT FAMILY		
Fulica americana	American coot	
CHARADRIIDAE – PLOVER FAMILY		
Charadrius vociferus	killdeer	
LARIDAE – GULL AND TERN FAMILY		
Thalasseus elegans	elegant tern	
PHALACROCORACIDAE – CORMORANT FAMILY		
Phalacrocorax auritus	double-crested cormorant	
PELECANIDAE – PELICAN FAMILY		
Pelecanus erythrorhynchos	American white pelican	SSC
ARDEIDAE – HERON FAMILY		
Ardea alba	great egret	
CATHARTIDAE – NEW WORLD VULTURE FAMILY		
Cathartes aura	turkey vulture	
ACCIPITRIDAE – HAWK FAMILY		
Haliaeetus leucocephalus	bald eagle	SE, FP
Buteo lineatus	red-shouldered hawk	
Buteo jamaicensis	red-tailed hawk	
PICIDAE – WOODPECKER FAMILY		
Melanerpes formicivorus	acorn woodpecker	
Picoides nuttallii	Nuttall's woodpecker	
FALCONIDAE – FALCON FAMILY		
Falco sparverius	American kestrel	
TYRANNIDAE – TYRANT FLYCATCHER FAMILY		
Empidonax difficilis	Pacific-slope flycatcher	
Sayornis saya	Say's phoebe	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
Myiarchus cinerascens	ash-throated flycatcher	
Tyrannus vociferans	Cassin's kingbird	
VIREONIDAE – VIREO FAMILY		
Vireo bellii pusillus	least Bell's vireo	FE, SE
CORVIDAE – JAY AND CROW FAMILY		
Aphelocoma californica	California scrub-jay	
Corvus corax	common raven	
ALAUDIDAE – LARK FAMILY		
Eremophila alpestris actia	California horned lark	
HIRUNDINIDAE – SWALLOW FAMILY		
Hirundo rustica	barn swallow	
Petrochelidon pyrrhonota	cliff swallow	
AEGITHALIDAE – BUSHTIT FAMILY		
Psaltriparus minimus	bushtit	
TROGLODYTIDAE – WREN FAMILY		
Troglodytes aedon	house wren	
Thryomanes bewickii	Bewick's wren	
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	SSC
POLIOPTILIDAE – GNATCATCHER FAMILY		
Polioptila caerulea	blue-gray gnatcatcher	
Polioptila californica	California gnatcatcher	FT, SSC
SYLVIIDAE – SILVIID WARBLERS FAMILY		
Chamaea fasciata	wrentit	
TURDIDAE – THRUSH FAMILY		
Sialia mexicana	western bluebird	
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY		
Toxostoma redivivum	California thrasher	
Mimus polyglottos	northern mockingbird	
STURNIDAE – STARLING FAMILY		
*Sturnus vulgaris**	European starling*	
FRINGILLIDAE – FINCH FAMILY		
Haemorhous mexicanus	house finch	
Spinus psaltria	lesser goldfinch	
Spinus lawrencei	Lawrence's goldfinch	
PASSERELLIDAE – NEW WORLD SPARROW FAMILY		
Ammodramus savannarum	grasshopper sparrow	SSC
Zonotrichia leucophrys	white-crowned sparrow	
Melospiza melodia	song sparrow	
Melozone crissalis	California towhee	
Aimophila ruficeps	rufous-crowned sparrow	
Pipilo maculatus	spotted towhee	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
ICTERIIDAE – YELLOW-BREASTED CHAT FAMILY		
Icteria virens	yellow-breasted chat	SSC
ICTERIDAE – BLACKBIRDS AND ORIOLES		
Sturnella neglecta	western meadowlark	
Icterus cucullatus	hooded oriole	
Agelaius phoeniceus	red-winged blackbird	
PARULIDAE – WOOD-WARBLER FAMILY		
Geothlypis trichas	common yellowthroat	
Setophaga petechia	yellow warbler	SSC
Setophaga coronata	yellow-rumped warbler	
CARDINALIDAE – CARDINALS AND ALLIES		
Pheucticus melanocephalus	black-headed grosbeak	
Passerina caerulea	blue grosbeak	
Passerina amoena	lazuli bunting	
MAMMALS		
SCIURIDAE – SQUIRREL FAMILY		
Otospermophilus beecheyi	California ground squirrel	
GEOMYIDAE – POCKET GOPHER FAMILY		
Thomomys bottae	Botta's pocket gopher	
LEPORIDAE – HARE AND RABBIT FAMILY		
Sylvilagus audubonii	desert cottontail	
CANIDAE – CANID FAMILY		
Canis latrans	coyote	
CERVIDAE – CERVID FAMILY		
Odocoileus hemionus	southern mule deer	

USFWS: U.S. Fish and Wildlife Service

Species Status:

Federal (USFWS)	State (CDFW)
FE Endangered	SE Endangered
FT Threatened	FP Fully Protected
	SSC Species of Special Concern

ATTACHMENT C

CNDDB FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0011
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Pelecanus erythrorhynchos*

Common name: American white pelican

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Additionally observed during second survey on April 14, 2022.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation: Identified visually

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidentally observed during focused gnatcatcher surveys.

Total number of individuals: 6

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
6				

Age class comment: Six adults flew into the reservoir during focused survey

Bird site use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek

☐ Non-breeding (over-wintering) ☐ Communal roost ☑ Other

Site use description: Used for foraging

What was the observed behavior? Six adults flew into the site, landed in the reservoir and began foraging.

Describe any evidence of reproduction: None

SITE INFORMATION

Habitat description: open water/reservoir

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

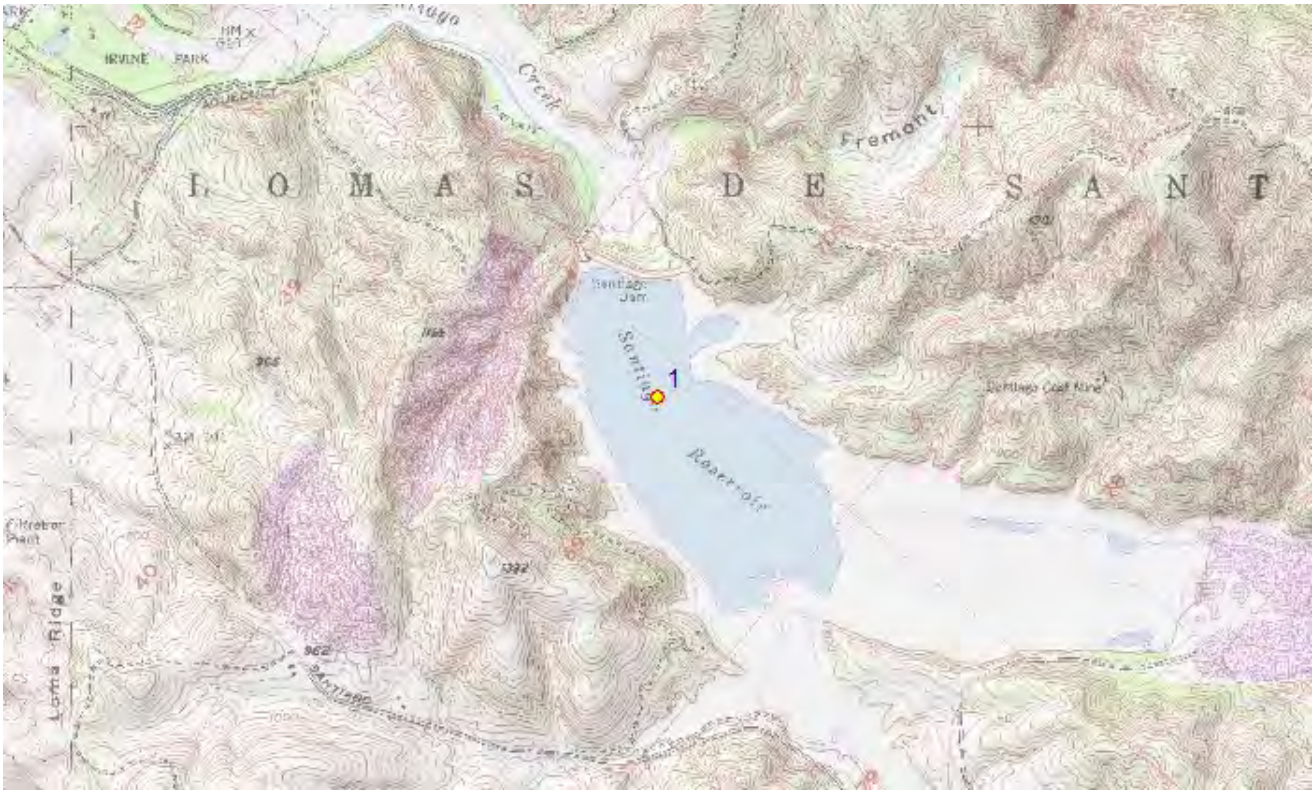
Immediate & surrounding land use: Open space, Santiago Dam and Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.78141	-117.72398	432970	3738155	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	American white pelican						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes: Point represents 6 individuals

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0015
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Haliaeetus leucocephalus*

Common name: bald eagle

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Individuals observed during subsequent surveys on April 14, and June 9, 2022

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Observed during focused gnatcatcher surveys

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2	2			

Age class comment: Pair had a nest with 2 nestlings

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Nesting and foraging

What was the observed behavior? Pair was observed at the nest location along with 2 older nestlings

Describe any evidence of reproduction: Nest with nestlings was observed

SITE INFORMATION

Habitat description: Ornamental trees with surrounding sagebrush scrub and grassland

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	926	33.78037	-117.70476	434749	3738027	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	BAEA approximate nest location						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes: Point represents the approximate nest location.

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0012
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Campylorhynchus brunneicapillus sandiegensis*

Common name: coastal cactus wren

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Observed/detected during subsequent surveys on April 14, and June 9, 2022

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Observed incidentally during focused gnatcatcher surveys

Total number of individuals: 2

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2				

Age class comment: Observed 2 adult individuals at separate locations.

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Used for nesting and foraging

What was the observed behavior? Both individuals were observed singing from cactus patches.

Describe any evidence of reproduction: One nest was observed

SITE INFORMATION

Habitat description: sagebrush scrub

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam and Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	837	33.78538	-117.71838	433492	3738592	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	coastal cactus wren						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes: Point represents one individual detected through vocalization. This location also includes a nest (status unknown). The second individual was detected through vocalization at a separate location at 33.777009, -117.698625

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0014
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Ammodramus savannarum*

Common name: grasshopper sparrow

Date of field work (mm-dd-yyyy): 04-19-2022

Comment about field work date(s): Both pairs observed on subsequent visit on June 19, 2022.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Observed during focused gnatcatcher surveys

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
4				

Age class comment: Two pairs observed

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Used for nesting and foraging

What was the observed behavior? Both pairs were flushed from grassland areas. Males were both detected initially through vocalizations.

Describe any evidence of reproduction: Assumed nesting due to behavior (ie, males singing and female flushed out of dense vegetation).

SITE INFORMATION

Habitat description: Annual grassland

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.76985	-117.72054	433279	3736871	11
1	**Public Land Survey**	**Feature Comment**						
	S T05S R08W 4	GHSP pair						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes: Point represents one pair of grasshopper sparrows (assumed nesting due to behavior ie flushed out of thick grassland area). Second pair was observed on multiple occasions at 33.775723, -117.702390

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code MES22F0013
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Aimophila ruficeps canescens*

Common name: southern California rufous-crowned sparrow

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Observed on subsequent survey on June 9, 2022.

OBSERVER INFORMATION

Observer: Lindsay A. Messett
Affiliation: Psomas
Address: 7236 E Stearns Street , Long Beach, CA 90815
Email: lindsay.messett@psomas.com
Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:
Compared w/ specimen at:
Compared w/ image in:
By another person:
Other: Familiarity with the species
Identification explanation:
Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Observed while conducting focused gnatcatcher surveys.

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2				

Age class comment: Pair detected singing within sagebrush scrub

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Used for nesting and foraging

What was the observed behavior? Pair was detected singing, calling and foraging together

Describe any evidence of reproduction: No evidence of active nesting was observed

SITE INFORMATION

Habitat description: sagebrush scrub

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

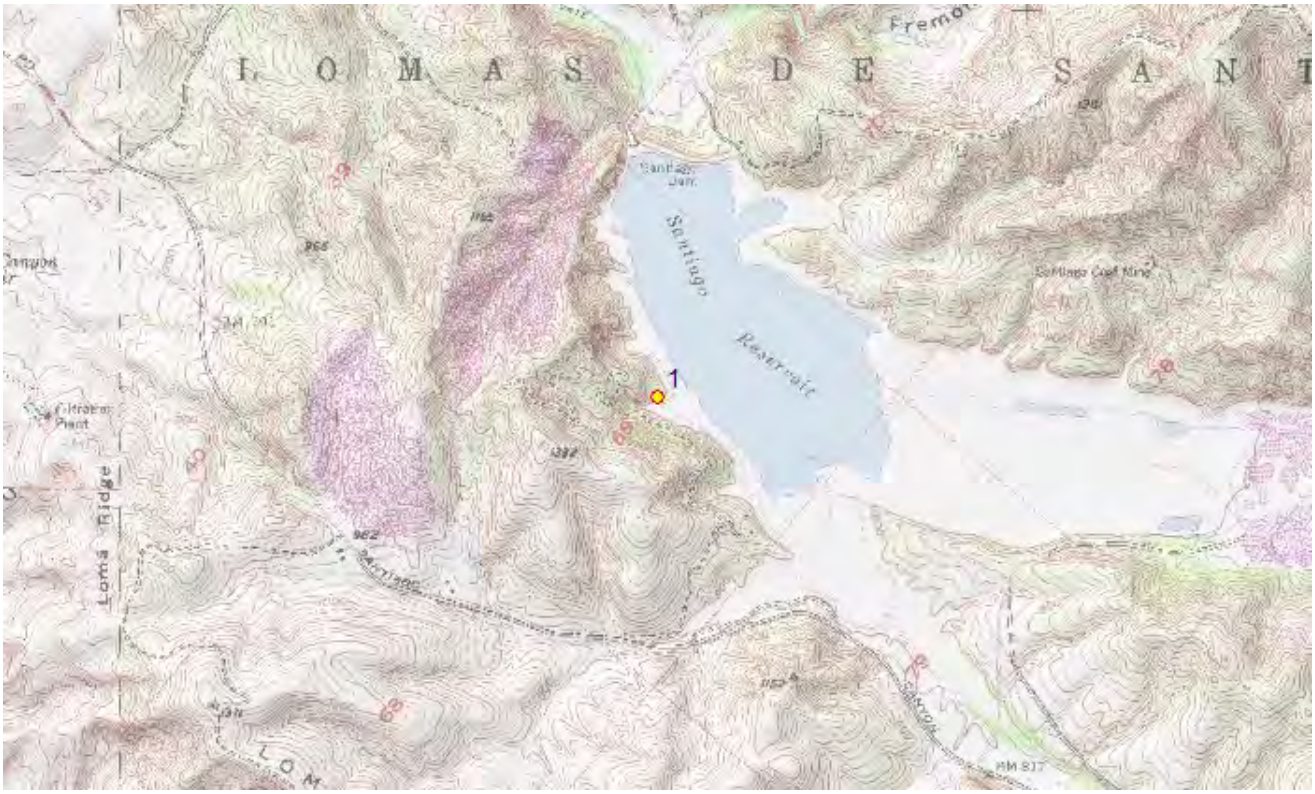
Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	806	33.77700	-117.72622	432759	3737668	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 33	RCSP pair						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes:

Location/directions comments:

Attachment(s):

APPENDIX K

LEAST BELL'S VIREO/SOUTHWESTERN WILLOW FLYCATCHER SURVEYS

August 26, 2020

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Christine Beck
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

Christine.Beck@wildlife.ca.gov

Subject: Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love and Ms. Beck:

This Letter Report presents the results of focused surveys for the least Bell's vireo (*Vireo bellii pusillus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the least Bell's vireo on or immediately adjacent to the project site. Surveys were conducted by a Biologist with the necessary experience and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS). Notification of the intent to conduct protocol-level surveys was submitted to California Department of Fish and Wildlife (CDFW) on April 8, 2020.

PROJECT LOCATION AND DESCRIPTION

The Irvine Ranch Water District (IRWD) and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the early design phase but would be located within the project site provided by IRWD.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project site is depicted on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography in the center of the survey area is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 657 to 898 feet above mean sea level (msl). Santiago Creek, a blueline stream,

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

occurs in the survey area. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The following vegetation types and other areas occur within the project site: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed (Exhibit 3).

SURVEY AREA

The survey area for the least Bell's vireo surveys includes all suitable habitat (i.e., southern willow scrub and mule fat scrub) on the project site and within a 500-foot buffer north of the project site along Santiago Creek. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, least Bell's vireo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats occur along Santiago Creek downstream from the existing spillway and within the low flow channel of the creek. These habitat types were generally dominated by arroyo willow (*Salix lasiolepis*) and mule fat (*Baccharis salicifolia* ssp. *salicifolia*), with scattered white alder (*Alnus rhombifolia*), western sycamore (*Platanus racemosa*), and Fremont cottonwood (*Populus fremontii* ssp. *fremontii*). California sagebrush (*Artemisia californica*), flatsedge (*Cyperus* sp.), non-native fennel (*Foeniculum vulgare*), mustards (*Hirschfeldia* spp. and *Brassica* spp.), and non-native grasses (*Avena* spp. and *Bromus* spp.) also occur in these areas. Additionally, a depression in the streambed holds standing water surrounded by cattails (*Typha* sp.). Site photographs of representative habitat in the survey area are provided in Attachment A.

SPECIES BACKGROUND

Least Bell's Vireo

Least Bell's vireo is a federally and State listed Endangered species. It is one of four subspecies of the Bell's vireo (*Vireo bellii*); this subspecies is the westernmost of the four subspecies, breeding entirely in southwestern California and northwestern Baja California, Mexico. Although not well known, the winter range of the least Bell's vireo is believed to be the west coast of Central America from southern Sonora, Mexico, south to northwestern Nicaragua, including the cape region of Baja California, Mexico (Brown 1993). The least Bell's vireo arrives in southern California from mid-March to early April and departs for its wintering grounds in August to mid-September.

The least Bell's vireo is a small, gray migratory songbird that is about 4.5 to 5 inches long. It has short, rounded wings and a short, straight bill for catching insects. Feathers are gray above and pale below. "The least Bell's vireo is easily recognized on the breeding grounds by its distinctive song" (Coues 1903).

Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males (USFWS 1998).

Least Bell's vireos consume a "wide variety of insects including bugs, beetles, grasshoppers, moths, and particularly caterpillars" (Chapin 1925; Bent 1950). They obtain prey through foliage gleaning (i.e., picking prey from leaves or bark) and through hovering (i.e., removing prey from vegetation surfaces while fluttering in the air) (Salata 1983; Miner 1989). Vireos will forage in all layers of the canopy but tend to concentrate their foraging in the lower to mid-strata from 9 to 18 feet in height (Miner 1989). Vireos forage in both riparian and adjacent upland habitat (Salata 1983; Kus and Miner 1987).

The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) and prefers early-successional habitat. On its breeding grounds, it typically inhabits structurally diverse woodlands along watercourses. In California, least Bell's vireo habitat consists of southern willow scrub, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, and cottonwood bottomland forest (Faber et al. 1989). Although least Bell's vireos typically nest in willow-dominated areas, plant species composition does not appear to be as important in nest site selection as habitat structure (USFWS 1998). The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately 3 to 6 feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989). This structure is typically met by willows that are between four and ten years of age (RECON 1988; Franzreb 1989). As stands mature, the tall canopy tends to shade out the shrub layer, making the sites less suitable for nesting; however, least Bell's vireos will continue to use such areas if patches of understory exist (USFWS 1998). Vireo nest placement tends to occur in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs (USFWS 1998). The riparian ecosystems required by the vireo are dynamic systems; and the scouring of vegetation during periodic floods is required to create the low, dense vegetation favored by the bird (USFWS 1986).

Males arrive on the breeding grounds about one week prior to females, and older birds arrive before first-year birds. Pair formation occurs within a few days, and pairs build a nest together over the next four to five days. The typical clutch size for least Bell's vireo is four eggs, which are incubated for approximately 14 days. The young remain in the nest for approximately 10 to 12 days. Adults continue to care for the young for at least two weeks post-fledging, as the family groups forage over larger areas. The largest causes of least Bell's vireo nest failure are nest parasitism by brown-headed cowbird (*Molothrus ater*) and egg predation; nests also fail due to vegetation clearing, trampling by humans and cattle, ant infestations, and rainstorms. Least Bell's vireo will make up to five nesting attempts per season, assuming adequate energy resources; typically, a pair will successfully fledge young from one to two nests per season. Few nests are initiated after mid-July (USFWS 1998). The least Bell's vireo often shows a strong site fidelity, returning not just to the same drainage and the same territory but even to the same tree where it previously nested. However, vireos may move locations due to habitat loss or failure to attract a mate (USFWS 1998).

The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). At the time of its listing, the least Bell's vireo had been eliminated from 95 percent of its former range (USFWS 1986). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Loss of riparian habitat has been attributed to flood control and water development projects, agricultural development, livestock grazing, spread of invasive exotic plant species, degradation of habitat by off-road vehicles, and urban development. With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). Vireos have also expanded their range into areas where they were formerly extirpated.

On February 2, 1994, the USFWS issued their final determination of Critical Habitat for the least Bell's vireo, identifying approximately 37,560 acres as Critical Habitat in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties (USFWS 1994). The project site is not located in designated Critical Habitat for this species.

SURVEY METHODS

The USFWS protocol for the least Bell's vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). Psomas Senior Biologist Lindsay Messett conducted all focused surveys for least Bell's vireo. Surveys were conducted on April 30, May 12 and 27, June 9, and 25, and July 6, 17, and 28, 2020.

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos detected were recorded with a Global Positioning System (GPS) unit (Garmin Vista) or an iPad. Although not required during a presence/absence survey, time was also taken to visually observe any individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions and during early morning hours when bird activity is at its peak (Table 1). It should be noted that the timing of a few of the surveys began later because on these mornings, Ms. Messett was surveying for coastal California gnatcatcher (*Polioptila californica californica*) in the adjacent upland habitat. If a least Bell's vireo was singing during the gnatcatcher survey, Ms. Messett likely would have heard it in the adjacent riparian habitat. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird). A complete list of wildlife species observed during the surveys is included in Attachment B.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
LEAST BELL'S VIREO SURVEYS

Survey Dates	Surveyors	Time	Air Temperature (°F) (Start/End)		Cloud Cover (Start/End)	Wind (mph) (Start/End)
April 30	Messett	10:00 AM – 11:30 AM	71	75	50/Clear	0–1/0–1
May 12	Messett	7:30 AM – 11:00 AM	61	69	10/80	0–1/0–1
May 27	Messett	6:30 AM – 8:15 AM	65	76	10/Clear	0–1/0–2
June 9	Messett	6:50 AM – 10:45 AM	70	91	Clear/Clear	0–1/1–2
June 25	Messett	10:00 AM – 11:40 AM	68	77	90/40	0–1/0–1
July 6	Messett	6:45 AM – 10:30 AM	68	83	10/Clear	0–1/1–3
July 17	Messett	7:00 AM – 10:10 AM	67	74	100/Clear	0–1/0–1
July 28	Messett	6:40 AM – 10:25 AM	65	70	Clear/Clear	0–1/1–2

SURVEY RESULTS

Least Bell's Vireo

No least Bell's vireo were observed in the survey area over the course of the surveys.

Following completion of the survey on July 17, 2020, Ms. Messett was incidentally observed a male least Bell's vireo when she was opening the gate to leave through Irvine Regional Park. The gate and vireo observation are located approximately one-mile northwest of the survey area. The male vireo was observed singing continuously (indicating that he was likely not paired) and foraging within a coast live oak (*Quercus agrifolia*) just within the boundary of Irvine Regional Park. A California Natural Diversity Database (CNDDB) form will be submitted online by Ms. Messett but one is not included in this report because of the distance from the survey area.

The required Least Bell's Vireo Survey Data Summary Form is included in Attachment C. The incidental vireo observation is not included in this form because of its distance from the survey area. Additionally, the area of the incidental observation was not systematically surveyed so it is unknown if this male was a transient male or if he maintained a territory over the breeding season.

Other Observations

Two sensitive species were observed and/or detected in the survey area during the surveys: coastal California gnatcatcher and coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*). The coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. The coastal cactus wren is a California Species of Special Concern. Both species were observed and/or detected during multiple surveys. CNDDB forms documenting these species will be submitted online by Ms. Messett and are included with the Results of Coastal California Gnatcatcher Survey Report (Psomas 2020).

Brown-headed cowbirds were not observed in the survey area during the surveys.

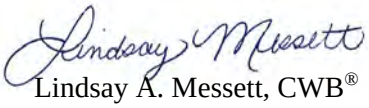
Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this Survey Report and enclosed exhibits fully and accurately represents my work.



Lindsay A. Messett, CWB®
Senior Biologist (TE 067064-3)

Enclosures: Exhibits 1–4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – Least Bell's Vireo Survey Data Summary Form

cc: Jo Ann Corey, corey@irwd.com
Jacob Moeder, Moeder@irwd.com

R:\Projects\IRW_IRWD\3IRW000905\Documentation\LBV\Santiago_LBV Report-082620.docx

REFERENCES

Bent, A.C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. National Museum Bulletin 197, 41 pp.

Brown, B.T. 1993. Bell's Vireo (*Vireo bellii*). *The Birds of North America, No. 35* (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia, PA and Washington, D.C.: The Academy of Natural Sciences and AOU (respectively).

Chapin, E. 1925. Food habits of the vireos; a family of insectivorous birds. Bulletin.1355: 1–44. Washington, D.C.: United States Department of Agriculture.

Coues, E. 1903. Key to North American birds (5th ed.). Boston, MA: The Page Co.

Faber, P., E. Keller, A. Sands, B. Massey. 1989. *The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile* (Biological Report 85 [7.27]). Washington, D.C: U.S. Fish and Wildlife Service, Research and Development, National Wetlands Research Center.

Franzreb, K.E. 1989. *Ecology and Conservation of the Endangered Least Bell's Vireo* (Biological Report 89[1]). Sacramento, CA: USFWS, Endangered Species Office.

Goldwasser, S. 1981. *Habitat Requirements of the Least Bell's Vireo* (Final Report, Job IV-38.1). Sacramento, CA: CDFG.

Gray, V. And J. Greaves. 1981 (September). The Riparian Forest as Habitat for the Least Bell's Vireo (*Vireo bellii pusillus*). Paper presented at the California Riparian Systems Conference, University of California, Davis.

Kus, B.E., and K.L. Miner. 1987. Foraging behavior of the least Bell's vireo: use of riparian and non-riparian habitats. San Diego State University, San Diego, CA. 22 pp. Unpubl. Rep.

Miner, K. L. 1989. Foraging ecology of the Least Bell's Vireo, Vireo bellii pusillus. Tesis de Maestria. San Diego State University. San Diego, California. USA.

Psomas. 2020 (August 24). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California.* Santa Ana, CA: Psomas.

Regional Environmental Consultants (RECON). 1989. Comprehensive Species Management Plan for the Least Bell's Vireo (*Vireo bellii pusillus*). Prepared for San Diego Association of Governments, San Diego.

———. 1988. Draft Comprehensive Species Management Plan for the Least Bell's Vireo (Prepared for the San Diego Association of Governments). San Diego, CA: RECON.

Salata, L.R. 1983. *Status of the Least Bell's Vireo on Camp Pendleton, California: Report on Research Done in 1983*. Laguna Niguel, CA: USFWS.

———. 1981. Least Bell's vireo research, Camp Pendleton Marine Corps Base, San Diego County, California, 1981. Unpubl. Rept., Natural Resources Officer, Camp Pendleton.

U.S. Fish and Wildlife Service (USFWS). 2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.

———. 1998 (May 6). *Draft Recovery Plan for the Least Bell's Vireo*. USFWS, Portland, OR. 139 pp.

———. 1994 (February 2). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Least Bell's Vireo. *Federal Register* 59(22): 4845–4867. Washington, D.C.: USFWS.

———. 1986 (May 2). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Least Bell's Vireo. *Federal Register* 51(85):16474–16482. Washington, D.C.: USFWS.

D:\Projects\3IRW\00905\MXD\LBV\ex_LV_RL_20200824.mxd

Project Location

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

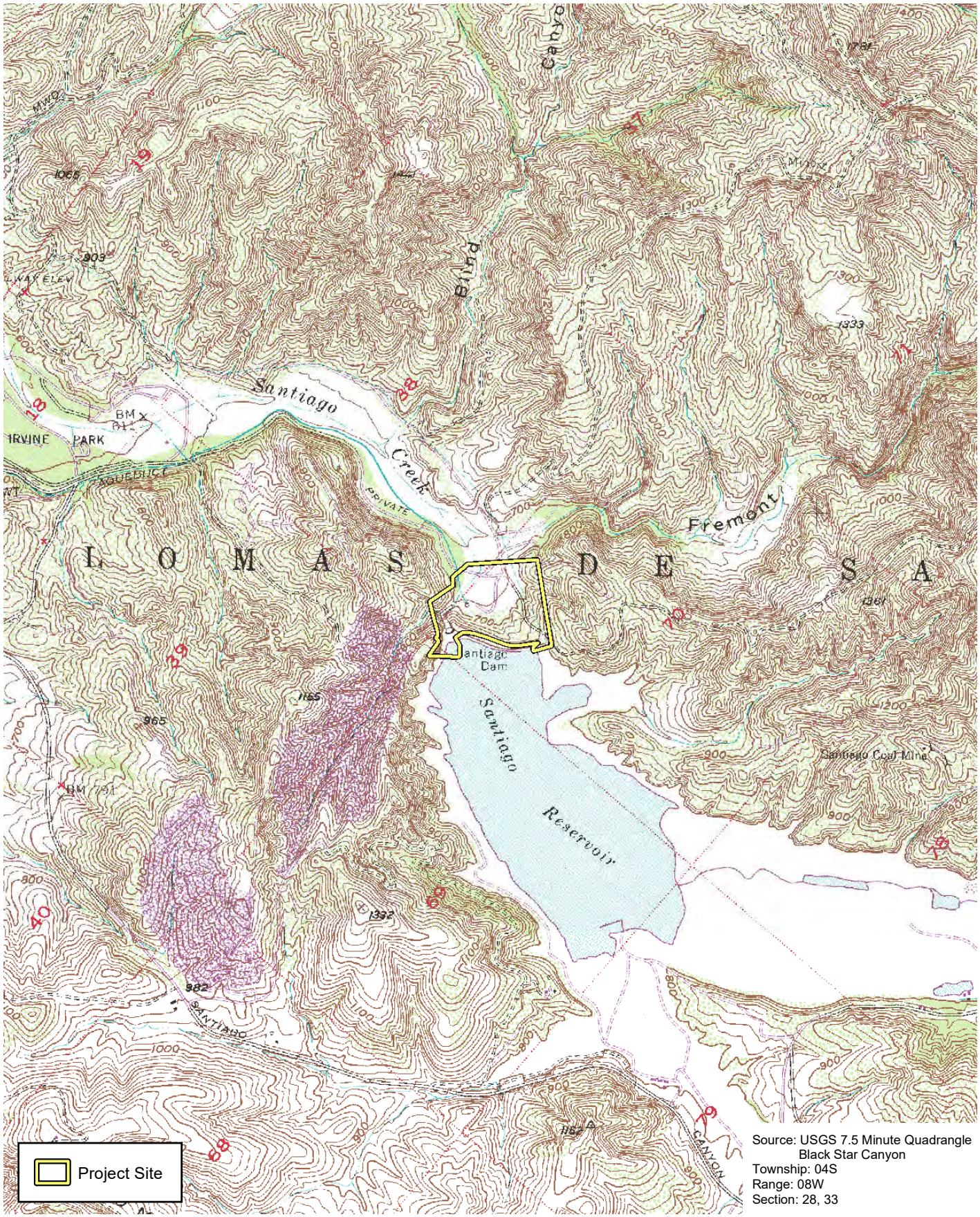
N
W E
S

1,100 550 0 1,100

Feet

PSOMAS

(Rev: 8-24-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\ex_LV_RL.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S
Range: 08W
Section: 28, 33

D:\Projects\3IRW\0905\MXD\LBV\ex_USGS_20200824.mxd

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 2

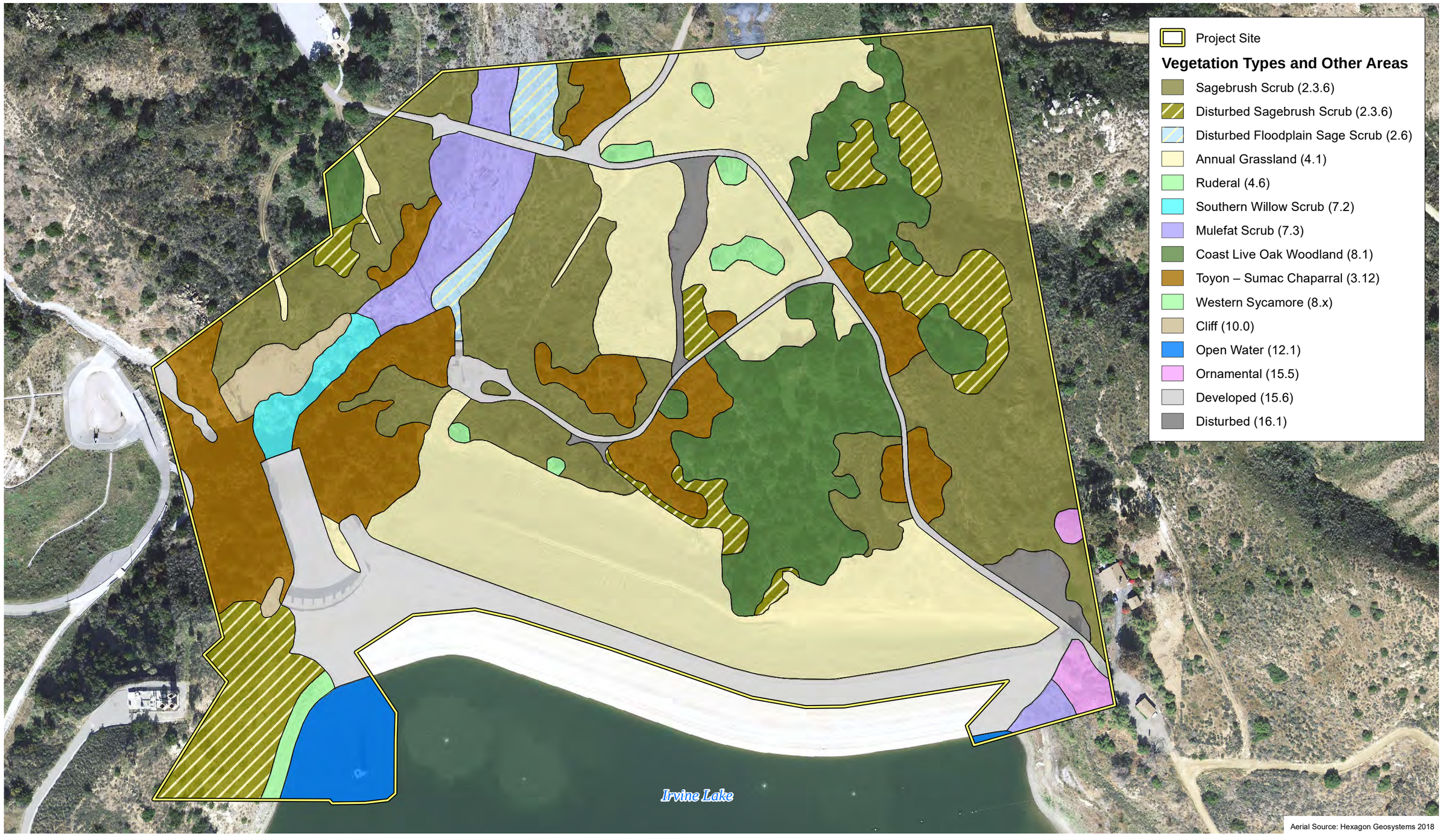
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 8-24-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\ex_USGS.pdf



D:\Projects\3IRW\000905\MXD\LBV\ex_Vegetation_20200824.mxd

Vegetation Types and Other Areas

Exhibit 3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

175 87.5 0 175 Feet

PSOMAS

(Rev: 08/24/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\ex_Vegetation.pdf

D:\Projects\3IRW000905\MXD\LBV\ex_BiologicalResources_20200824.mxd

Survey Area and Biological Resources

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

250 125 0 250
Feet

PSOMAS

(Rev: 08/25/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\ex_SurveyArea_BiologicalResources.pdf

ATTACHMENT A

SITE PHOTOGRAPHS

Photo 1: Southern willow scrub located in the western portion of the survey area, looking southwest.

Photo 2: Mulefat scrub located in the western portion of the survey area, looking southwest.

D:\Projects\3IRW\00905\GRAPHICS\LBV\AttA-1_SitePhotographs.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/24/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\AttA_SitePhotographs.pdf

Photo 3: Mulefat scrub located in the northern portion of the survey area, looking north.

Photo 4: Overview of mulefat scrub located in the western portion of the survey area, looking west.

D:\Projects\3IRW\00905\GRAPHICS\LBV\AttA-2_SitePhotographs.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/24/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\AttA_SitePhotographs.pdf

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE SPECIES OBSERVED DURING THE SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
BIRDS		
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY		
Branta canadensis	Canada goose	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY		
Callipepla californica	California quail	
COLUMBIDAE - PIGEON AND DOVE FAMILY		
*Columba livia**	rock pigeon	
Zenaida macroura	mourning dove	
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY		
Geococcyx californianus	greater roadrunner	
CAPRIMULGIDAE - NIGHTJAR FAMILY		
Chordeiles acutipennis	lesser nighthawk	
TROCHILIDAE - HUMMINGBIRD FAMILY		
Calypte anna	Anna's hummingbird	
Selasphorus rufus	rufous hummingbird	
CATHARTIDAE - NEW WORLD VULTURE FAMILY		
Cathartes aura	turkey vulture	
ACCIPITRIDAE - HAWK FAMILY		
Buteo jamaicensis	red-tailed hawk	
TYTONIDAE - BARN OWL FAMILY		
Tyto alba	barn owl	
STRIGIDAE - TYPICAL OWL FAMILY		
Bubo virginianus	great horned owl	
PICIDAE - WOODPECKER FAMILY		
Melanerpes formicivorus	acorn woodpecker	
PSITTACIDAE - PARROT FAMILY		
*Amazona viridigenalis**	red-crowned parrot*	
TYRANNIDAE - TYRANT FLYCATCHER FAMILY		
Myiarchus cinerascens	ash-throated flycatcher	
Tyrannus vociferans	Cassin's kingbird	
VIREONIDAE - VIREO FAMILY		
Vireo gilvus	warbling vireo	
CORVIDAE - JAY AND CROW FAMILY		
Aphelocoma californica	California scrub-jay	
Corvus brachyrhynchos	American crow	
HIRUNDINIDAE - SWALLOW FAMILY		
Petrochelidon pyrrhonota	cliff swallow	
Hirundo rustica	barn swallow	
AEGITHALIDAE - BUSHTIT FAMILY		
Psaltriparus minimus	bushtit	
TROGLODYTIDAE - WREN FAMILY		
Troglodytes aedon	house wren	
Thryomanes bewickii	Bewick's wren	
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	SSC

WILDLIFE SPECIES OBSERVED DURING THE SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
POLIOPTILIDAE - GNATCATCHER FAMILY		
Polioptila caerulea	blue-gray gnatcatcher	
Polioptila californica	California gnatcatcher	FT, SSC (subsp. californica)
SYLVIIDAE - SILVIID WARBLERS FAMILY		
Chamaea fasciata	wrentit	
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY		
Toxostoma redivivum	California thrasher	
Mimus polyglottos	northern mockingbird	
STURNIDAE - STARLING FAMILY		
*Sturnus vulgaris**	European starling*	
FRINGILLIDAE - FINCH FAMILY		
Haemorhous mexicanus	house finch	
Spinus psaltria	lesser goldfinch	
PASSERELLIDAE - NEW WORLD SPARROW FAMILY		
Pipilo maculatus	spotted towhee	
Melozone crissalis	California towhee	
Melospiza melodia	song sparrow	
ICTERIDAE - BLACKBIRDS AND ORIOLES		
Icterus cucullatus	hooded oriole	
PARULIDAE - WOOD-WARBLER FAMILY		
Geothlypis trichas	common yellowthroat	
Cardellina pusilla	Wilson's warbler	
CARDINALIDAE - CARDINALS AND ALLIES		
Piranga ludoviciana	western tanager	
Pheucticus melanocephalus	black-headed grosbeak	
MAMMALS		
SCIURIDAE - SQUIRREL FAMILY		
Otospermophilus beecheyi	California ground squirrel	
LEPORIDAE - HARE AND RABBIT FAMILY		
Sylvilagus audubonii	desert cottontail	

USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife

* Non-native

Species Status:

Federal (USFWS)	**State (CDFW)**
FT Threatened	SSC Species of Special Concern

ATTACHMENT C

LEAST BELL'S VIREO SURVEY DATA SUMMARY FORM

LEAST BELL'S VIREO SURVEY DATA SUMMARY

Site Information

Project Title:	Santiago Creek Dam Outlet Tower and Spillway Improvement Project
Landowner:	County of Orange

Survey Information

Surveyors:	Lindsay Messett	Year:	2020

Survey Begin Coordinates		Survey End Coordinates		Datum
Northing:	3738817	Northing:	3739165	NAD83
Easting:	432635	Easting:	432774	NAD 83

Survey Length (Km)	Total Number of Surveys	Total Number of Survey Hours
0.40	8	21.0

Least Bell's Vireo Detection Information

Number of males that were:

Paired:	0	Based on observation of female, nest, young, or nesting behavior (nest-building, food carrying).
Undetermined Status:	0	The total number of resident males not confirmed as paired.
Transient:	0	Only detected once despite repeated surveys, or were not detected at the same location for more than 2 weeks.
Total number of males:	0	The sum of the three categories above.

Coordinates for LBVI Territories (continue on second sheet if necessary)

Territory ID	Northing	Easting	Status/Comments (e.g. paired)

September 27, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

David Mayer
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
David.Mayer@wildlife.ca.gov

Subject: Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love and Mr. Mayer:

This Letter Report presents the results of focused surveys for the least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the least Bell's vireo and southwestern willow flycatcher upstream of Santiago Dam. Focused surveys for least Bell's vireo were conducted downstream of Santiago Dam in Spring 2020 (Psomas 2020). A Biologist with the necessary experience and the Federal Endangered Species Act 10(a) survey permit conducted the surveys according to U.S. Fish and Wildlife Service (USFWS) protocol for these species (Sogge et al. 2010; USFWS 2001). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on April 28, 2022.

PROJECT LOCATION AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the dam. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level.

The Biological Study Area is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Focused surveys were conducted along Santiago Creek upstream of the lake to determine whether least Bell's vireo or southwestern willow flycatcher are present or absent adjacent to the proposed staging areas on the east side of the lake.

SURVEY AREA

A variety of vegetation types occur in the Biological Study Area, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

The survey area for the least Bell's vireo includes all suitable riparian habitats (i.e., riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the dam (Exhibit 3). The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (Exhibit 4). Representative site photos are included in Attachment A.

[1] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

BACKGROUND

Least Bell's Vireo

Least Bell's vireo is a federally and State listed Endangered species. It is one of four subspecies of the Bell's vireo (*Vireo bellii*); this subspecies is the westernmost of the four subspecies, breeding entirely in southwestern California and northwestern Baja California, Mexico. Although not well known, the winter range of the least Bell's vireo is believed to be the west coast of Central America from southern Sonora, Mexico, south to northwestern Nicaragua, including the cape region of Baja California, Mexico (Brown 1993). The least Bell's vireo arrives in southern California from mid-March to early April and departs for its wintering grounds in August to mid-September.

The least Bell's vireo is a small, gray migratory songbird that is about 4.5 to 5 inches long. It has short, rounded wings and a short, straight bill for catching insects. Feathers are gray above and pale below. "The least Bell's vireo is easily recognized on the breeding grounds by its distinctive song" (Coues 1903). Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males (USFWS 1998).

Least Bell's vireos consume a "wide variety of insects including bugs, beetles, grasshoppers, moths, and particularly caterpillars" (Chapin 1925; Bent 1950). They obtain prey through foliage gleaning (picking prey from leaves or bark) and through hovering (removing prey from vegetation surfaces while fluttering in the air) (Salata 1983; Miner 1989). Vireos will forage in all layers of the canopy but tend to concentrate their foraging in the lower to mid-strata from 9 to 18 feet in height (Miner 1989). Vireos forage in both riparian and adjacent upland habitat (Salata 1983; Kus and Miner 1987).

The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) and prefers early-successional habitat. On its breeding grounds, it typically inhabits structurally diverse woodlands along watercourses. In California, least Bell's vireo habitat consists of southern willow scrub, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, and cottonwood bottomland forest (Faber et al. 1989). Although least Bell's vireos typically nest in willow-dominated areas, plant species composition does not appear to be as important in nest site selection as habitat structure (USFWS 1998). The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately 3 to 6 feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989). This structure is typically met by willows (*Salix* spp.) that are between four and ten years of age (RECON 1988; Franzreb 1989). As stands mature, the tall canopy tends to shade out the shrub layer, making the sites less suitable for nesting; however, least Bell's vireos will continue to use such areas if patches of understory exist (USFWS 1998). Vireo nest placement tends to occur in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs (USFWS 1998). The riparian ecosystems required by the vireo are dynamic systems; and the scouring of vegetation during periodic floods is required to create the low, dense vegetation favored by the bird (USFWS 1986).

Males arrive on the breeding grounds about one week prior to females, and older birds arrive before first-year birds. Pair formation occurs within a few days, and pairs build a nest together over the next four to five days. The typical clutch size for least Bell's vireo is four eggs, which are incubated for approximately 14 days. The young remain in the nest for approximately 10 to 12 days. Adults continue to care for the young for at least two weeks post-fledging, as the family groups forage over larger areas. The

largest causes of least Bell's vireo nest failure are nest parasitism[2] by brown-headed cowbird (*Molothrus ater*) and egg predation; nests also fail due to vegetation clearing, trampling by humans and cattle, ant infestations, and rainstorms. Least Bell's vireo will make up to five nesting attempts per season, assuming adequate energy resources; typically, a pair will successfully fledge young from one to two nests per season. Few nests are initiated after mid-July (USFWS 1998). The least Bell's vireo often shows a strong site fidelity, returning not just to the same drainage and the same territory but even to the same tree where it previously nested. However, vireos may move locations due to habitat loss or failure to attract a mate (USFWS 1998).

The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). At the time of its listing, the least Bell's vireo had been eliminated from 95 percent of its former range (USFWS 1986). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Loss of riparian habitat has been attributed to flood control and water development projects, agricultural development, livestock grazing, spread of invasive exotic plant species, degradation of habitat by off-road vehicles, and urban development. With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). Vireos have also expanded their range into areas where they were formerly extirpated.

On February 2, 1994, the USFWS issued their final determination of Critical Habitat for the least Bell's vireo, identifying approximately 37,560 acres as Critical Habitat in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties (USFWS 1994). The Biological Study Area is not located in designated Critical Habitat for this species.

Southwestern Willow Flycatcher

Southwestern willow flycatcher is a federally and State listed Endangered species. It is one of four subspecies of the willow flycatcher (*Empidonax traillii*) (Sedgwick 2000); the breeding range of the southwestern willow flycatcher includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, and extreme northwestern Mexico (i.e., Baja California del Norte, Sonora, and Chihuahua) (USFWS 2002). The winter range of the southwestern willow flycatcher includes the tropical regions of southern Mexico, Central America, and northern South America (Sogge et al. 2010).

The southwestern willow flycatcher arrives in southern California in mid-May and departs for its wintering grounds in late July to mid-September. The spring migration of southwestern willow flycatcher is earlier than that of the northern subspecies of willow flycatchers (Unitt 1984; USFWS 1993). As a result, the presence of more abundant subspecies that migrate through the range of the southwestern willow flycatcher during its breeding season complicates surveys for nesting southwestern willow flycatchers. Similarly, the other subspecies may pass through southern California during their fall migration in July and August while the southwestern willow flycatcher is still breeding; therefore, there is only a short period from June 15 to July 20 when the presence of a willow flycatcher in southern California can be determined to be southwestern subspecies of the willow flycatcher (USFWS 2002).

[2] Nest parasitism is when one species lays its eggs in another species' nest and the young are raised by the host bird, often to the detriment of their biological young.

The southwestern willow flycatcher occurs in dense riparian habitat along rivers, streams, and other wetlands. Typically, southwestern willow flycatchers nests in thickets of trees and shrubs 13 to 23 feet or greater in height, with a dense understory and a high percentage of canopy cover (USFWS 1995). The dense patches are often interspersed with small openings, open water, or small areas of shorter/sparse vegetation that create a mosaic of habitat that is not uniformly dense (USFWS 2002). In almost all cases, slow-moving or still surface water and/or saturated soil is present during wet or non-drought years (UFSWS 2002). Plant species composition of low to mid-elevation sites ranges from monotypic stands to mixtures of broadleaf trees and shrubs including willows, cottonwoods (*Populus* spp.), coast live oak (*Quercus agrifolia*), ash (*Fraxinus* sp.), alder (*Alnus* sp.), blackberry (*Rubus* sp.), and nettle (*Urtica* sp.) (USFWS 2002). They can also nest in riparian habitats dominated by a mix of native and introduced species, such as Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix* sp.) or in monotypic stands of these introduced species; however, southwestern willow flycatchers rarely nest in giant reed (*Arundo donax*) (USFWS 2002). Overall, nest site selection appears to be driven more by plant structure than species composition (Sogge et al. 2010).

In California, the southwestern willow flycatcher was once considered common in all lower elevation riparian areas in the southern third of the state including the Los Angeles Basin, Riverside/San Bernardino area, and San Diego County (Wheelock 1912; Willett 1912; Grinnell and Miller 1944; Unitt 1984, 1987). The primary cause of the southwestern willow flycatcher's decline is the loss and modification of riparian habitat (USFWS 2002). With the increase in urbanization and agricultural development, these systems have declined or have been further degraded by reduction in water flow, interruption of the natural hydrogeological events or cycles, physical modifications to streams, removal of riparian vegetation, invasion by non-native invasive plant species, livestock grazing, and recreation (USFWS 2002). Additionally, agriculture and certain other types of development can increase foraging habitat for brown-headed cowbirds in proximity to southwestern willow flycatcher breeding habitat, which can increase nest parasitism[3] (USFWS 2002). Flycatcher habitat and their populations are threatened further with additional stressors such as introductions of tamarisk leaf beetle (*Diorhabda carninulata*), which defoliates tamarisk, and shot hole borer beetle (*Euwallacea* sp.)/Fusarium (*Fusarium euwallaceae*), a beetle/fungi complex that causes tree die-off (USFWS 2017). All of these threats to the flycatcher and its habitat vary in severity over the southwest; and, at any given location, multiple stressors are likely to be at work, with cumulative and synergistic effects (USFWS 2017).

On January 3, 2013, the USFWS published a Revised Final Critical Habitat for the southwestern willow flycatcher (USFWS 2013). This final rule designated 208,973 acres (1,227 stream miles) in 24 Management Units on a combination of federal, State, tribal, and private lands in California, Nevada, Utah, Arizona, and New Mexico. In California, critical habitat was designated in Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties. The Biological Study Area is not located within the 2013 Revised Critical Habitat for the southwestern willow flycatcher.

SURVEY METHODS

The USFWS protocol for the least Bell's vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). The USFWS protocol for the southwestern willow flycatcher requires a total of five surveys, with the first survey conducted between May 15 and May 31; the second and third surveys between June 1 and June 24; and the fourth and fifth surveys between June 25 and July 17 (Sogge et al. 2010). Psomas Senior Biologist Jonathan Aguayo (USFWS Permit No. TE 96514A-3) conducted all focused surveys for least Bell's vireo and

[3] Nest parasitism is when one species lays its eggs in another species' nest and the young are raised by the host bird, often to the detriment of their biological young.

southwestern willow flycatcher. Because the survey area contained more than 80 acres of suitable habitat, 2 days were required to cover the entire survey area for each of the 8 visits. Mr. Aguayo conducted focused surveys for the least Bell's vireo on April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Focused surveys for southwestern willow flycatcher were conducted on May 25 and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Per guidance issued from the USFWS, focused surveys for least Bell's vireo and southwestern willow flycatcher were not conducted concurrently. During the last five surveys, surveys were conducted for southwestern willow flycatcher first; surveys for least Bell's vireo followed (described below).

Mr. Aguayo systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from any potentially territorial southwestern willow flycatchers. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos or southwestern willow flycatchers observed were recorded, and their locations were mapped in the field. Because of the high density of least Bell's vireos in the survey area, great care was taken in the field to verify that adjacent territories were occupied by distinct males. Although not required during a presence/absence survey, time was also taken to visually observe the individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions during early morning hours when bird activity is at its peak (Table 1). As mentioned above, the surveys were conducted sequentially, with surveys for the southwestern willow flycatcher conducted first (i.e., first thing in the morning) and surveys for the least Bell's vireo conducted afterwards. The survey area was split into two mainly linear routes; therefore, southwestern willow flycatchers were surveyed from the starting point to the end, and least Bell's vireos were surveyed on the way back. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird). A complete list of wildlife species observed during the surveys is included in Attachment B.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER SURVEYS

Survey No.	Survey Dates	Survey for Flycatcher (F)/ Vireo (V)	Time	Air Temperature (°F)		Cloud Cover (%) Start/End	Wind (mph)
				Start	End		
1A	April 13, 2022	V	6:10 AM–11:00 AM	43	61	0/0	2–4
1B	April 14, 2022	V	6:12 AM–11:00 AM	45	63	0/0	1–5
2A	April 24, 2022	V	5:55 AM–11:00 AM	54	79	0/0	3–7
2B	April 25, 2022	V	6:02 AM–11:00 AM	57	83	0/0	2–6
3A	May 12, 2022	V	5:44 AM–11:00 AM	55	73	15/5	3–6
3B	May 13, 2022	V	5:44 AM–11:00 AM	56	79	0/0	3–4
4A	May 25, 2022	F	5:34 AM–8:22 AM	56	68	40/20	1–2
		V	8:22 AM–11:00 AM	68	74	20/10	2–5
4B	May 26, 2022	F	5:31 AM–8:30 AM	55	62	0/0	1–2
		V	8:30 AM–11:00 AM	62	71	0/0	2–4
5A	June 7, 2022	F	5:38 AM–8:37 AM	56	66	60/10	1–2
		V	8:37 AM–11:00 AM	66	75	10/5	2–4
5B	June 8, 2022	F	5:36 AM–8:34 AM	56	66	30/0	1–2
		V	8:34 AM–11:00 AM	66	75	0/0	2–5
6A	June 21, 2022	F	5:40 AM–8:38 AM	62	74	0/0	1–3
		V	8:38 AM–11:00 AM	74	82	10/10	3–6
6B	June 22, 2022	F	5:35 AM–8:37 AM	65	77	60/40	2–4
		V	8:37 AM–10:52 AM	77	83	40/30	4–5
7A	July 1, 2022	F	5:32 AM–8:36 AM	58	68	100/0	1–3
		V	8:36 AM–11:00 AM	68	76	0/0	3–5
7B	July 4, 2022	F	5:50 AM–8:46 AM	53	62	20/0	2–3
		V	8:46 AM–11:00 AM	62	70	0/0	3–4
8A	July 13, 2022	F	5:52 AM–8:44 AM	55	62	15/0	2–3
		V	8:44 AM–11:00 AM	62	74	0/0	3–7
8B	July 14, 2022	F	6:14 AM–8:38 AM	59	66	10/0	3–6
		V	8:38 AM–10:49 AM	66	73	0/0	6–8

°F: degrees Fahrenheit; mph: miles per hour

SURVEY RESULTS

Least Bell's Vireo

A total of 29 least Bell's vireo locations were observed during the focused surveys (Exhibit 4). A total of 27 locations consisted of territories occupied by breeding pairs, 1 location consisted of a territory occupied by an unpaired male, and 1 location consisted of a transient male. A territory is defined as a singing male observed or heard consistently in the same general location on multiple surveys (i.e., defending a territory). A transient male is one observed during only one survey. The territory points shown on Exhibit 4 represent either a nest location or the general area where least Bell's vireos were observed and/or detected most of the time.

A total of 25 pairs were observed to have successfully nested; a total of 38 juveniles were observed during focused surveys. The survey results include only the number of nestlings/fledglings that were visually or aurally confirmed; additional fledglings may have been undetected in the habitat.

Details on each location are described below and summarized in Table 2. Representative species and habitat photos are included in Attachment A. The California Natural Diversity Database (CNDDB) form is included in Attachment C and will be submitted online by Mr. Aguayo. The required Least Bell's Vireo Survey Data Summary Form is included in Attachment D.

Location 1: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with the two juveniles. On the seventh and eighth surveys (July 1 and 13, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow (*Salix gooddingii*) with arroyo willow (*Salix lasiolepis*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), and mule fat (Baccharis salicifolia ssp. salicifolia).

Location 2: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southern portion of the survey area. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with the two juveniles. On the seventh and eighth surveys (July 1 and 13, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, blue elderberry, and mule fat.

Location 3: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third survey (May 12, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 25, 2022), the male was detected singing briefly and the female was not observed, indicating there may be an active nest. On the fifth survey (June 7, 2022), the pair was observed foraging with two juveniles; therefore, this territory was successful. The male was observed foraging and moving around during the sixth, seventh, and eighth surveys (June 21; July 1 and 13, 2022). Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with blue elderberry and mule fat.

TABLE 2
SUMMARY OF LEAST BELL'S VIREO OBSERVATIONS

LBV Location Number	Survey 1 (April 13 and 14)	Survey 2 (April 24 and 25)	Survey 3 (May 12 and 13)	Survey 4 (May 25 and 26)	Survey 5 (June 7 and 8)	Survey 6 (June 21 and 22)	Survey 7 (July 1 and 4)	Survey 8 (July 13 and 14)	Nest Success[a]
1	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged two juveniles
2	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged two juveniles
3	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Male singing briefly; female not observed	Pair foraging with two juveniles	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Fledged two juveniles
4	Male observed foraging and moving around	Male observed foraging and staying hidden; followed by female observed separately foraging	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged two juveniles
5	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food into vegetation	Pair foraging with one juvenile	Pair observed foraging and moving around together	Male observed foraging and moving around	Fledged one juvenile
6	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Female carrying nest material into vegetation; male following close by	Pair observed incubating nest	Pair feeding nestlings in the nest	Pair feeding three juveniles	Pair foraging with three juveniles	Not observed	Fledged three juveniles
7	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Pair carrying food into vegetation	Not observed	Pair feeding two juveniles	Pair foraging with two juveniles	Fledged two juveniles
8	Male observed foraging and moving around	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Not observed	Fledged one juvenile
9	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food into vegetation	Pair feeding one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Fledged one juvenile
10	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair feeding nestling in the nest	Pair feeding one juvenile	Pair foraging with one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Fledged one juvenile
11	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed foraging and staying hidden; followed by female observed separately foraging	Male observed briefly; staying hidden and quiet	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Unknown
12	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding one juvenile	Pair foraging with one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Fledged one juvenile
13	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Male carrying food into vegetation	Pair carrying food into vegetation	Pair feeding two juveniles	Pair observed foraging and moving around together	Male observed foraging and moving around	Not observed	Fledged two juveniles
14	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food; juveniles begging vocalizations heard	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Not observed	Fledged two juveniles
15	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair defending two juveniles from California scrub jay	Male observed foraging and moving around	Not observed	Not observed	Fledged two juveniles
16	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Not observed	Male observed briefly; staying hidden and quiet	Not observed	Male observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair observed foraging and moving around together	Unknown
17	Male observed foraging and moving around	Male observed foraging and moving around	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not applicable; unpaired male
18	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair foraging with one juvenile	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged one juvenile
19	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed foraging and staying hidden; followed by female observed separately foraging	Pair entering vegetation; nestling begging vocalizations heard	Pair carrying food; juveniles begging vocalizations heard	Pair observed foraging and moving around together	Male observed foraging and moving around	Fledged an unknown number of juveniles
20	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair foraging with one juvenile	Not observed	Not observed	Fledged two juveniles

TABLE 2
SUMMARY OF LEAST BELL'S VIREO OBSERVATIONS

LBV Location Number	Survey 1 (April 13 and 14)	Survey 2 (April 24 and 25)	Survey 3 (May 12 and 13)	Survey 4 (May 25 and 26)	Survey 5 (June 7 and 8)	Survey 6 (June 21 and 22)	Survey 7 (July 1 and 4)	Survey 8 (July 13 and 14)	Nest Success[a]
21	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food into vegetation	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together; juvenile foraging in vicinity	Pair observed foraging and moving around together	Fledged two juveniles
22	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair entering vegetation; nestling begging vocalizations heard	Male observed briefly	Male observed briefly	Pair observed foraging and moving around together; juvenile foraging in vicinity	Fledged one juvenile
23	Pair observed foraging and moving around together	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair carrying food into vegetation	Pair foraging with two juveniles	Male observed foraging and moving around	Not observed	Fledged two juveniles
24	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair feeding one juvenile	Pair observed foraging and moving around together	Not observed	Not observed	Fledged one juvenile
25	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Male observed foraging and moving around; juvenile foraging in vicinity	Not observed	Fledged two juveniles
26	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding one juvenile	Male observed briefly	Pair observed foraging and moving around together	Male observed foraging and moving around	Pair observed foraging and moving around together	Not observed	Fledged one juvenile
27	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair carrying food; juvenile begging vocalizations heard	Pair observed foraging and moving around together; juvenile foraging in vicinity	Male observed foraging and moving around	Not observed	Fledged one juvenile
28	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding one juvenile	Pair observed foraging and moving around together	Male observed foraging and moving around	Not observed	Fledged one juvenile
29	Not observed	Male observed foraging and moving around	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not applicable; transient male

LBV: Least Bell's vireo

[a] The survey results include only the number of nestlings/fledglings that were visually or aurally confirmed; additional fledglings may have been undetected in the habitat.

Location 4: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; a male was observed foraging before staying hidden then a female was observed foraging, indicating they were most likely incubating a nest. On the third and fourth surveys (May 12 and 25, 2022), the male was observed briefly before staying hidden and quiet, indicating he was most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with the two juveniles. On the seventh and eighth surveys (July 1 and 13, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with mule fat.

Location 5: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southern portion of the survey area. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed carrying food to a presumed nest location within riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 21, 2022), the pair was observed foraging with one juvenile; therefore, this territory was successful. On the seventh survey (July 1, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar (*Tamarix ramosissima*).

Location 6: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southern portion of the survey area. On the third survey (May 12, 2022), a pair was confirmed; the female was observed carrying nesting material to a presumed nest location within riparian vegetation with the male following close by, indicating there was an active nest nearby. On the fourth survey (May 25, 2022), the pair was observed incubating a nest in a blue elderberry. On the fifth survey (June 7, 2022), the pair was observed feeding nestlings on the nest. On the sixth survey (June 21, 2022), the nest was confirmed to have successfully fledged young; the pair was observed feeding three juveniles near the nest location. On the seventh survey (July 1, 2022), the pair was observed foraging with three juveniles. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, blue elderberry, mule fat, and saltcedar.

Location 7: On the first, second, third, and fourth surveys (April 13 and 24; May 12 and 25, 2022), a male was observed foraging and moving around within dense vegetation in the southern portion of the survey area. On the fifth survey (June 7, 2022), a pair was confirmed; the pair was observed carrying food to a presumed nest location within riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 21, 2022), no vireos were detected at this location. On the seventh survey (July 1, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the eighth survey (July 13, 2022), the pair was observed foraging with the two juveniles. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 8: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second and third surveys (April 25 and May 12, 2022), the male was observed briefly before staying hidden and quiet, indicating that he was possibly paired. On the fourth survey (May 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth and seventh surveys (June 21, and July 1, 2022), the male was observed foraging and moving around. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of southern black willow forest/riparian herb dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 9: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southwestern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 12 and 25, 2022), the pair was again observed briefly before staying hidden and quiet, indicating there was a nest nearby. On the fifth survey (June 7, 2022), the pair was observed carrying food to a presumed nest location within riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 21, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the seventh and eighth surveys (July 1 and 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of southern black willow forest and riparian herb dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 10: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southwestern portion of the survey area. On the third survey (May 12, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 25, 2022), the pair was observed feeding a nestling in a nest within a Goodding's black willow. On the fifth survey (June 7, 2022), the nest was confirmed to have successfully fledged young; the pair was observed feeding one juvenile. On the sixth survey (June 21, 2022), the pair was observed foraging with one juvenile. On the seventh and eighth surveys (July 1 and 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat.

Location 11: On the first survey (April 13, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third survey (May 12, 2022), the male was observed foraging and then staying hidden followed by a female observed foraging, indicating they were most likely incubating a nest. On the fourth survey (May 25, 2022), the male was observed briefly before staying hidden and quiet. On the fifth, sixth, seventh, and eighth surveys (June 7 and 21; July 1 and 13, 2022), the male was observed foraging and moving around. No nestlings or fledglings were detected during the surveys; therefore, it is unknown if this territory was successful. Habitat in this location consists of disturbed mulefat scrub with scattered mule fat, coyote brush (*Baccharis pilularis* ssp. *consanguinea*), California sagebrush (*Artemisia californica*), and saltcedar.

Location 12: On the first survey (April 13, 2022), a male was observed foraging and moving around in the middle portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with one juvenile. On the seventh and eighth surveys (July 1 and 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of disturbed mulefat scrub with scattered mule fat, saltcedar, and grayish shortpod mustard (*Hirschfeldia incana*).

Location 13: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the middle portion of the survey area. On the third survey (May 12, 2022), the male was observed carrying food to a presumed nest location within riparian vegetation. On the fourth survey (May 25, 2022), the pair was observed carrying food to a presumed nest location within dense vegetation, indicating there was an active nest with nestlings nearby. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging and moving around together. On the seventh survey (July 1, 2022), the male was observed foraging and moving around. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed mulefat scrub with mule fat, coyote brush, saltcedar, and grayish shortpod mustard.

Location 14: On the first survey (April 13, 2022), a male was observed foraging and moving around in the middle portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed carrying food and juvenile food begging vocalizations were heard; therefore, this territory was successful. On the sixth and seventh surveys (June 21 and July 1, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed mulefat scrub with mule fat, coyote brush, California sagebrush, and saltcedar.

Location 15: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden. On the fifth survey (June 8, 2022), the pair was observed defending two juveniles from a California scrub jay (*Aphelocoma californica*); therefore, this territory was successful. On the sixth survey (June 22, 2022), the male was observed foraging and moving around. On the seventh and eighth surveys (July 4 and 14, 2022), no vireos were detected at this location. Habitat in this location consists of southern sycamore riparian woodland with of a closed riparian canopy dominated by western sycamore (*Platanus racemosa*). Other species in the tree canopy include Goodding's black willow, arroyo willow, Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), and coast live oak.

Location 16: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fifth surveys (May 13 and June 8, 2022), no vireos were detected at this location. On the fourth and sixth survey (May 26 and June 22, 2022), the male was observed briefly before staying hidden, indicating he was most likely nesting. On the seventh survey (July 4, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the eighth survey (July 14, 2022), the pair was observed foraging and moving around together. No nestlings or fledglings were detected during the surveys; therefore, it is unknown if this territory was successful. Habitat in this location consists of southern sycamore riparian woodland dominated by western sycamore with Goodding's black willow, arroyo willow, Fremont cottonwood, and mule fat.

Location 17: On the first and second surveys (April 14 and 25, 2022), a male was observed foraging and moving around. No vireos were detected during subsequent surveys. Therefore, this location was categorized as an unpaired male. Habitat in this location consists of southern sycamore riparian woodland dominated by western sycamore with Goodding's black willow, arroyo willow, Fremont cottonwood, and mule fat.

Location 18: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third, fourth, and fifth surveys (May 13 and 26; June 8, 2022), the male was observed briefly. On the sixth survey (June 22, 2022), the pair was observed foraging with one juvenile; therefore, this territory was successful. On the seventh and eighth surveys (July 4 and 14, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, western sycamore, Fremont cottonwood, and mule fat.

Location 19: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third survey (May 13, 2022), the male was observed briefly before staying hidden. On the fourth survey (May 26, 2022), a male was observed foraging before staying hidden then a female was observed foraging, indicating they were most likely incubating a nest. On the fifth survey (June 8, 2022), the pair was observed entering the same general area of riparian vegetation and nestling food begging vocalizations were heard, indicating there was a nest. On the sixth survey (June 22, 2022), the pair was observed carrying food and juvenile food begging vocalizations were heard; therefore, this territory was successful. On the seventh survey (July 4, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 14, 2022), the male was observed foraging and moving around. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 20: On the first survey (April 14, 2022), a pair was observed foraging and moving around in the middle portion of the survey area. On the second and third surveys (April 25 and May 13, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 26, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the fifth survey (June 8, 2022), the pair was observed foraging with the two juveniles. On the sixth survey (June 22, 2022), the pair was observed foraging with one juvenile. On the seventh and eighth surveys (July 4 and July 14,

2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 21: On the first survey (April 14, 2022), a pair was observed foraging and moving around in the middle portion of the survey area. On the second and third surveys (April 25 and May 13, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 26, 2022), the pair was observed carrying food into riparian vegetation, indicating there was an active nest with nestlings nearby. On the fifth survey (June 8, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging with two juveniles. On the seventh survey (July 4, 2022), the pair was observed foraging and moving around; a juvenile was observed foraging in the vicinity of the pair. On the eighth survey (July14, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of riparian herb and disturbed mulefat scrub dominated by mule fat with Goodding's black willow, arroyo willow, and saltcedar.

Location 22: On the first survey (April 14, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed entering riparian vegetation and nestling food begging vocalizations were heard, indicating there was a nest. On the sixth and seventh surveys (June 22 and July 4, 2022), the male was observed briefly. On the eighth survey (July 14, 2022), the pair was observed foraging and moving around and a juvenile was observed foraging in the vicinity of the pair; therefore, this territory was successful. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 23: On the first survey (April 14, 2022), a pair was observed foraging and moving around in the middle portion of the survey area. On the second, third, and fourth surveys (April 25; May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet, indicating he was most likely nesting. On the fifth survey (June 8, 2022), the pair was observed carrying food into riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 22, 2022), the pair was observed foraging with the two juveniles; therefore, this territory was successful. On the seventh survey (July 4, 2022), the male was observed foraging and moving around. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow, and saltcedar.

Location 24: On the first survey (April 14, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging and moving around. On the seventh and eighth surveys (July 4 and 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow and saltcedar.

Location 25: On the first, second, and third surveys (April 14 and 25; May 13, 2022), a pair was observed briefly before staying hidden and quiet in the middle portion of the survey area, indicating they were most likely nesting. On the fourth survey (May 26, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the fifth survey (June 8, 2022), the pair was observed foraging with the two juveniles. On the sixth survey (June 22, 2022), the male was observed foraging and moving around. On the seventh survey (July 4, 2022), the male was observed foraging and moving around; a juvenile was observed foraging in the vicinity of the male. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 26: On the first and second surveys (April 14 and 25, 2022), a pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third survey (May 13, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the fourth survey (May 26, 2022), the male was observed briefly. On the fifth survey (June 8, 2022), the pair was observed foraging and moving around together. On the sixth survey (June 22, 2022), the male was observed foraging and moving around. On the seventh survey (July 4, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow and saltcedar.

Location 27: On the first survey (April 14, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed carrying food and juvenile food begging vocalizations were heard; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging and moving around; a juvenile was observed foraging in the vicinity of the pair. On the seventh survey (July 4, 2022), the male was observed foraging and moving around. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of southern black willow forest/riparian herb dominated by Goodding's black willow, cocklebur (*Xanthium strumarium*), white sweetclover (*Melilotus albus*), alkali-mallow (*Malvella leprosa*), and grayish shortpod mustard.

Location 28: On the first survey (April 14, 2022), a male was observed foraging in the western portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the pair was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging and moving around together. On the seventh survey (July 4, 2022), the male was observed foraging and moving around. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 29: On the second survey (April 24, 2022), a male was observed foraging in the eastern portion of the survey area. No vireos were observed in this location on any of the remaining surveys; therefore, this location was presumed to be a transient individual.

Southwestern Willow Flycatcher

No southwestern willow flycatchers were detected during the surveys.

Six migrant willow flycatchers of undetermined subspecies were observed/detected in the survey area during the May/early June focused surveys (Exhibit 4). Three migrant willow flycatchers of undetermined subspecies were observed foraging and moving around together in the middle portion of the survey area on May 12, 2022. The same three migrant willow flycatchers were observed foraging and moving around together in the middle portion of the survey area the following day (May 13, 2022), north of the previous observation location. During the first willow flycatcher focused survey (May 25, 2022), one migrant willow flycatcher of undetermined subspecies was observed. During the second willow flycatcher focused survey (June 7 and June 8, 2022), two migrant willow flycatchers of undetermined subspecies were observed/detected. Of the six migrant willow flycatchers observed, two of the individuals responded to recorded playback by singing "fitzbew" multiple times while four individuals were detected singing unsolicited "fitzbew" vocalization. No willow flycatchers were detected during subsequent surveys; therefore, the observations were all assumed to be migrants of the other subspecies. Per USFWS protocol requirements, the Willow Flycatcher Survey and Detection Form (showing negative survey results) is included in Attachment E.

OTHER OBSERVATIONS

Seven other special status species were observed and/or detected in the survey area during the surveys: Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*, California Department of Fish and Wildlife [CDFW] Watch List), coastal whiptail (*Aspidoscelis hyperythra*, California Species of Special Concern), white-tailed kite (*Elanus leucurus*, California Fully Protected), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*, California Species of Special Concern), grasshopper sparrow (*Ammodramus savannarum*, California Species of Special Concern), yellow-breasted chat (*Icteria virens*, California Species of Special Concern), and yellow warbler (*Setophaga petechia*, California Species of Special Concern) (Exhibit 4). These species are tracked by the CDFW's CNDDB. The coastal cactus wren CNDDB form was included with the *Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher Report* (Psomas 2022) and was submitted online by Lindsay Messett. CNDDB forms for the remaining species are included in Attachment C and will be submitted online by Mr. Aguayo.

One to two brown-headed cowbirds were observed by Mr. Aguayo during the April focused surveys. No brown-headed cowbirds were observed by Mr. Aguayo during the May, June, and July focused surveys.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Jonathan Aguayo (Jonathan.Aguayo@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager, Resource Management

Jonathan Aguayo
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.

Jonathan Aguayo
Senior Biologist
(TE96514A-3)

Enclosures: Exhibits 1–4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – California Natural Diversity Database Forms
Attachment D – Least Bell's Vireo Survey Data Summary Form
Attachment E – Willow Flycatcher Survey and Detection Form

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com

REFERENCES

Bent, A.C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. National Museum Bulletin 197, 41 pp.

Brown, B.T. 1993. Bell's Vireo (*Vireo bellii*). *The Birds of North America, No. 35* (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia, PA and Washington, D.C.: The Academy of Natural Sciences and AOU (respectively).

Chapin, E. 1925. Food habits of the vireos; a family of insectivorous birds. Bulletin.1355: 1–44. Washington, D.C.: United States Department of Agriculture.

Coues, E. 1903. Key to North American birds (5th ed.). Boston, MA: The Page Co.

Faber, P., E. Keller, A. Sands, B. Massey. 1989. *The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile* (Biological Report 85 [7.27]). Washington, D.C: U.S. Fish and Wildlife Service, Research and Development, National Wetlands Research Center.

Franzreb, K.E. 1989. *Ecology and Conservation of the Endangered Least Bell's Vireo* (Biological Report 89[1]). Sacramento, CA: USFWS, Endangered Species Office.

Goldwasser, S. 1981. *Habitat Requirements of the Least Bell's Vireo* (Final Report, Job IV-38.1). Sacramento, CA: CDFG.

Gray, V. And J. Greaves. 1981 (September). The Riparian Forest as Habitat for the Least Bell's Vireo (*Vireo bellii pusillus*). Paper presented at the California Riparian Systems Conference, University of California, Davis.

Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* No. 27. Cooper Ornithological Club: Berkeley, California.

Kus, B.E., and K.L. Miner. 1987. Foraging behavior of the least Bell's vireo: use of riparian and non-riparian habitats. San Diego State University, San Diego, CA. 22 pp. Unpubl. Rep.

Miner, K. L. 1989. Foraging ecology of the Least Bell's Vireo, Vireo bellii pusillus. Tesis de Maestria. San Diego State University. San Diego, California. USA.

Psomas. 2022 (July 25). *Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

———. 2020 (August 26). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

Regional Environmental Consultants (RECON). 1989. Comprehensive Species Management Plan for the Least Bell's Vireo (*Vireo bellii pusillus*). Prepared for San Diego Association of Governments, San Diego.

———. 1988. Draft Comprehensive Species Management Plan for the Least Bell's Vireo (Prepared for the San Diego Association of Governments). San Diego, CA: RECON.

Salata, L.R. 1983. *Status of the Least Bell's Vireo on Camp Pendleton, California: Report on Research Done in 1983*. Laguna Niguel, CA: USFWS.

———. 1981. Least Bell's vireo research, Camp Pendleton Marine Corps Base, San Diego County, California, 1981. Unpubl. Rept., Natural Resources Officer, Camp Pendleton.

Sedgwick, J.A. 2000. Willow Flycatcher (*Empidonax traillii*). *The Birds of North America, No. 533* (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.

Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher: U.S. Geological Survey Techniques and Methods (prepared in cooperation with the Bureau of Reclamation and the U.S. Fish and Wildlife Service). Menlo Park, CA: USGS, Western Region.

Unitt, P. 1987. *Empidonax traillii extimus:* An Endangered Subspecies. *Western Birds*, 18(3): 137–162. San Diego, CA: Western Field Ornithologists.

———. 1984. *The Birds of San Diego County* (Memoir 13). San Diego, CA: San Diego Society of Natural History.

U.S. Fish and Wildlife Service (USFWS). 2017 (August). 12-Month Findings on Petitions To List a Species and Remove a Species From the Federal Lists of Endangered and Threatened Wildlife and Plants; Notice of 12-month Petition Findings (Beaverpond Marstonia and Southwestern Willow Flycatcher).

———. 2013 (January 3). Endangered and Threatened Wildlife and Plants: Final Rule, Designation of Critical Habitat for Southwestern Willow Flycatcher. *Federal Register*. 78(2): 344–534. Washington, D.C.: USFWS.

———. 2002. *Southwestern Willow Flycatcher Recovery Plan.* Albuquerque, NM: USFWS.

———. 2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.

———. 1998 (May 6). *Draft Recovery Plan for the Least Bell's Vireo*. USFWS, Portland, OR. 139 pp.

———. 1995 (February 27). Endangered and Threatened Wildlife and Plants: Final Rule, Determining Endangered Status for the Southwestern Willow Flycatcher. *Federal Register*. 60(38): 10693–10715. Washington, D.C.: USFWS.

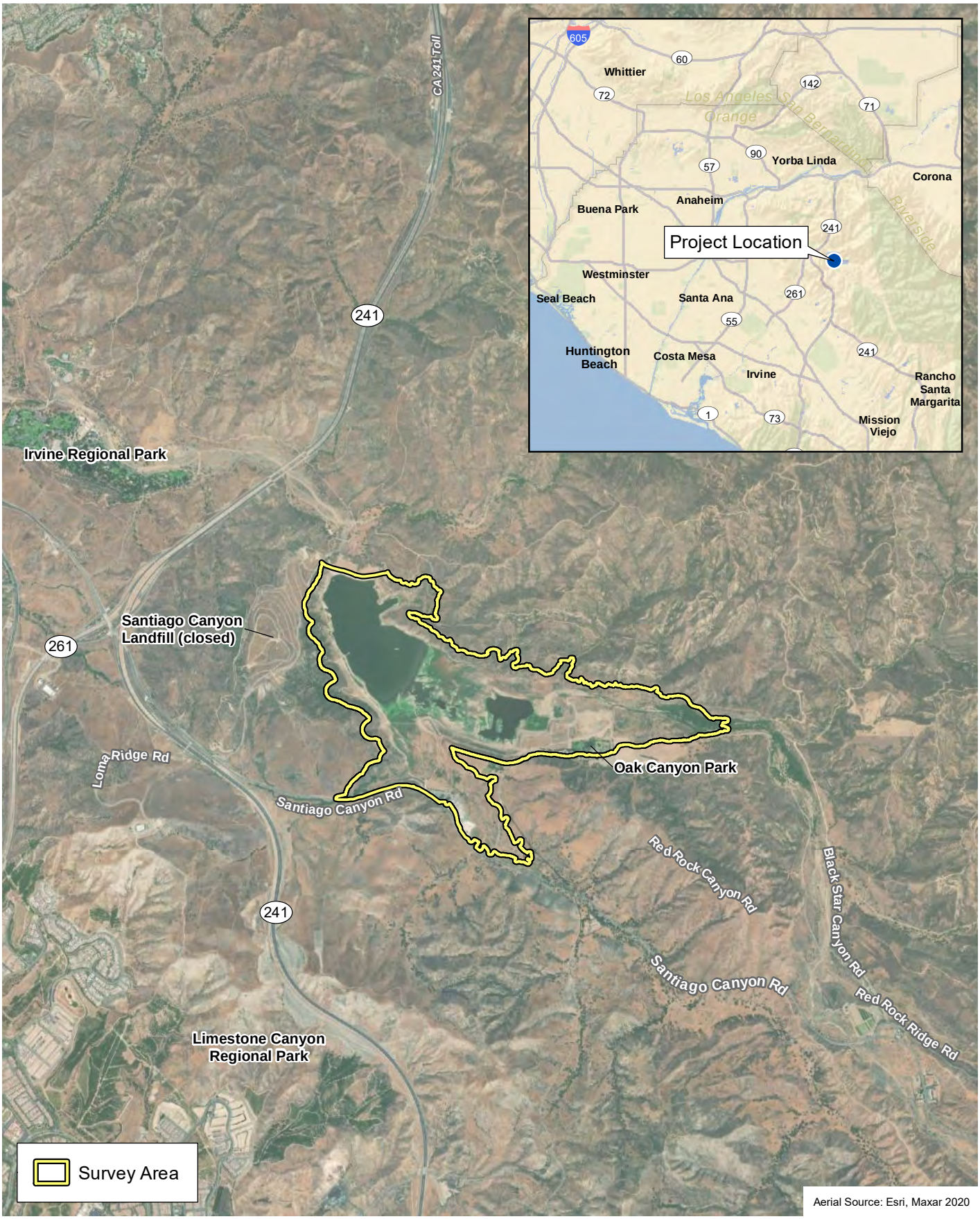
———. 1994 (February 2). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Least Bell's Vireo. *Federal Register* 59(22): 4845–4867. Washington, D.C.: USFWS.

———. 1993 (July 23). Endangered and Threatened Wildlife and Plants; Proposed Rule to List the Southwestern Willow Flycatcher as Endangered With Critical Habitat. *Federal Register* 58(140): 39495–39522. Washington, D.C.: USFWS.

———. 1986 (May 2). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Least Bell's Vireo. *Federal Register* 51(85):16474–16482. Washington, D.C.: USFWS.

Wheelock, I.G. 1912. Birds of California: an introduction to more than three hundred common birds of the state and adjacent islands. A.C. McClurg and Company, Chicago, Illinois.

Willett, G. 1912. Birds of the Pacific Slope of Southern California. *Pacific Coast Avifauna* No. 7. Cooper Ornithological Club.



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\LBV_SWF\ex_RL_LV_20220829.mxd

Regional Location and Local Vicinity

Exhibit 1

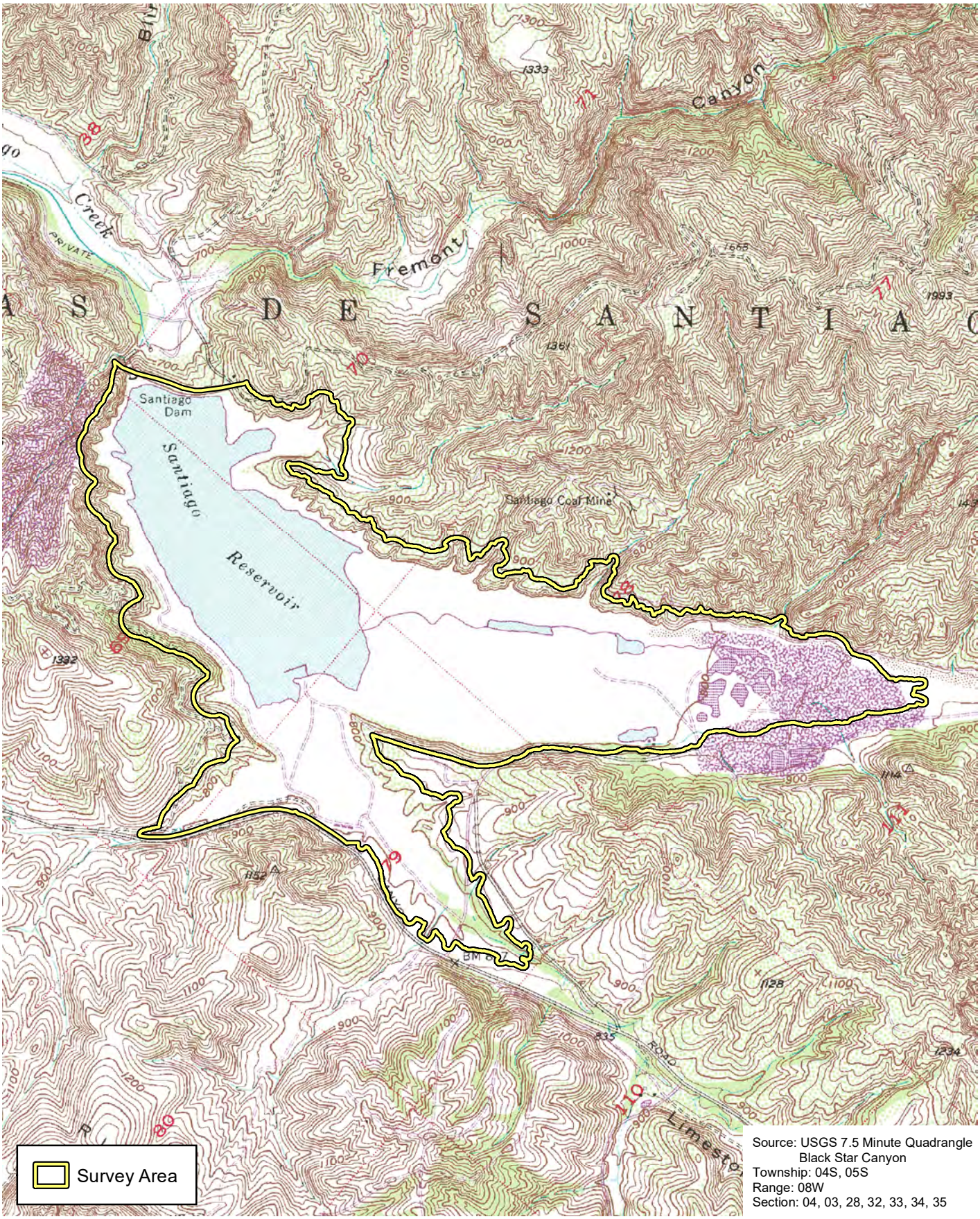
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

4,000 2,000 0 4,000 Feet

PSOMAS

(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_RL_LV.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S, 05S
Range: 08W
Section: 04, 03, 28, 32, 33, 34, 35

Riparian Bird Survey Area

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

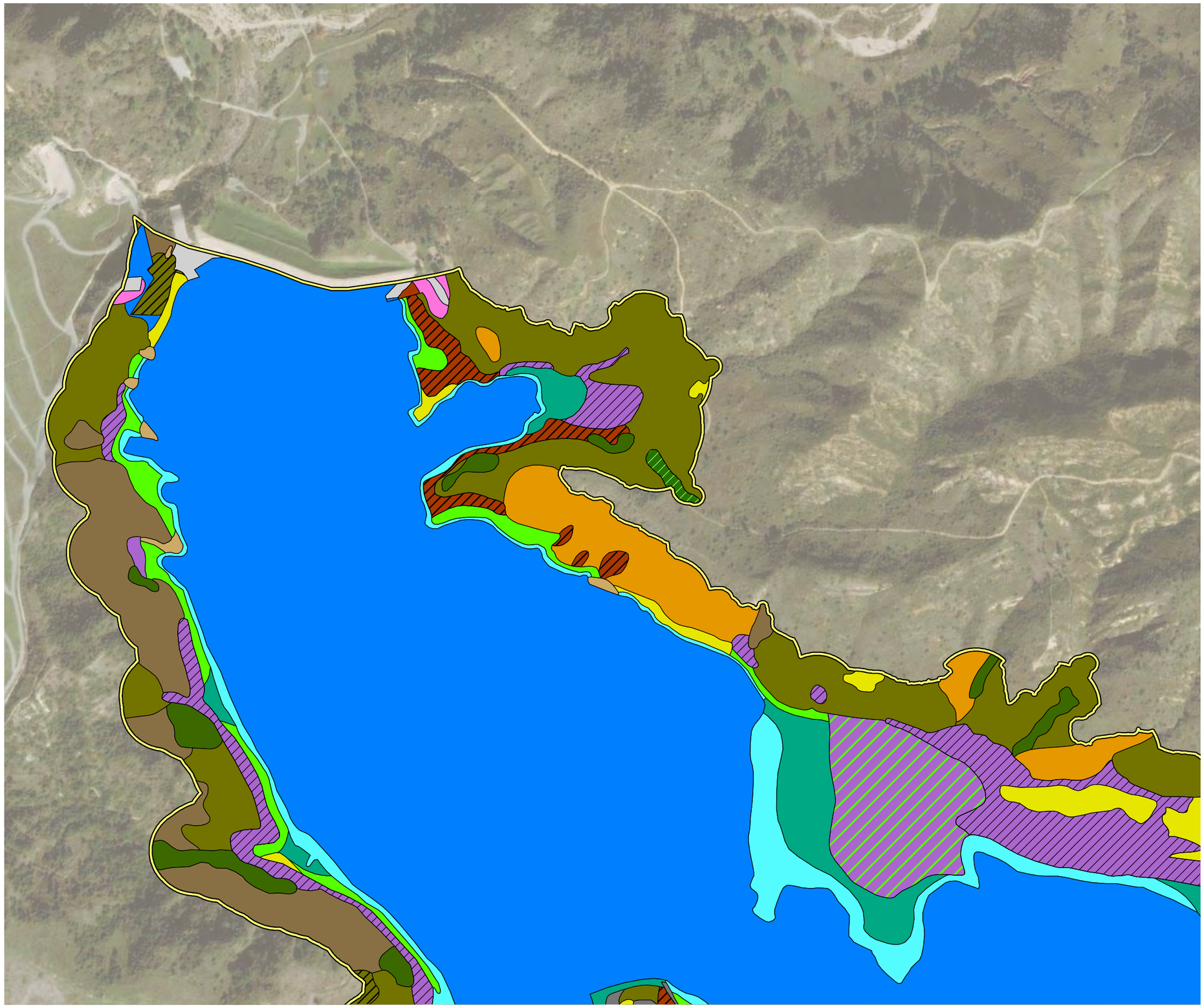
N
W E
S

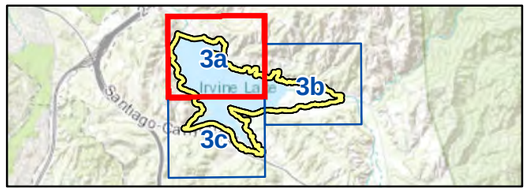
2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 9-27-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_SurveyArea_USGS.pdf

D:\Projects\3IRW\010200\MXD\LBV_SWF\ex_SurveyArea_USGS_20220829.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600
Feet

Aerial Source: Esri, Maxar 2020

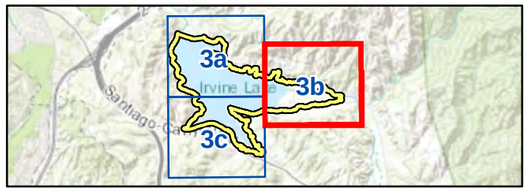
Biological Resources Exhibit 3a

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\LBV_SWF\ex_BioResources_20220829.mxd



Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

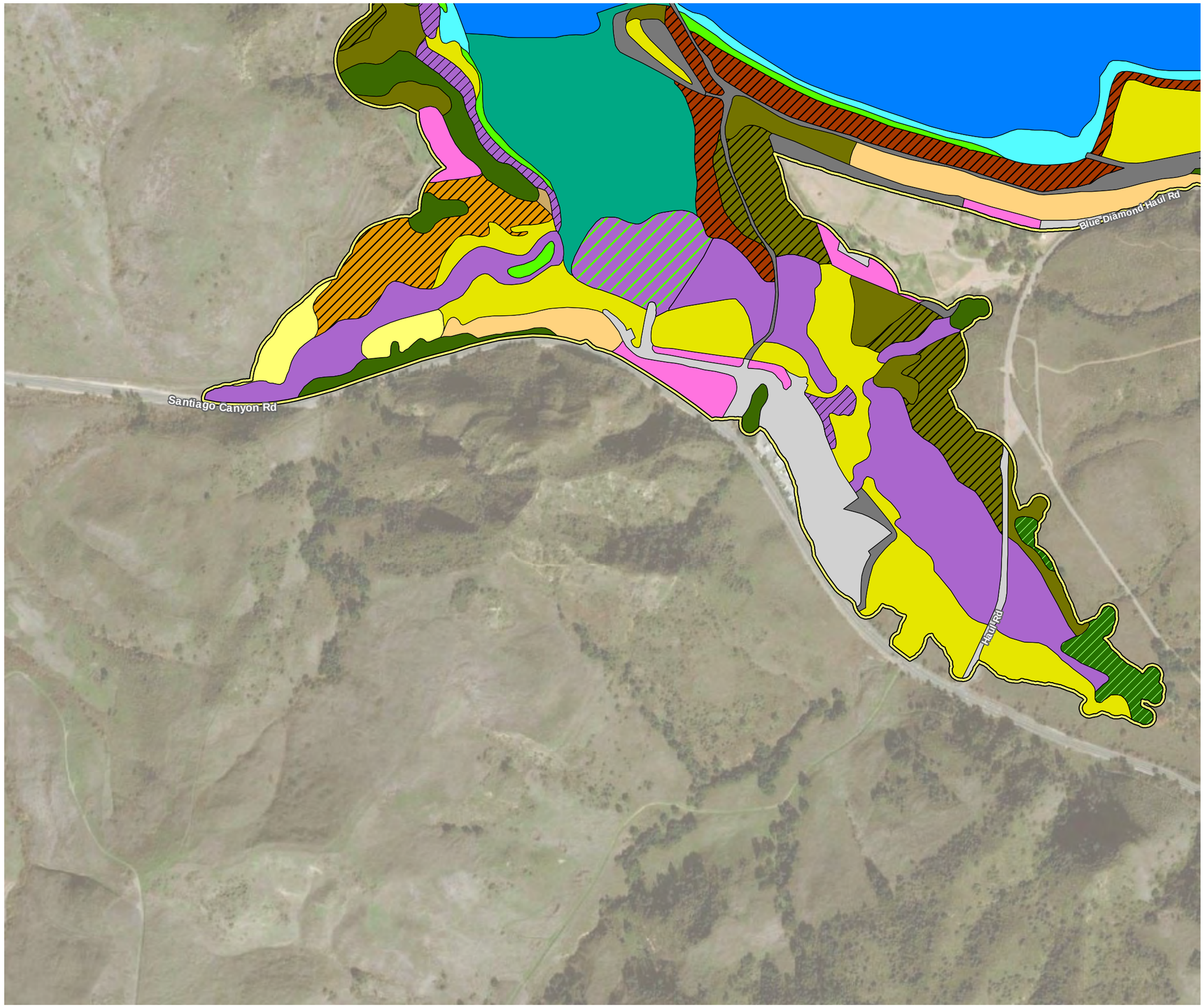
Biological Resources Exhibit 3b

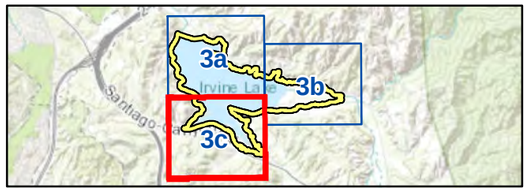
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\LBV_SWF\ex_BioResources_20220829.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

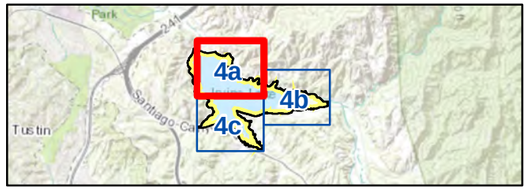
Biological Resources Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\LBV_SWF\ex_BioResources_20220829.mxd



Survey Area

Special Status Species Observed

- Grasshopper Sparrow Individual
- Least Bell's Vireo Pair
- White-Tailed Kite Pair
- Yellow-Breasted Chat Individual
- Yellow-Breasted Chat Pair

N
W E
S

500 250 0 500
Feet

Aerial Source: Esri, Maxar 2020

Special Status Species Observed

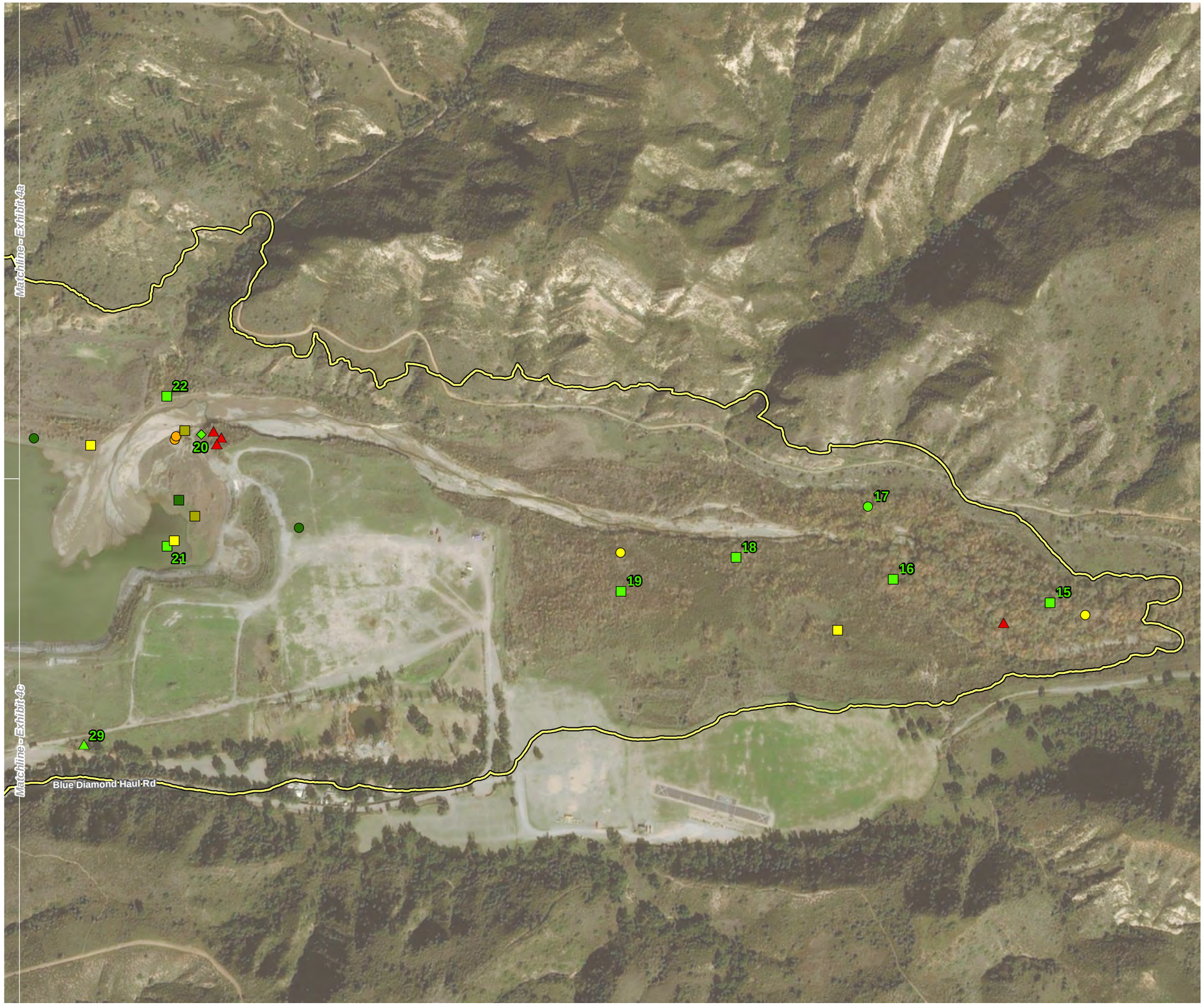
Exhibit 4a

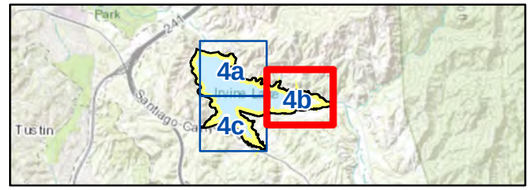
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 09/28/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWFlex_SS_Observed.pdf

D:\Projects\3IRW\010200\MXD\LBV_SWFlex_SS_Observed_20220909.mxd





Survey Area

Special Status Species Observed

- Belding's Orange-Throated Whiptail Individual
- Grasshopper Sparrow Individual
- Grasshopper Sparrow Pair
- Least Bell's Vireo Individual Male
- Least Bell's Vireo Individual Male (Observed On Only One Visit)
- Least Bell's Vireo Pair
- Least Bell's Vireo Pair (Nest)
- Willow Flycatcher Migrant (Observed On Only One Visit)
- Yellow Warbler Pair
- Yellow-Breasted Chat Individual
- Yellow-Breasted Chat Pair

N
W E
S

500 250 0 500 Feet

Aerial Source: Esri, Maxar 2020

Special Status Species Observed

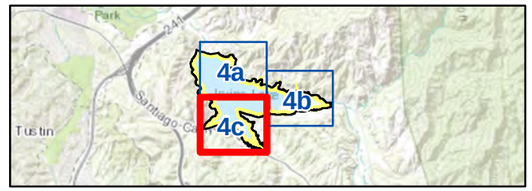
Exhibit 4b

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 09/28/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_SS_Observed.pdf

D:\Projects\3IRW\010200\MXD\LBV_SWF\ex_SS_Observed_20220909.mxd



Survey Area

Special Status Species Observed

- Coastal Whiptail Individual
- Least Bell's Vireo Pair
- Least Bell's Vireo Pair (Nest)
- Willow Flycatcher Migrant (Observed On Only One Visit)
- Yellow Warbler Pair
- Yellow-Breasted Chat Individual
- Yellow-Breasted Chat Pair

N
W E
S

500 250 0 500 Feet

Aerial Source: Esri, Maxar 2020

Special Status Species Observed

Exhibit 4c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 09/28/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_SS_Observed.pdf

D:\Projects\3IRW010200\MXD\LBV_SWF\ex_SS_Observed_20220909.mxd

ATTACHMENT A

SITE PHOTOGRAPHS

View of riparian habitat in the southern portion of the survey area facing southeast. A pair of least Bell's vireos nested in this area at Location 1.

View of riparian habitat in the southern portion of the survey area facing north. A pair of least Bell's vireos nested in this area at Location 3.

D:\Projects\3IRW\010200\GRAPHICS\LBV_SWF\Att_SP1_20220829.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\Att_SP.pdf

View of riparian habitat in the southwestern portion of the survey area facing southeast. A pair of least Bell's vireos nested in this area at Location 9.

View of riparian habitat in the southwestern portion of the survey area facing southeast. A pair of least Bell's vireos nested in this area at Location 10.

View of least Bell's vireo observed in the middle portion of the survey area at Location 20.

View of riparian habitat in the middle portion of the survey area facing north. A pair of least Bell's vireos nested in this area at Location 20.

D:\Projects\3IRW\010200\GRAPHICS\LBV_SWF\Att_SP3_20220829.ai

View of least Bell's vireo observed in the middle portion of the survey area at Location 14.

View of riparian habitat in the eastern portion of the survey area facing east. A pair of least Bell's vireos nested in this area at Location 19.

D:\Projects\3IRW\010200\GRAPHICS\LBV_SWF\Att_SP4_20220829.ai

Site Photographs

Attachment A-4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\Att_SP.pdf

View of a migrant willow flycatcher observed in the southern portion of the survey area.

View of a migrant willow flycatcher observed in the southern portion of the survey area.

D:\Projects\3IRW\010200\GRAPHICS\LBV_SWF\Att_SP5_20220829.ai

Site Photographs

Attachment A-5

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\Att_SP.pdf

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
LIZARDS		
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY		
Sceloporus occidentalis	western fence lizard	
Uta stansburiana	common side-blotched lizard	
TEIIDAE – WHIPTAIL LIZARD FAMILY		
Aspidoscelis hyperythra beldingi	Belding's orange-throated whiptail	WL
Aspidoscelis tigris stejnegeri	coastal whiptail	SSC
SNAKES		
COLUBRIDAE – COLUBRID SNAKE FAMILY		
Coluber flagellum piceus	red racer	
Pituophis catenifer	gopher snake	
BIRDS		
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY		
Branta canadensis	Canada goose	
Anas platyrhynchos	mallard	
Bucephala albeola	bufflehead	
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY		
Callipepla californica	California quail	
PODICIPEDIDAE – GREBE FAMILY		
Podilymbus podiceps	pied-billed grebe	
Aechmophorus occidentalis	western grebe	
Aechmophorus clarkii	Clark's grebe	
COLUMBIDAE – PIGEON AND DOVE FAMILY		
Zenaida macroura	mourning dove	
CUCULIDAE – CUCKOO AND ROADRUNNER		
Geococcyx californianus	greater roadrunner	
APODIDAE – SWIFT FAMILY		
Aeronautes saxatalis	white-throated swift	
TROCHILIDAE – HUMMINGBIRD FAMILY		
Archilochus alexandri	black-chinned hummingbird	
Calypte anna	Anna's hummingbird	
Calypte costae	Costa's hummingbird	
Selasphorus sasin	Allen's hummingbird	
RALLIDAE – RAIL AND COOT FAMILY		
Fulica americana	American coot	
CHARADRIIDAE – PLOVER FAMILY		
Charadrius vociferus	killdeer	
SCOLOPACIDAE – SANDPIPER FAMILY		
Calidris minutilla	least sandpiper	
LARIDAE – GULL AND TERN FAMILY		
Larus delawarensis	ring-billed gull	
Sterna forsteri	Forster's tern	
PHALACROCORACIDAE – CORMORANT FAMILY		

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
Phalacrocorax auritus	double-crested cormorant	
ARDEIDAE – HERON FAMILY		
Ardea alba	great egret	
Egretta thula	snowy egret	
CATHARTIDAE – NEW WORLD VULTURE FAMILY		
Cathartes aura	turkey vulture	
ACCIPITRIDAE – HAWK FAMILY		
Elanus leucurus	white-tailed kite	FP
Accipiter striatus	sharp-shinned hawk	
Buteo lineatus	red-shouldered hawk	
Buteo jamaicensis	red-tailed hawk	
PICIDAE – WOODPECKER FAMILY		
Melanerpes formicivorus	acorn woodpecker	
Picoides nuttallii	Nuttall's woodpecker	
FALCONIDAE – FALCON FAMILY		
Falco sparverius	American kestrel	
TYRANNIDAE – TYRANT FLYCATCHER FAMILY		
Empidonax difficilis	Pacific-slope flycatcher	
Sayornis nigricans	black phoebe	
Sayornis saya	Say's phoebe	
Myiarchus cinerascens	ash-throated flycatcher	
Tyrannus vociferans	Cassin's kingbird	
VIREONIDAE – VIREO FAMILY		
Vireo bellii pusillus	least Bell's vireo	FE, SE
Vireo gilvus	warbling vireo	
CORVIDAE – JAY AND CROW FAMILY		
Aphelocoma californica	California scrub-jay	
Corvus brachyrhynchos	American crow	
Corvus corax	common raven	
ALAUDIDAE – LARK FAMILY		
Eremophila alpestris	horned lark	
HIRUNDINIDAE – SWALLOW FAMILY		
Tachycineta bicolor	tree swallow	
Stelgidopteryx serripennis	northern rough-winged swallow	
Hirundo rustica	barn swallow	
Petrochelidon pyrrhonota	cliff swallow	
PARIDAE – TITMOUSE FAMILY		
Baeolophus inornatus	oak titmouse	
AEGITHALIDAE – BUSHTIT FAMILY		
Psaltriparus minimus	bushtit	
TROGLODYTIDAE – WREN FAMILY		
Troglodytes aedon	house wren	
Thryomanes bewickii	Bewick's wren	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	SSC
POLIOPTILIDAE – GNATCATCHER FAMILY		
Polioptila caerulea	blue-gray gnatcatcher	
SYLVIIDAE – SILVIID WARBLERS FAMILY		
Chamaea fasciata	wrentit	
TURDIDAE – THRUSH FAMILY		
Sialia mexicana	western bluebird	
Turdus migratorius	American robin	
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY		
Toxostoma redivivum	California thrasher	
Mimus polyglottos	northern mockingbird	
STURNIDAE – STARLING FAMILY		
*Sturnus vulgaris**	European starling*	
BOMBYCILLIDAE – WAXWING FAMILY		
Bombycilla cedrorum	cedar waxwing	
PTILOGONATIDAE – SILKY-FLYCATCHER FAMILY		
Phainopepla nitens	phainopepla	
FRINGILLIDAE – FINCH FAMILY		
Haemorhous mexicanus	house finch	
Spinus psaltria	lesser goldfinch	
PASSERELLIDAE – NEW WORLD SPARROW FAMILY		
Ammodramus savannarum	grasshopper sparrow	SSC
Chondestes grammacus	lark sparrow	
Zonotrichia leucophrys	white-crowned sparrow	
Melospiza melodia	song sparrow	
Melospiza lincolnii	Lincoln’s sparrow	
Melozone crissalis	California towhee	
Pipilo maculatus	spotted towhee	
ICTERIIDAE – YELLOW-BREASTED CHAT FAMILY		
Icteria virens	yellow-breasted chat	SSC
ICTERIDAE – BLACKBIRDS AND ORIOLES		
Sturnella neglecta	western meadowlark	
Icterus cucullatus	hooded oriole	
Icterus bullockii	Bullock’s oriole	
Agelaius phoeniceus	red-winged blackbird	
Molothrus ater	brown-headed cowbird	
Quiscalus mexicanus	great-tailed grackle	
PARULIDAE – WOOD-WARBLER FAMILY		
Geothlypis trichas	common yellowthroat	
Setophaga petechia	yellow warbler	SSC
Setophaga coronata	yellow-rumped warbler	
Cardellina pusilla	Wilson’s warbler	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
CARDINALIDAE – CARDINALS AND ALLIES		
Pheucticus melanocephalus	black-headed grosbeak	
Passerina caerulea	blue grosbeak	
Passerina amoena	lazuli bunting	
MAMMALS		
SCIURIDAE – SQUIRREL FAMILY		
Otospermophilus beecheyi	California ground squirrel	
GEOMYIDAE – POCKET GOPHER FAMILY		
Thomomys bottae	Botta's pocket gopher	
LEPORIDAE – HARE AND RABBIT FAMILY		
Sylvilagus audubonii	desert cottontail	
CANIDAE – CANID FAMILY		
Canis latrans	coyote	
Urocyon cinereoargenteus	common gray fox	
CERVIDAE – CERVID FAMILY		
Odocoileus hemionus	southern mule deer	

USFWS: U.S. Fish and Wildlife Service

Species Status:

Federal (USFWS)	State (CDFW)
FE Endangered	SE Endangered
	FP Fully Protected
	SSC Species of Special Concern
	WL Watch List

ATTACHMENT C

CALIFORNIA NATURAL DIVERSITY DATABASE FORMS

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0024
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Vireo bellii pusillus*

Common name: least Bell's vireo

Date of field work (mm-dd-yyyy): 07-14-2022

Comment about field work date(s): April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14.

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with species visually and aurally

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: 8 protocol surveys; 2 days were required to cover the entire survey area for each of the 8 visits.

Total number of individuals: 93

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
55	38			

Age class comment:

28 least Bell’s vireo locations:

1) 33.764777°, -117.710305° (Pair with 2 juveniles)
2) 33.765114°, -117.711182° (Pair with 2 juveniles)
3) 33.765876°, -117.712117° (Pair with 2 juveniles)
4) 33.768001°, -117.714219° (Pair with 2 juveniles)
5) 33.769314°, -117.714889° (Pair with 1 juvenile)
6) 33.768878°, -117.715414° (Pair with 3 juveniles)
7) 33.769731°, -117.716091° (Pair with 2 juveniles)
8) 33.770402°, -117.718515° (Pair with 1 juvenile)
9) 33.770277°, -117.719961° (Pair with 1 juvenile)
10) 33.772119°, -117.721014° (Pair with 1 juvenile)
11) 33.773265°, -117.716250° (Pair)
12) 33.772626°, -117.714527° (Pair with 1 juvenile)
13) 33.772080°, -117.712309° (Pair with 2 juveniles)
14) 33.771542°, -117.710188° (Pair; juvenile heard)
15) 33.774118°, -117.690132° (Pair with 2 juveniles)
16) 33.774419°, -117.692770° (Pair)
17) 33.775328°, -117.693509° (male)
18) 33.774692°, -117.695418° (Pair with 1 juvenile)
19) 33.774194°, -117.697336° (Pair; juvenile heard)
20) 33.776310°, -117.704417° (Pair with 2 juveniles)
21) 33.774737°, -117.704965° (Pair with 2 juveniles)
22) 33.776838°, -117.705004° (Pair with 1 juvenile)
23) 33.776837°, -117.708460° (Pair with 2 juveniles)
24) 33.776944°, -117.710168° (Pair with 1 juvenile)
25) 33.778569°, -117.711445° (Pair with 2 juveniles)
26) 33.778805°, -117.712710° (Pair with 1 juvenile)
27) 33.776649°, -117.714474° (Pair with 1 juvenile)
28) 33.780173°, -117.716426° (Pair with 1 juvenile)

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? Pairs were observed foraging, nest building, incubating nest, feeding nestlings, and feeding juveniles. Individual male was observed foraging.

Describe any evidence of reproduction: Twenty-five pairs were observed to have successfully nested; a total of thirty-eight juveniles were observed during focused survey.

SITE INFORMATION

Habitat description: Riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb occur upstream of the Dam on the project site.

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

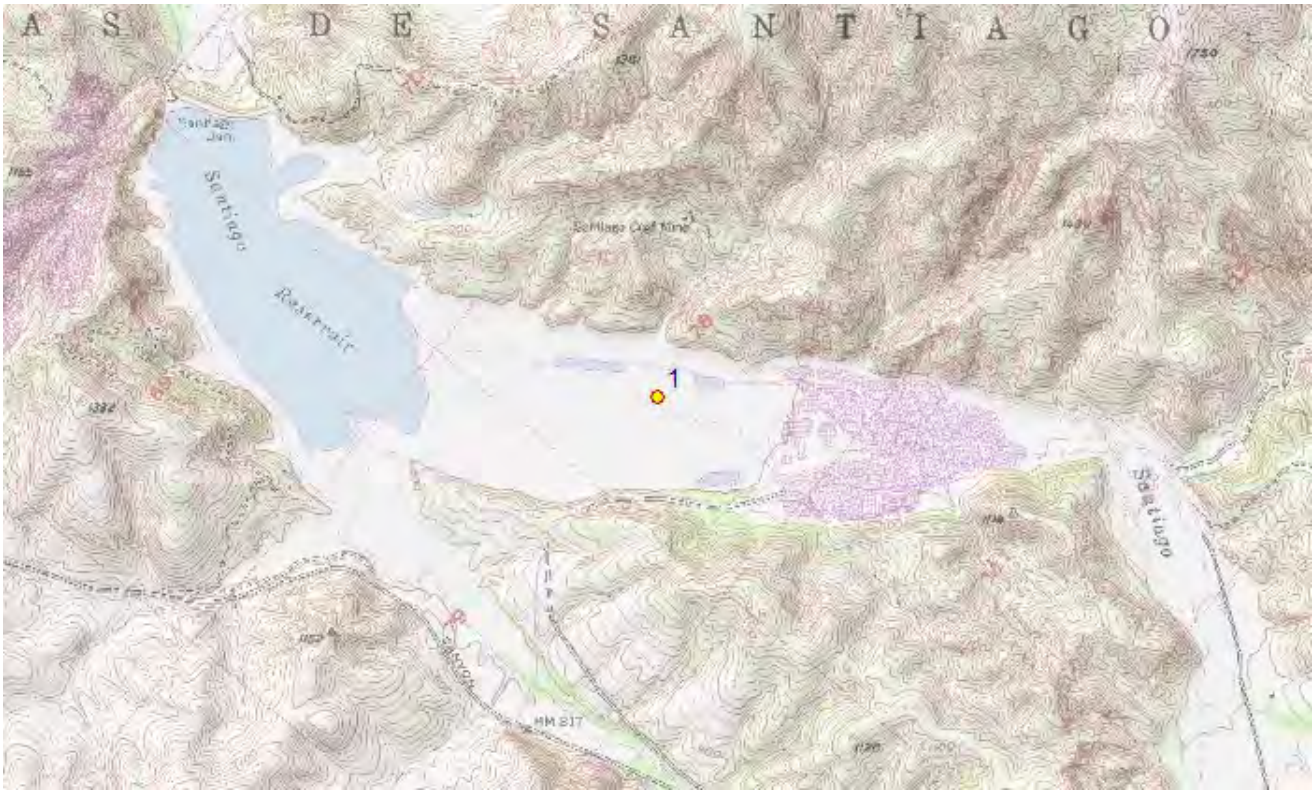
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77529	-117.70502	434721	3737464	11

1	Public Land Survey	Feature Comment
	S T04S R08W 34	28 Territories (27 pairs and 1 male)

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: Please see attachment.

Location/directions comments:

Attachment(s): 28 LBVI locations.docx

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0025
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Aspidoscelis hyperythra*

Common name: orange-throated whiptail

Date of field work (mm-dd-yyyy): 05-26-2022

Comment about field work date(s): Incidental observation during protocol focused surveys for least Bell's vireo

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with California reptiles through research, workshops, and/or training.

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort:

Total number of individuals: 2

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
	2			

Age class comment:

Site use description:

What was the observed behavior? Foraging

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Juveniles observed within ruderal and riparian herb. Ruderal is dominated by grayish shortpod mustard (Hirschfeldia incana). Riparian herb is dominated by mule fat (Baccharis salicifolia ssp. salicifolia) with Goodding's black willow (Salix gooddingii), arroyo willow (Salix lasiolepis), mule fat, and saltcedar (Tamarix ramosissima).

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77628	-117.70483	434740	3737574	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	2 juveniles						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0026
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Aspidoscelis tigris stejnegeri*

Common name: coastal whiptail

Date of field work (mm-dd-yyyy): 06-08-2022

Comment about field work date(s): Incidental observation during protocol focused surveys for least Bell's vireo

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with California reptiles through research, workshops, and/or training.

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort:

Total number of individuals: 3

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
3				

Age class comment:

Site use description:

What was the observed behavior? Foraging

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Individuals observed within southern black willow forest. Southen black willow forest is dominated by Goodding's black willow (Salix gooddingii), with arroyo willow (Salix lasiolepis), blue elderberry (Sambucus nigra ssp. caerulea), and mule fat (Baccharis salicifolia ssp. salicifolia).

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.76960	-117.71720	433588	3736841	11
1	**Public Land Survey**	**Feature Comment**						
	S T05S R08W 4	coastal whiptail #1						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: Coastal whiptail #2: 33.769770, -117.717106; and coastal whiptail #3: 33.769081, -117.715273

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0020
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Elanus leucurus*

Common name: white-tailed kite

Date of field work (mm-dd-yyyy): 07-01-2022

Comment about field work date(s): Additionally observed during on April 13 and June 7, 2022

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species, visually and aurally

Identification explanation: Identified visually

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidental observation during least Bell's vireo surveys

Total number of individuals: 2

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2				

Age class comment:

Bird site use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☑ **Other**

Site use description: Pair observed using site for perching and foraging.

What was the observed behavior? Pair observed perched together and foraging near Irvine Lake.

Describe any evidence of reproduction: None

SITE INFORMATION

Habitat description: Pair was found in southern black willow forest/riparian herb with Goodding's black willow (Salix gooddingii), cocklebur (Xanthium strumarium), white sweetclover (Melilotus albus), alkali-mallow (Malvella leprosa), and grayish shortpod mustard.

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

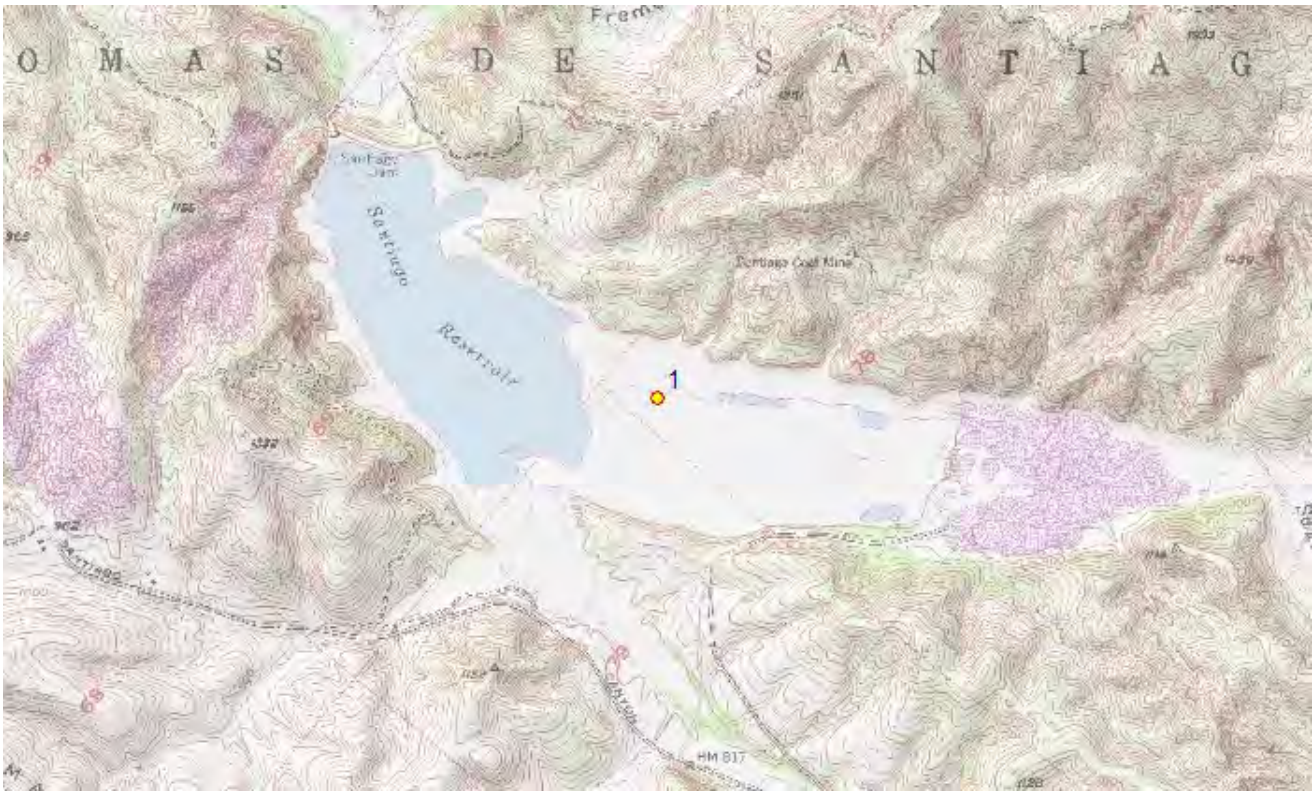
Immediate & surrounding land use: Open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training and training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77660	-117.71249	434030	3737615	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	WTKI Pair						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0028
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Ammodramus savannarum*

Common name: grasshopper sparrow

Date of field work (mm-dd-yyyy): 06-08-2022

Comment about field work date(s): Incidental observations on May 26 and June 8, 2022

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with species visually and aurally

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort:

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
4				

Age class comment:

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? Individuals observed foraging. Pair observed defending territory and appeared to be nesting.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Pair and individuals observed within ruderal vegetation. Ruderal is dominated by grayish shortpod mustard (Hirschfeldia incana) with some native herbs and non-native grasses.

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

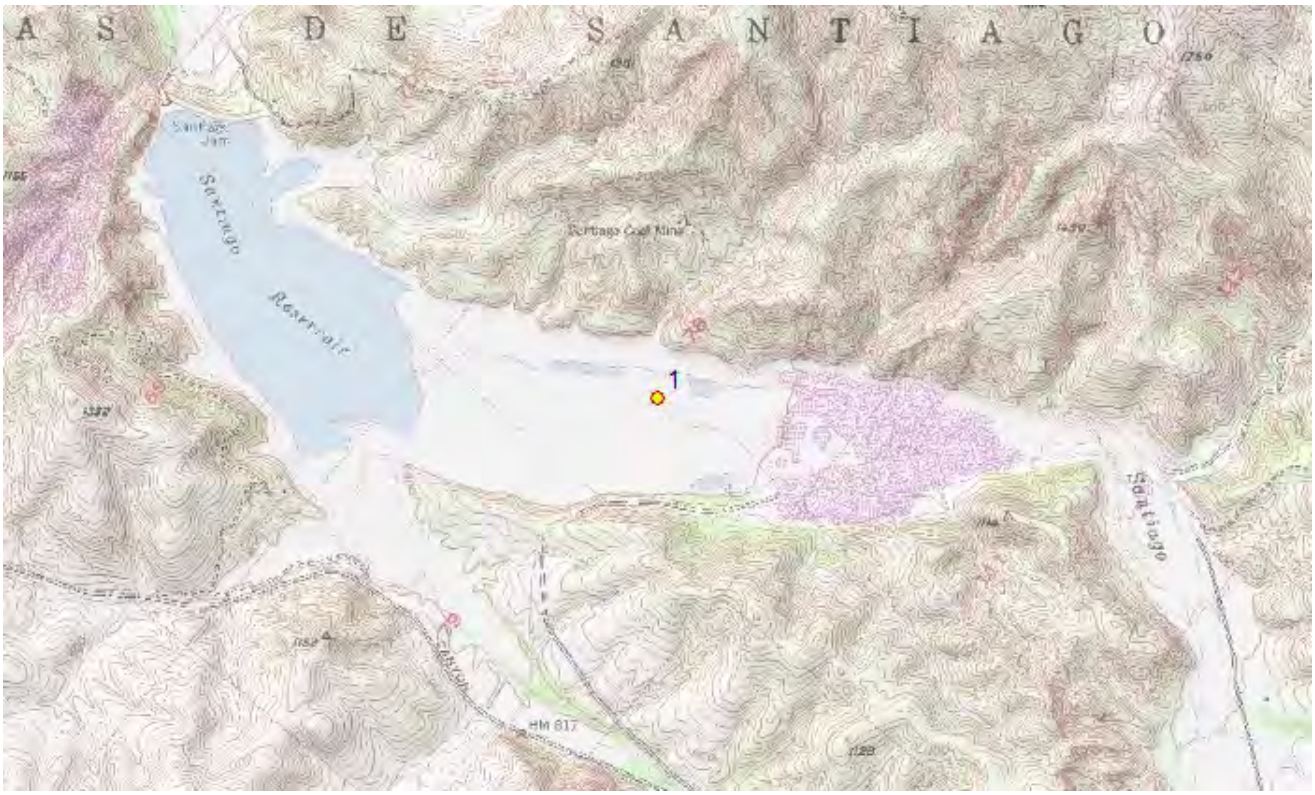
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority. Maintenance mowing of the area.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77539	-117.70477	434744	3737476	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	grasshopper sparrow pair						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: Pair: 33.775394, -117.704775 (pair observed on May 26 and June 8, 2022); Individual #1: 33.775022, -117.702750 (observed on 5/26/22); and individual #2: 33.776226, -117.707214 (observed on 6/8/2022)

Location/directions comments:

Attachment(s):

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0029
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Icteria virens*

Common name: yellow-breasted chat

Date of field work (mm-dd-yyyy): 07-14-2022

Comment about field work date(s): Incidental observations on May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14.

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with species visually and aurally

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidental observation during protocol focused surveys for least Bell's vireo

Total number of individuals: 43

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
36	7			

Age class comment:

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? Pairs were observed foraging and feeding juveniles. Individual were observed foraging.

Describe any evidence of reproduction: Pairs observed feeding juveniles.

SITE INFORMATION

Habitat description: Riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb occur upstream of the Dam on the project site.

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

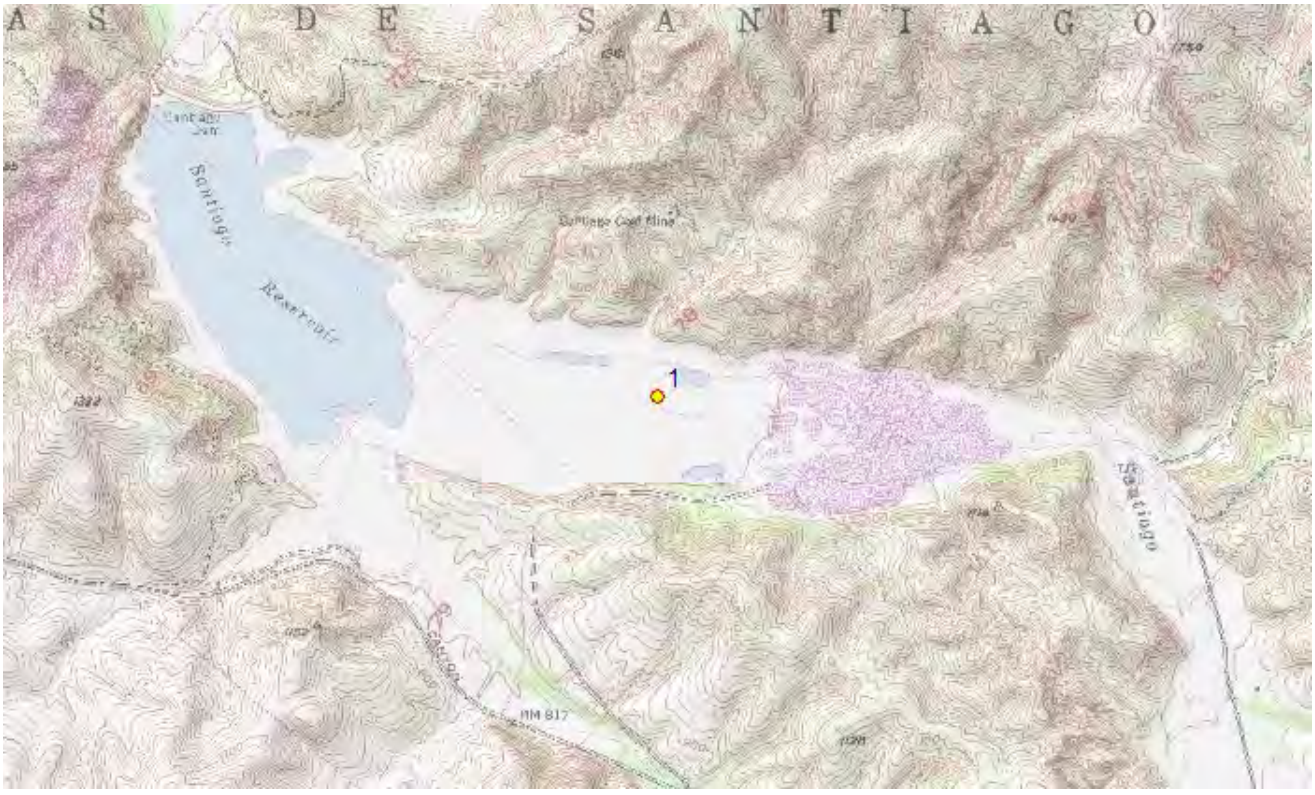
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77507	-117.70436	434782	3737440	11

1	Public Land Survey	Feature Comment
	S T04S R08W 34	28 pairs and 7 individuals

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: Please see attachment.

Location/directions comments:

Attachment(s): 21 YBCH locations.docx

21 yellow-breasted chat locations:

1) 33.768784°, -117.723804° (Pair)
2) 33.768758°, -117.714398° (Pair)
3) 33.764610°, -117.711081° (Pair)
4) 33.772185°, -117.712763° (Pair with 2 juveniles)
5) 33.770131°, -117.720144° (Pair)
6) 33.767752°, -117.713623° (Pair with 1 juvenile)
7) 33.776137°, -117.706273° (Pair)
8) 33.777870°, -117.710672° (Pair with 1 juvenile)
9) 33.776485°, -117.713231° (Individual)
10) 33.778968°, -117.714234° (Pair)
11) 33.769624°, -117.715906° (Pair with 2 juveniles)
12) 33.776820°, -117.708233° (Individual)
13) 33.773692°, -117.693693° (Pair)
14) 33.774735°, -117.697351° (Individual)
15) 33.773926°, -117.715910° (Individual)
16) 33.771552°, -117.710026° (Pair)
17) 33.765910°, -117.712344° (Individual)
18) 33.771802°, -117.721292° (Pair)
19) 33.773950°, -117.689537° (Individual)
20) 33.773118°, -117.715298° (Pair)
21) 33.774819°, -117.704847° (Pair with 1 juvenile)

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code AGU22F0027
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Setophaga petechia*

Common name: yellow warbler

Date of field work (mm-dd-yyyy): 07-14-2022

Comment about field work date(s): Incidental observations on June 7, 8, 21, and 22; and July 1, 4, 13, and 14.

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with species visually and aurally

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Incidental observation during protocol focused surveys for least Bell's vireo

Total number of individuals: 10

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
10				

Age class comment:

Bird site use:

☑ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrow site** ☐ **Lek**

☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? Pairs were observed foraging. Pairs appear to be nesting.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb occur upstream of the Dam on the project site.

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77636	-117.70469	434752	3737583	11
1	**Public Land Survey**	**Feature Comment**						
	S T04S R08W 34	YEWA Pair #1						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: Pair #2: 11s 434769, 3737450; Pair #3: 11s 433759, 3736816; Pair #4: 11s 433341, 3736877; and Pair #5: 11s 434155, 3736307

Location/directions comments:

Attachment(s):

ATTACHMENT D

LEAST BELL'S VIREO SURVEY DATA SUMMARY FORM

LEAST BELL'S VIREO SURVEY DATA SUMMARY

Site Information

Project Title:	Santiago Creek Dam Outlet Tower and Spillway Improvement Project
Landowner:	County of Orange

Survey Information

Surveyors:	Jonathan Aguayo	Year:	2022

Survey Begin Coordinates		Survey End Coordinates		Datum
Northing:	3736684	Northing:	3737277	NAD83
Easting:	**432888**	Easting:	436296	NAD83

Survey Length (Km)	Total Number of Surveys	Total Number of Survey Hours
7.6	8	54.18

Least Bell's Vireo Detection Information

Number of males that were:

Paired:	27	Based on observation of female, nest, young, or nesting behavior (nest-building, food carrying).
Undetermined Status:	1	The total number of resident males not confirmed as paired.
Transient:	1	Only detected once despite repeated surveys, or were not detected at the same location for more than 2 weeks.
Total number of males:	29	The sum of the three categories above.

Coordinates for LBVI Territories (continue on second sheet if necessary)

Territory ID	Northing	Easting	Status/Comments (e.g. paired)
1	3736302	434224	paired, fledged two juveniles
2	3736340	434143	paired, fledged two juveniles
3	3736425	434057	paired, fledged two juveniles
4	3736662	433864	paired, fledged two juveniles
5	3736808	433803	paired, fledged one juvenile
6	3736760	433754	paired, fledged three juveniles
7	3736855	433692	paired, fledged two juveniles
8	3736931	433468	paired, fledged one juvenile
9	3736918	433334	paired, fledged one juvenile
10	3737123	433238	paired, fledged one juvenile
11	3737247	433680	paired

Coordinates for LBVI Territories (continue on second sheet if necessary)			
Territory ID	Northing	Easting	Status/Comments (e.g. paired)
12	3737175	433839	paired, fledged one juvenile
13	3737113	434044	paired, fledged two juveniles
14	3737052	434240	paired, juvenile heard
15	3737325	436099	paired, fledged two juveniles
16	3737360	435855	paired
17	3737444	435780	male
18	3737392	435610	paired, fledged one juvenile
19	3737338	435432	paired, juvenile heard
20	3737577	434778	paired, fledged two juveniles
21	3737403	434726	paired, fledged two juveniles
22	3737636	434724	paired, fledged one juvenile
23	3737638	434404	paired, fledged two juveniles
24	3737651	434246	paired, fledged one juvenile
25	3737832	434129	paired, fledged two juveniles
26	3737859	434012	paired, fledged one juvenile
27	3737621	433847	paired, fledged one juvenile
28	3738013	433669	paired, fledged one juvenile

ATTACHMENT E

WILLOW FLYCATCHER SURVEY AND DETECTION FORM

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project State: California County: Orange

USGS Quad Name: Black Star Canyon Elevation: 200 to 303 (meters)

Creek, River, or Lake Name: Irvine Lake

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** X ***No*** ____

Survey Coordinates: Start: E 434219 N 3736223 UTM Datum: NAD 83 (See instructions)

Stop: E 432935 N 3736729 UTM Zone: 11S

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s): Jonathan Aguayo	Date: 5/25/2022 Start: 5:34 Stop: 8:22 Total hrs: 2.8	1	N/A	N/A	N	One individual was detected. Individual responded to recorded playback by singing "fitbew" multiple times.	# Birds	Sex	UTM E	UTM N
							1	Unk	434180	3736254
Survey # 2 Observer(s): Jonathan Aguayo	Date: 6/7/2022 Start: 5:38 Stop: 8:37 Total hrs: 2.98	1	N/A	N/A	N	One individual was detected. Individual was detected singing unsolicited “fitzbew” vocalization.	# Birds	Sex	UTM E	UTM N
							1	Unk	433875	3736658
Survey # 3 Observer(s): Jonathan Aguayo	Date: 6/21/2022 Start: 5:40 Stop: 8:38 Total hrs: 2.97	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
Survey # 4 Observer(s): Jonathan Aguayo	Date: 7/1/2022 Start: 5:32 Stop: 8:36 Total hrs: 3.07	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
Survey # 5 Observer(s): Jonathan Aguayo	Date: 7/13/2022 Start: 5:52 Stop: 8:44 Total hrs: 2.87	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N

Overall Site Summary	Total Adult Residents	Total Pairs	Total Territories	Total Nests
Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals.	0	0	0	0
Total survey hrs: **14.69**				

Were any WIFLs color-banded? Yes ____ No ____

If yes, report color combination(s) in the comments section on back of form and report to USFWS.

Reporting Individual: Jonathan Aguayo Date Report Completed: 9/28/2022

US Fish & Wildlife Service Permit #: TE 96514A-3 State Wildlife Agency Permit #: EID-190240002

Submit ***form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.***

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: Jonathan Aguayo — Phone #: 8052046986

Affiliation: Psomas — E-mail: Jonathan.Aguayo@psomas.com

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project — Date report Completed: 092822

Was this site surveyed in a previous year? Yes____ No____ Unknown x

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable X

If name is different, what name(s) was used in the past?

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes ____ No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County ____ State ____ Tribal ____ Private X

Name of Management Entity or Owner (e.g., Tonto National Forest): Private - Irvine Ranch

Length of area surveyed: 1.7 (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Baccharis salicifolia ssp. salicifolia, Salix gooddingii, and Salix lasiolepis

Average height of canopy (Do not include a range): 6 (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;

2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;

3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)
1	5/25/2022	434180	3736254	N	N	No breeding or territorial behavior was observed.
2	6/7/2022	433875	3736658	N	N	No breeding or territorial behavior was observed.

Attach additional sheets if necessary

Territory Summary Table, continued

Reporting Individual _____ Phone # _____
Affiliation _____ E-mail _____
Site Name _____ Date report Completed _____

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, renesting attemps, behavior)

Comments

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project State: California County: Orange

USGS Quad Name: Black Star Canyon Elevation: 200 to 303 (meters)

Creek, River, or Lake Name: Irvine Lake

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** X ***No*** ____

Survey Coordinates: Start: E 436199 N 3737256 UTM Datum: NAD 83 (See instructions)

Stop: E 433595 N 3737990 UTM Zone: 11S

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s): Jonathan Aguayo	Date: 5/26/2022 Start: 5:31 Stop: 8:30 Total hrs: 2.98	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
Survey # 2 Observer(s): Jonathan Aguayo	Date: 6/8/2022 Start: 5:36 Stop: 8:34 Total hrs: 2.97	1	N/A	N/A	N	One individual was detected. Individual responded to recorded playback by singing "fitbew" multiple times.	# Birds 1	Sex Unk	UTM E 436027	UTM N 3737293
Survey # 3 Observer(s): Jonathan Aguayo	Date: 6/22/2022 Start: 5:35 Stop: 8:37 Total hrs: 3.03	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
Survey # 4 Observer(s): Jonathan Aguayo	Date: 7/4/2022 Start: 5:50 Stop: 8:46 Total hrs: 2.93	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
Survey # 5 Observer(s): Jonathan Aguayo	Date: 7/14/2022 Start: 6:14 Stop: 8:38 Total hrs: 2.4	0	0	0	0	No WILF detected	# Birds	Sex	UTM E	UTM N

Overall Site Summary	Total Adult Residents	Total Pairs	Total Territories	Total Nests
Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals.	0	0	0	0
Total survey hrs: 14.31				

Were any WIFLs color-banded? Yes ____ No ____

If yes, report color combination(s) in the comments section on back of form and report to USFWS.

Reporting Individual: Jonathan Aguayo Date Report Completed: 9/28/2022

US Fish & Wildlife Service Permit #: TE 96514A-3 State Wildlife Agency Permit #: EID-190240002

Submit ***form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.***

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: Jonathan Aguayo | Phone #: 8052046986

Affiliation: Psomas | E-mail: Jonathan.Aguayo@psomas.com

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project | Date report Completed: 092822

Was this site surveyed in a previous year? Yes____ No____ Unknown x

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable X

If name is different, what name(s) was used in the past? ____

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes ____ No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County ____ State ____ Tribal ____ Private X

Name of Management Entity or Owner (e.g., Tonto National Forest): Private - Irvine Ranch

Length of area surveyed: 2.15 (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Baccharis salicifolia ssp. salicifolia, Salix gooddingii, and Salix lasiolepis

Average height of canopy (Do not include a range): 6 (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;

2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;

3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)
1	6/8/2022	436027	3737293	N	N	No breeding or territorial behavior was observed.

Attach additional sheets if necessary

Territory Summary Table, continued

Reporting Individual _____ Phone # _____
Affiliation _____ E-mail _____
Site Name _____ Date report Completed _____

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, renesting attemps, behavior)

Comments

APPENDIX L

WESTERN YELLOW-BILLED CUCKOO SURVEY

September 30, 2022

Ms. Stacey Love
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Subject: Results of the 2022 Western Yellow-Billed Cuckoo Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused surveys to determine the presence or absence of the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, (hereinafter referred to as the "proposed project") located in Orange County, California (Exhibit 1). The purpose of the surveys was to determine the presence or absence of the western yellow-billed cuckoo upstream of Santiago Dam. A Biologist with the necessary experience and the Federal Endangered Species Act 10(a) survey permit conducted the surveys according to U.S. Fish and Wildlife Service (USFWS) protocol for this species. Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on May 26, 2022.

PROJECT DESCRIPTION AND LOCATION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Biological Study Area. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

The Biological Study Area is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)[1] is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Focused surveys were conducted along Santiago Creek upstream of the lake to determine whether western yellow-billed cuckoo is present or absent adjacent to the proposed staging areas on the east side of the lake.

SURVEY AREA

A variety of vegetation types occur in the Biological Study Area, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats (i.e., southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the dam (Exhibit 3). The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, western yellow-billed cuckoo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats were distributed throughout the survey area. These habitat types were generally dominated by Goodding's black willow (*Salix gooddingii*), red willow (*Salix laevigata*), arroyo willow (*Salix laseolepis*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii)*, western sycamore (*Platanus racemosa*), and white alder (*Alnus rhombifolia*). The understory and edges of these areas contained scattered mule fat (*Baccharis salicifolia* ssp. *salicifolia*), flatsedge (*Cyperus* sp.), broad-leaved cattail (*Typha latifolia*), saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), gum trees (*Eucalyptus* spp.), tree tobacco (*Nicotiana glauca*), and non-native grasses. Site photographs of representative habitat in the survey area are provided in Attachment A.

[1] The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

SPECIES BACKGROUND

Western yellow-billed cuckoo (Distinct Population Segment [DPS]) is a federally and State listed Endangered species. The USFWS concluded that the western population was discrete from the eastern population based on geographic separation during the breeding season, morphological differences, and behavioral differences (USFWS 2014a). The western yellow-billed cuckoo generally occurs west of the crest of the Rocky Mountains, specifically in southwest British Columbia in Canada; Washington, Idaho, western Montana, Oregon, California, Nevada, southwestern Wyoming, Utah, western Colorado, Arizona, western New Mexico, and Texas in the United States; and Baja California Sur, Sonora, Sinaloa, western Chihuahua, and northwestern Durango in Mexico (USFWS 2014a). It winters in South America east of the Andes, primarily south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (Ehrlich et al. 1992; American Ornithologists' Union 1998; Johnson et al. 2008). The western yellow-billed cuckoo arrives in southern California between late May and early July, with most arriving in mid-June; it departs for its wintering grounds from mid-September to mid-October (Halterman et al. 2015). The peak of breeding activity lasts about one month and is typically in July; but in some years it can begin as early as May and can end as late as September (Laymon et al. 1997; Halterman 1991, 2009; McNeil et al. 2013; Halterman et al. 2015).

The western yellow-billed cuckoo requires large tracts of riparian forest or woodland habitat along low-gradient rivers and streams in open riverine valleys that provide wide floodplain conditions (USFWS 2014b). The optimal size of habitat patches for the species is generally greater than 200 acres in extent and has dense canopy closure and high foliage volume of willows and cottonwoods (Laymon and Halterman 1989). Habitat between 100 acres and 200 acres, although considered suitable, are not consistently used by the species (Laymon and Halterman 1989). Habitat patches from 50 to 100 acres in size are considered marginal habitat; sites less than 37 acres are considered unsuitable habitat (Laymon and Halterman 1989). The species does not use narrow, steep-walled canyons (USFWS 2014b). Sites with strips of habitat less than 325 feet in width are rarely occupied for nesting (USFWS 2014b). Stopover and foraging sites can be similar to breeding sites but can be smaller in size (sometimes less than 10 acres in extent), narrower in width, and lack understory vegetation when compared to nesting sites (Laymon and Halterman 1989; USFWS 2014b). Minimum patch size for cuckoo occupancy is 12.4 acres; no cuckoos have been detected attempting to nest in patches this size or smaller in California or Arizona (Halterman et al. 2001; Johnson et al. 2010). They have also not been found nesting in narrow, linear habitat that is less than 33 to 66 feet wide (Halterman et al. 2015).

Optimal breeding habitat contains willow-dominated groves with dense canopy closure and well-foliaged branches for nest building with nearby foraging areas consisting of a mixture of cottonwoods and willows with a high volume of healthy foliage (USFWS 2014b). Sites can be relatively dense, contiguous stands or irregularly shaped mosaics of dense vegetation with open areas (USFWS 2014b). In California, habitat often consists of willows mixed with Fremont cottonwood (Halterman et al. 2015). Nest trees range from 10 feet to 98 feet in height and are an average of 35 feet in height. Nests are typically well-concealed in dense vegetation (Halterman 2002; Laymon et al. 1997; McNeil et al. 2013). Hydrologic conditions can vary from dry in some years to inundated in others (USFWS 2014b). Humid conditions created by surface and subsurface moisture appear to be important habitat parameters for selection of nest sites (USFWS 2014b). Multiple studies have found that cuckoo preferred nesting sites in younger riparian habitat which, when compared to mature woodlands, provided high productivity of invertebrate prey and reduced predator abundance (Layman 1998; McNeil et al. 2013; Carstensen et al. 2015; Stanek and Stanek 2012; Johnson et al. 2008). The dynamic transitional process of vegetation recruitment and maturity must be maintained to keep riparian habitat viable for this species over the long-term (USFWS 2014a).

Western yellow-billed cuckoos historically bred throughout riparian systems in western North America from southern British Columbia, Canada, to northwestern Mexico (Hughes 1999). In the past 90 years, the species' range in the western United States has contracted; the northern limit of breeding along the west coast is now in the Sacramento Valley, while the breeding limit in the western interior states is in southeastern Idaho (USFWS 2013). Within the three states with the highest historical number of yellow-billed cuckoo, past riparian habitat losses are estimated to be 90 to 95 percent in Arizona, 90 percent in New Mexico, and 90 to 99 percent in California (Ohmart 1994; USDOI 1994; Noss et al. 1995; Greco 2008). The primary factors threatening the western yellow-billed cuckoo are the loss and degradation of habitat for the species from altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture, and conversion of native habitat to predominantly non-native vegetation. Additional threats to the species include the effects of climate change, pesticides, wildfire, and small and widely separated habitat patches (USFWS 2014a). Compared to conditions historically, the areas currently used for nesting by the western yellow-billed cuckoo are very limited and disjunct. The breeding population is small, with 680 to 1,025 nesting pairs (350 to 495 pairs in the United States and 330 to 530 nesting pairs in Mexico) and with no site exceeding 60 nesting pairs. Estimating numbers is problematic because an individual can nest in more than one location in a single year, possibly causing overestimates of the number of nesting pairs (USFWS 2014b). The current nesting population in California, based on surveys conducted in 2010, likely does not exceed 40 to 50 pairs found in only the three core locations. Core areas in California include (1) the Sacramento River between Colusa and Red Bluff; (2) the South Fork of the Kern River upstream of Lake Isabella; and (3) lower Colorado River (Laymon and Halterman 1987).

This species formerly nested in the Los Angeles, San Gabriel, and the Santa Clara River systems (Allen and Garrett 1996). Breeding persisted until at least 1952 in the San Gabriel River near El Monte (Long 1993; Garrett and Dunn 1981). No nesting of this species has been documented in Los Angeles County since the late 1950s, although breeding is still "conceivable" in remnant riparian habitat along the Santa Clara River (Allen and Garrett 1996). In recent years, yellow-billed cuckoos occur in Los Angeles County and elsewhere in the Southern California Coastal Region only as rare migrants (Lehman 2015; Unitt 2004; Hamilton and Willick 1996; Garrett and Dunn 1981; Webster et al. 1980). Although no recent breeding observations have been confirmed in the Southern California Coastal Region, multiple observations of yellow-billed cuckoos have been reported at some locations with suitable breeding habitat, including the lower Santa Clara River in Ventura County, the Whittier Narrows area in Los Angeles County, Prado Basin in Riverside and San Bernardino Counties, San Joaquin Marsh in Orange County, and San Luis Rey River near Oceanside in San Diego County. These observations generally consist of single birds and sometimes occur at times that suggest summering individuals rather than migrants (McCaskie and Garrett 2013, 2014, 2015, 2016).

On April 21, 2021, the USFWS published a rule designating proposed critical habitat for the western DPS of the yellow-billed cuckoo (USFWS 2021). This proposed rule designated approximately 298,845 acres in Arizona, California, Colorado, Idaho, New Mexico, Texas, and Utah. In California, critical habitat includes the Sacramento River (Colusa, Glenn, Butte, and Tehama Counties), and the South Fork Kern River Valley (Kern County) (USFWS 2021). The Biological Study Area is not located within the proposed designated critical habitat area for this species.

SURVEY METHODS

The USFWS survey protocol for western yellow-billed cuckoo requires a minimum of four surveys be conducted in three time periods that span the peak of breeding activity for the western populations of this species: (1) one survey is required from June 15 to June 30 when migrating yellow-billed cuckoos are passing through but breeding birds are also arriving; (2) two surveys are required from July 1 to July 31 when individual cuckoos encountered are mostly breeders but are occasionally migrants, wandering

individuals, or young of the year; and (3) one survey is required from August 1 to August 15 when most breeding yellow-billed cuckoos have finished breeding activities and are departing. Each survey needs to be conducted 12 to 15 days apart. Focused surveys were conducted by Lindsay Messett (TE-067064-5).

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. Per USFWS survey protocol for the species, Ms. Messett played recorded contact or "kowlp" calls of western yellow-billed cuckoo five times at one-minute intervals at each calling station (or point) established in the survey area. Compact speakers capable of broadcasting recorded bird calls in excess of 70 decibels were used during all surveys. Upon arriving at each calling point, Ms. Messett listened and watched for cuckoos for one minute prior to playing the broadcast contact calls. Calling points were established approximately every 328 feet in riparian habitat that provided potentially suitable or marginally suitable habitat for the western yellow-billed cuckoo. All surveys were conducted under optimal weather conditions (i.e., between 55 degrees Fahrenheit [°F] and 95°F with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak (Table 1). Additionally, per USFWS guidelines, all incidental observations of least Bell's vireo (*Vireo bellii pusillus*) and willow flycatcher (*Empidonax trailli*) were recorded and mapped. All wildlife species detected during the surveys were recorded and are included in Attachment B.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR WESTERN YELLOW-BILLED CUCKOO SURVEYS

Survey No.	Survey Date	Surveyor	Time	Air Temperature (°F)		Cloud Cover (%)	Wind (mph)
				Start	End	Start/End	
1A	June 23, 2022	Messett	6:00 AM–10:50 AM	67	83	50/30	1–3
1B	June 24, 2022	Messett	6:15 AM–10:45 AM	55	80	0/0	0–6
2A	July 12, 2022	Messett	5:50 AM–11:00 AM	64	73	100/0	2–4
2B	July 13, 2022	Messett	5:45 AM–10:55 AM	63	72	100/0	1–2
3A	July 28, 2022	Messett	6:00 AM–11:05 AM	66	76	100/50	0–1
3B	July 29, 2022	Messett	6:05 AM–10:45 AM	67	78	90/75	4–5
4A	August 11, 2022	Messett	6:00 AM–10:30 AM	63	87	25/0	0–1
4B	August 12, 2022	Messett	5:54 AM–11:00 AM	70	82	25/10	0–4

(°F): Fahrenheit; %: percent; mph: miles per hour

RESULTS

No western yellow-billed cuckoos were observed in the survey area during the focused surveys. The required Yellow-Billed Cuckoo Survey Summary and Site Detection Forms are included as Attachment C.

Six other special status species were observed and/or detected in the survey area during the surveys: American white pelican (*Pelecanus erythrorhynchos*, California Species of Special Concern), bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected), least Bell's vireo (State Endangered, Federally Endangered), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*, California Department of Fish and Wildlife [CDFW] Watch List), yellow-breasted chat (*Icteria virens*, California Species of Special Concern), and yellow warbler (*Setophaga petechia*, California Species of Special Concern). These species are tracked by the CDFW's California Natural Diversity Database (CNDDB). The least Bell's vireo, yellow-breasted chat, and yellow warbler were all observed within riparian habitat; exhibits showing the location of these species and CNDDB forms documenting these species were included with the Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher Report (Psomas 2022b). CNDDB forms for the remaining species were included with the Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher Report (Psomas 2022a).

One to three brown-headed cowbirds were observed during the first two focused surveys on June 23 and 24; and July 12 and 13, 2022.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,
PSOMAS

Amber O. Heredia
Senior Project Manager, Resource Management

Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and attached exhibits fully and accurately represents my work.

Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-5)

Enclosures: Exhibit 1
Exhibit 2
Exhibit 3
Exhibit 4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – Yellow-Billed Cuckoo Survey Summary and Site Detection Forms

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com

R:\Projects\IRW_IRWD\3IRW010200\Documentation\YBCU\Santiago YBCU Focused Survey Report-093022.docx

REFERENCES CITED

Allen, L.W., and K.L. Garrett. 1996. *Atlas Handbook: Los Angeles County Breeding Bird Atlas*. West Hollywood CA: Los Angeles Audubon Society.

American Ornithologists' Union (AOU). 2017 (July). *Check-list of North and Middle American Birds* (7th ed., as revised through 58th Supplement). Washington, D.C.: AOU. http://www.americanornithology.org/content/checklist-north-and-middle-american-birds.

———. 1998. Checklist of North American Birds. (7th ed, as revised through 58th Supplement). Washington, D.C: AOU. http://checklist.aou.org/.

Carstensen, D., D. Ahlers, and D. Moore. 2015. Yellow-billed Cuckoo Study Results – 2014: Middle Rio Grande from Los Lunas to Elephant Butte Reservoir, New Mexico. U.S. Bureau of Reclamation, Technical service Center, Denver, CO.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. *Birds in Jeopardy*. Stanford, CA: Stanford University Press.

Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Audubon Press.

Greco, S.E. 2008. Long-term Conservation of the Yellow-billed Cuckoo Will Require Process-based Restoration on the Sacramento River. *Ecesis* 18(3):4–7.

Halterman, M.D. 2009. Sexual dimorphism, detection probability, home range, and parental care in the yellow-billed cuckoo. Dissertation. Reno, NV: University of Nevada, Reno, USA.

———. 2002. Surveys and Life History Studies of the Yellow-Billed Cuckoo: Summer 2001. Admin. Rept., Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, NV and Bureau of Land Management. Sierra Vista, AZ.: Bureau of Reclamation and BLM.

———. 1991. Distribution and Habitat use of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) on the Sacramento River, California, 1987–1990. Master's Thesis. Chico, CA: California State University.

Halterman, M., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 2015 (April). A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo. Flagstaff, AZ: USFWS, Colorado Plateau Research Station. http://www.fws.gov/southwest/es/Documents/R2ES/YBCU_SurveyProtocol_FINAL_DRAFT_22Apr2015.pdf.

Halterman, M.D., D.S. Gilmer, S.A. Laymon, and G.A. Falxa. 2001. Status of the Yellow-billed Cuckoo in California: 1999-2000. Report to the U.S. Geological Survey, Dixon, CA.: USGS.

Hamilton, R.A., and D.R. Willick. 1996. *The Birds of Orange County, California: Status and Distribution*. Irvine, CA: Sea and Sage Audubon Society.

Hughes, J.M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). *The Birds of North America, No. 418* (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.

Johnson, M.J., S.L. Durst, C.M. Calvo, L. Stewart, M.K. Sogge, G. Bland, and T. Arundel. 2008. Yellow-billed cuckoo distribution, abundance, and habitat use along the lower Colorado River and its tributaries, 2007 Annual Report. U.S. Geological Survey Open-File Report 2008–1177.

Johnson, M.J., R.T. Magill, and C. van Riper, III. 2010. Yellow-billed cuckoo distribution and habitat associations in Arizona, 1998-1999. In: *The Colorado Plateau IV: Integrating Research and Resources Management for Effective Conservation* (van Riper, C., III, B. F. Wakeling, and T. D. Sisk, eds). Tucson, AZ: University of Arizona Press.

Laymon, S.A. 1998. Yellow-billed Cuckoo survey and monitoring protocol for California. Available from the author, P. O. Box 1236, Weldon, California 93282.

Laymon, S.A., P.L. Williams, and M.D. Halterman. 1997. Breeding Status of the Yellow-billed Cuckoo in the South Fork Kern River Valley, Kern County, California: Summary Report 1985–1996. Prepared for the U.S. Department of Agriculture Forest Service, Sequoia National Forest, Cannell Meadow Ranger District.

Laymon, S.A., and M.D. Halterman. 1989. A Proposed Habitat Management Plan for Yellow-Billed Cuckoos in California *Proceedings of the California Riparian Systems Conference: protection, management, and restoration for the 1990s* (September 22–24, 1988)(USDA Forest Service General Technical Report PSW-110 p 272–277). Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station.

———. 1987. Distribution and status of the yellow-billed cuckoo in California: 1986–1987. Final Report to the California Department of Fish and Game, Nongame Bird and Mammal Section, Wildlife Management Division. Sacramento, CA: CDFG.

Lehman, P.E. 2015. The Birds of Santa Barbara County, California (revised edition, April 2015; original edition 1994). https://sites.google.com/site/lehmanbosbc/.

Long, M.C. 1993. Birds of the Whittier Narrows Recreation Area, Los Angeles County, California. South El Monte, CA: Whittier Narrows Nature Center Associates.

McCaskie, G. and K.L. Garrett. 2016. The Nesting Season: June through July 2015. North American Birds 69(4):489–496.

McCaskie, G. and K.L. Garrett. 2015. The Nesting Season: June through July 2014. North American Birds 68(4):552–556.

McCaskie, G. and K.L. Garrett. 2014. The Nesting Season: June through July 2013. North American Birds 67(4):649–652.

McCaskie, G. and K.L. Garrett. 2013. The Nesting Season: June through July 2012. North American Birds 66(4):732–736.

McNeil, S.E., D. Tracy, J.R. Stanek, and J.E. Stanek. 2013. Yellow-billed Cuckoo Distribution, Abundance and Habitat Use on the Lower Colorado River and Tributaries, 2008–2012 Summary Report. Submitted to the Bureau of Reclamation, Lower Colorado River Multi-Species Conservation Program, Boulder City, Nevada, by the Southern Sierra Research Station. www.lcrmscp.gov/reports/2012/d7_sumrep_08-12.pdf.

Noss, R.F., E.T. LaRoe III, and J.M. Scott. 1995. Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation. U.S. Geological Survey, Biological Resources Division (National Biological Service), BSR no. 9501. Washington, DC.: USGS.

Ohmart, R.D. 1994. The Effects of Human-Induced Changes on the Avifauna of Western Riparian Habitats. *Studies in Avian Biology* 15:273–285.

Psomas. 2022a (July 25). *Results of Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project.* Santa Ana, CA.: Psomas.

———. 2022b (September 27). *Results of Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project.* Santa Ana, CA.: Psomas.

Stanek, J. R., and J. E. Stanek. 2012. Yellow-billed Cuckoo Occupancy, Breeding, and Habitat Use in the South Fork Kern River Valley, 2012 Annual Report. Report to the U.S. Fish and Wildlife Service, Sacramento Office. Sacramento, CA: USFWS.

Unitt, P. 2004. *San Diego County Bird Atlas* (San Diego Society of Natural History, No. 39). San Diego, CA: Ibis Publishing Co.

U.S. Department of Interior (USDOI). 1994 (March). The Impact of Federal Programs on Wetlands, Vol. II, A Report to Congress by the Secretary of the Interior. Washington, DC: USDOI.

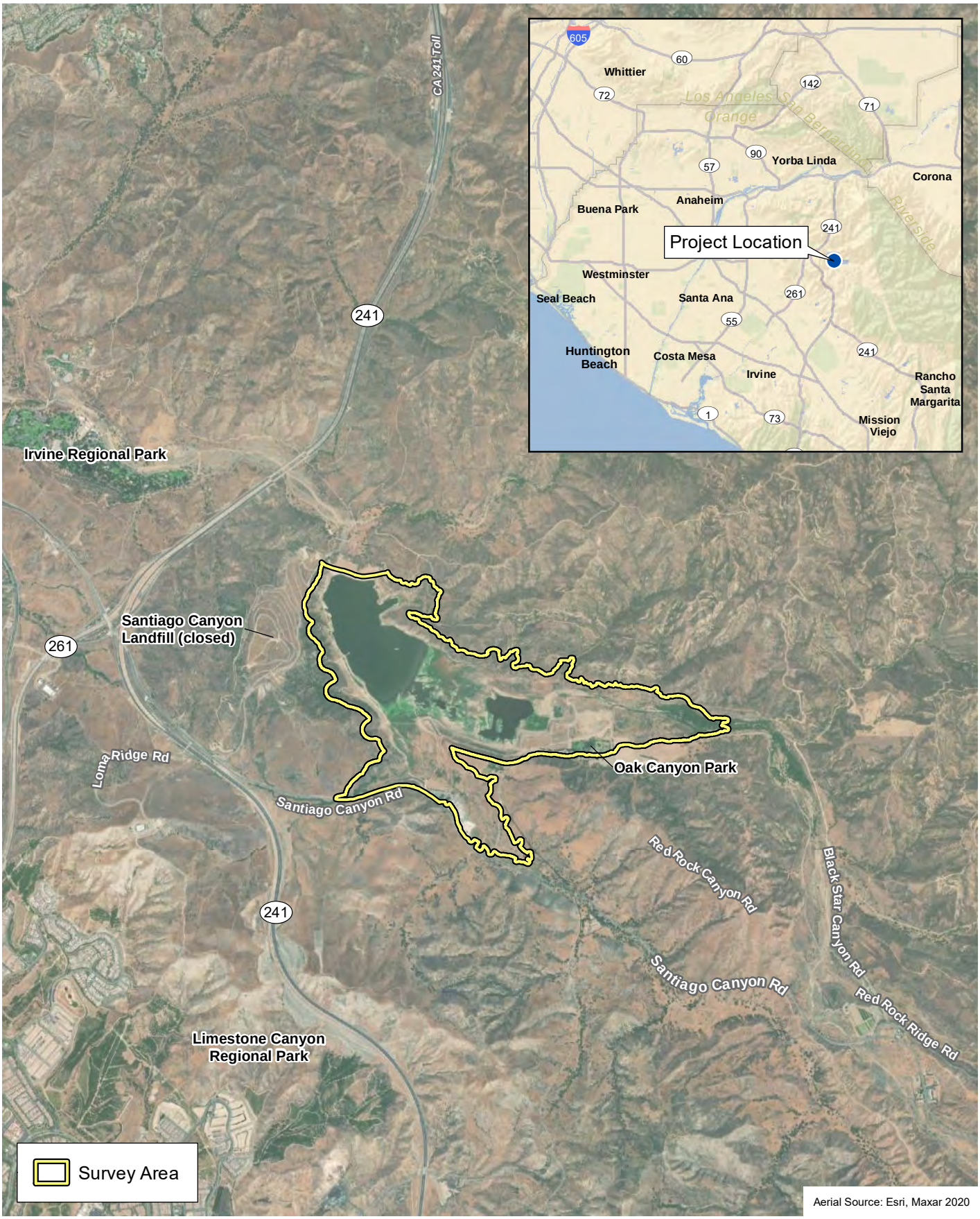
United States Fish and Wildlife Service (USFWS). 2021 (April 21). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo. *Federal Register* 86(75). Washington D.C.; USFWS.

———. 2014a. (August 15). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo (*Coccyzus americanus*); Proposed Rule. *Federal Register* 79(158):48548 – 48652. Washington, D.C.; USFWS.

———. 2014b (August 15). Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo; Proposed Rule. *Federal Register* 79(158): 48548-48652. Washington, D.C.: USFWS.

———. 2013 (October 3). Proposed Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*). Proposed Rule. *Federal Register* 78(192): 61622-61666. Washington, D.C.: USFWS.

Webster, R.E., P. Lehman, and L. Bevier. 1980. The Birds of Santa Barbara and Ventura Counties (Occasional Paper No. 10. Santa Barbara). Santa Barbara, CA: Santa Barbara Museum of Natural History.



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\YBCU\ex_RL_LV_20220928.mxd

Regional Location and Local Vicinity

Exhibit 1

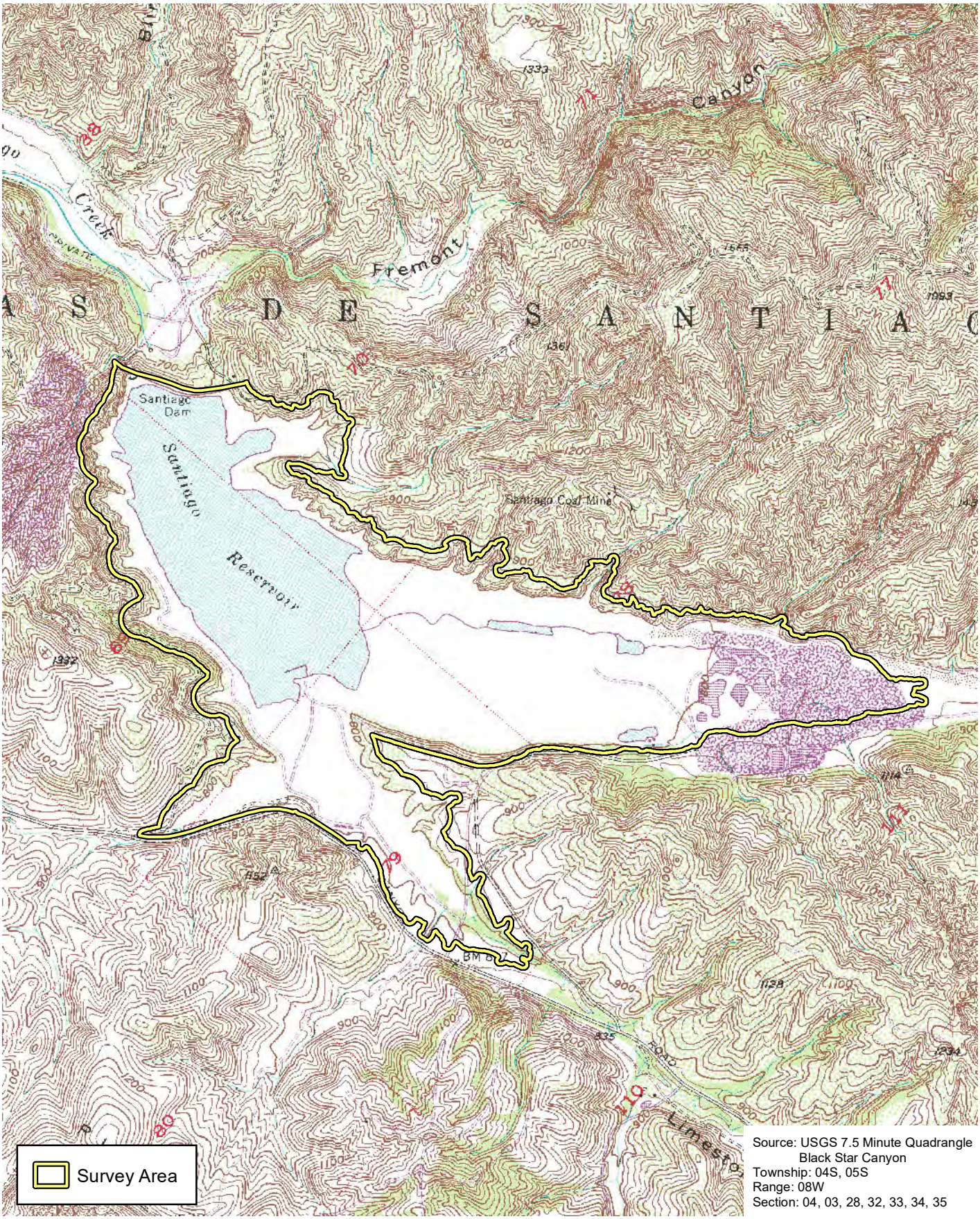
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

4,000 2,000 0 4,000 Feet

PSOMAS

(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_RL_LV.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04S, 05S
Range: 08W
Section: 04, 03, 28, 32, 33, 34, 35

D:\Projects\3IRW\010200\MXD\YBCU\ex_SurveyArea_USGS_20220928.mxd

Riparian Bird Survey Area

Exhibit 2

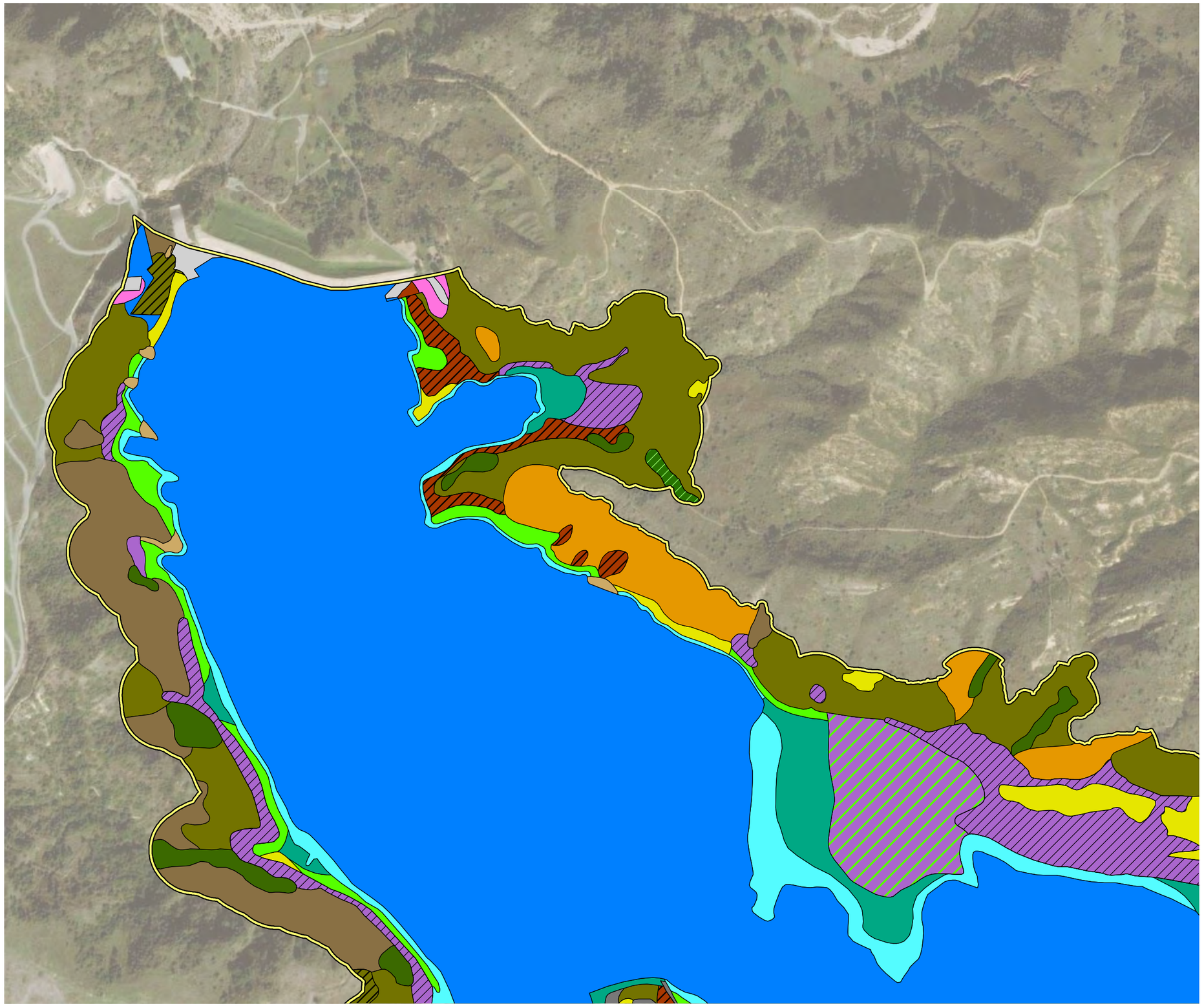
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

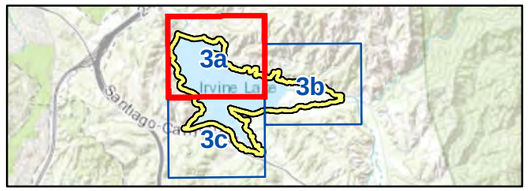
N
W E
S

2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 9-28-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_SurveyArea_USGS.pdf





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Mulefat Scrub (7.3)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600
Feet

Aerial Source: Esri, Maxar 2020

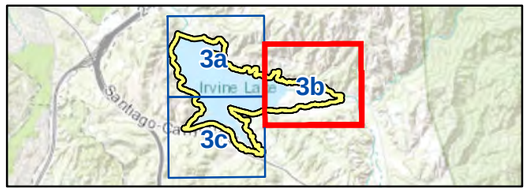
Biological Resources Exhibit 3a

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\YBCU\ex_BioResources_20220928.mxd



Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

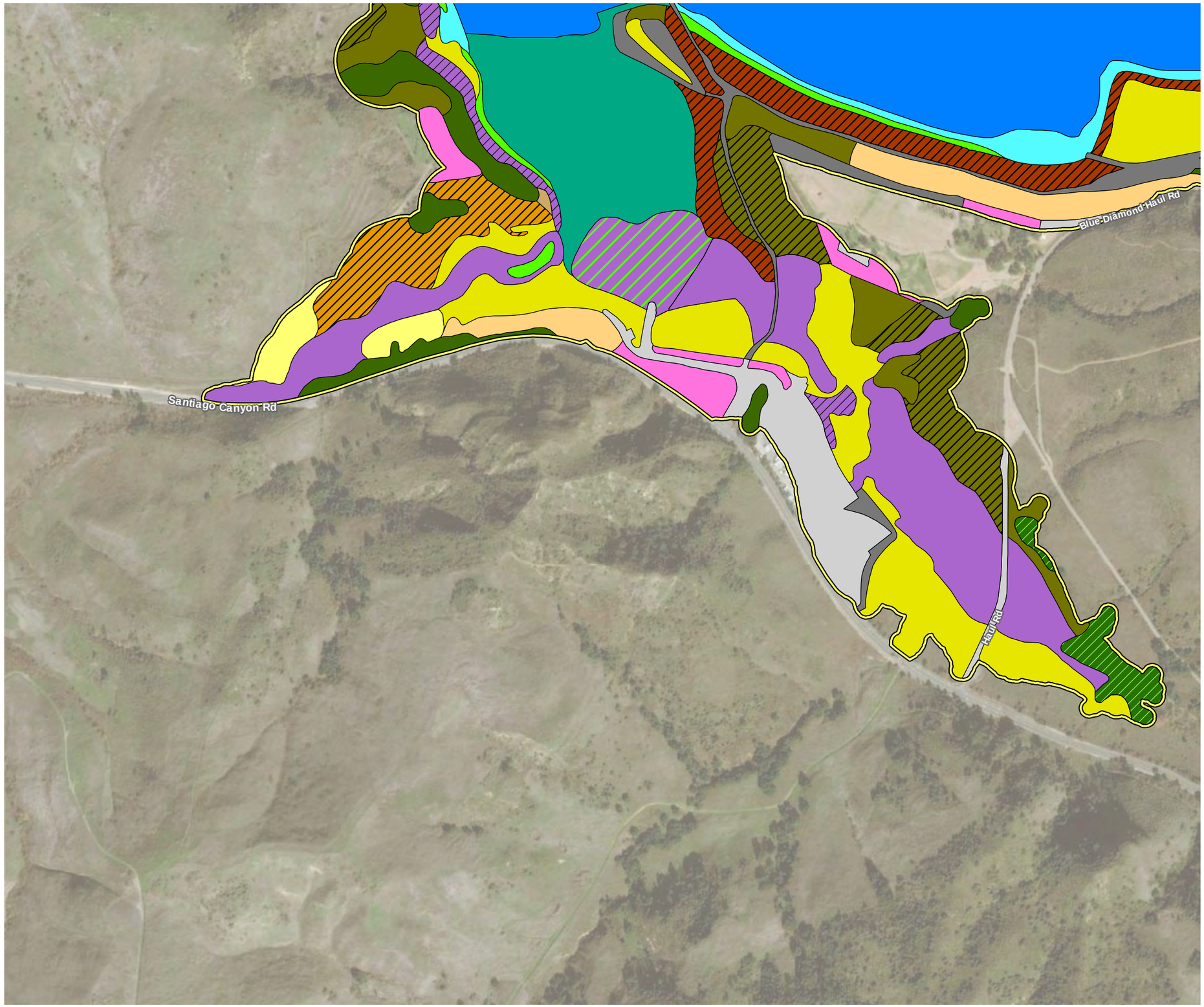
Biological Resources Exhibit 3b

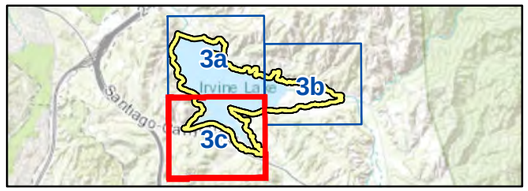
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\YBCU\ex_BioResources_20220928.mxd





Survey Area

Vegetation Types and Other Areas

- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

N
W E
S

600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

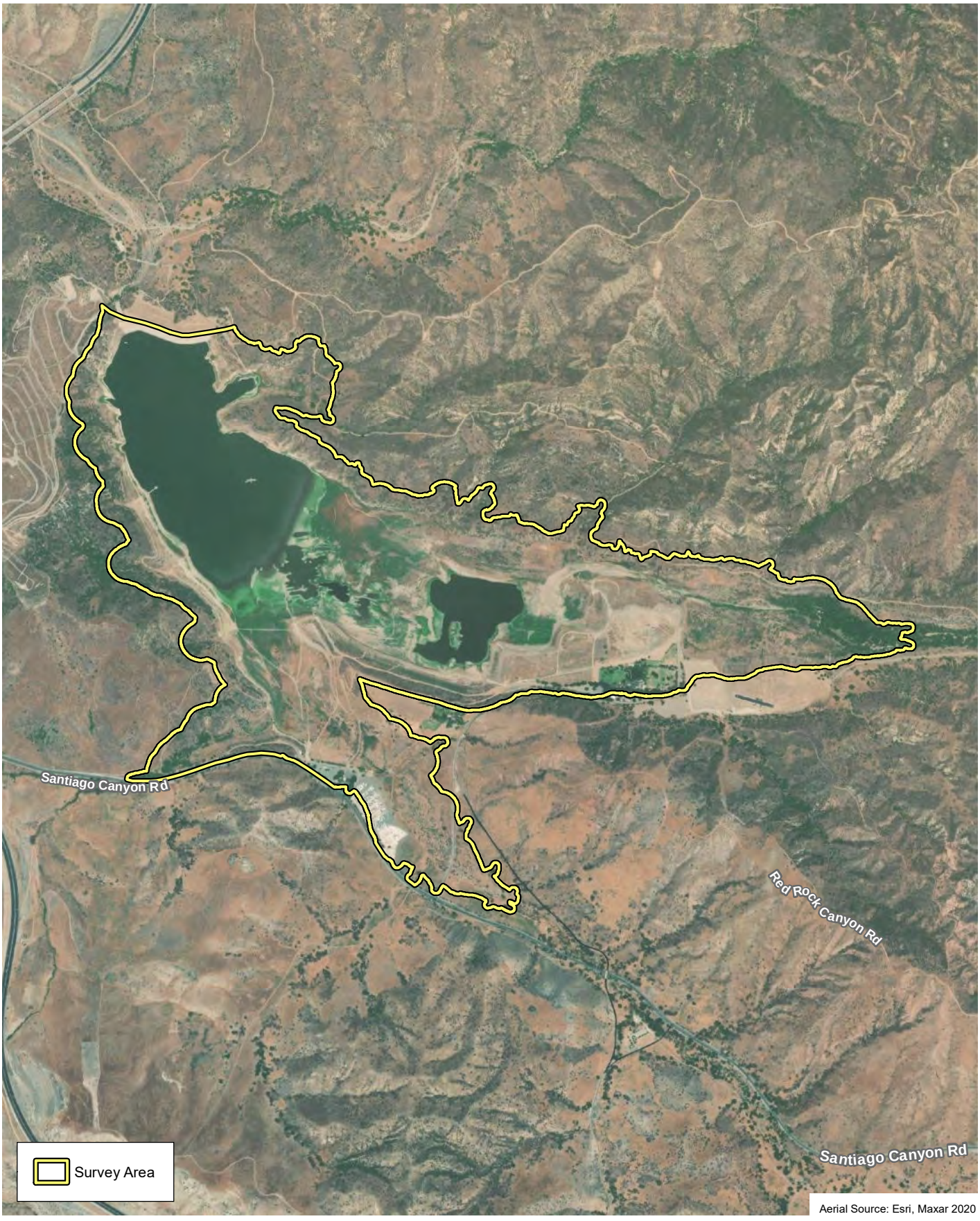
Biological Resources Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\YBCU\ex_BioResources_20220928.mxd



Aerial Source: Esri, Maxar 2020

D:\Projects\3IRW\010200\MXD\YBCU\ex_SurveyArea_20220928.mxd

Survey Area

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N
W E
S

2,000 1,000 0 2,000

Feet

PSOMAS

(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_SurveyArea.pdf

ATTACHMENT A

REPRESENTATIVE PHOTOGRAPHS

Southern sycamore riparian woodland/southern coast live oak riparian forest vegetation located in the eastern portion of the survey area, looking north.

Black willow forest vegetation located in the eastern portion of the survey area, looking east.

D:\Projects\3IRW\010200\GRAPHICS\YBCU\Att_SP1_20220922.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

(09/22/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\Att_SP.pdf

Disturbed southern black willow forest vegetation located in the north/central portion of the survey area, looking north.

Southern black willow forest/riparian herb vegetation located in the eastern portion of the survey area, looking northeast.

D:\Projects\3IRW\010200\GRAPHICS\YBCU\Att_SP2_20220922.ai

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

ATTACHMENT B

WILDLIFE COMPENDIUM

WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
AMPHIBIANS		
HYLIDAE - TREEFROG FAMILY		
Pseudacris cadaverina	California treefrog	
Pseudacris hypochondriaca	Baja California treefrog	
LIZARDS		
PHRYNOSOMATIDAE - SPINY LIZARD FAMILY		
Sceloporus occidentalis	western fence lizard	
SNAKES		
COLUBRIDAE - COLUBRID SNAKE FAMILY		
Pituophis catenifer	gophersnake	
BIRDS		
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY		
Branta canadensis	Canada goose	
Mareca americana	American wigeon	
Anas platyrhynchos	mallard	
Aythya affinis	lesser scaup	
Oxyura jamaicensis	ruddy duck	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY		
Callipepla californica	California quail	
PODICIPEDIDAE - GREBE FAMILY		
Aechmophorus occidentalis	western grebe	
COLUMBIDAE - PIGEON AND DOVE FAMILY		
*Columba livia**	rock pigeon	
Zenaida macroura	mourning dove	
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY		
Geococcyx californianus	greater roadrunner	
CAPRIMULGIDAE - NIGHTJAR FAMILY		
Chordeiles acutipennis	lesser nighthawk	
TROCHILIDAE - HUMMINGBIRD FAMILY		
Calypte anna	Anna's hummingbird	
Selasphorus sasin	Allen's hummingbird	
CHARADRIIDAE - PLOVER FAMILY		
Charadrius vociferus	killdeer	
LARIDAE - GULL AND TERN FAMILY		
Larus occidentalis	western gull	
PHALACROCORACIDAE - CORMORANT FAMILY		
Phalacrocorax auritus	double-crested cormorant	
ARDEIDAE - HERON FAMILY		
Ardea alba	great egret	
Egretta thula	snowy egret	
Nycticorax nycticorax	black-crowned night-heron	
CATHARTIDAE - NEW WORLD VULTURE FAMILY		
Cathartes aura	turkey vulture	

WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
PANDIONIDAE - OSPREY FAMILY		
Pandion haliaetus	osprey	
ACCIPITRIDAE - HAWK FAMILY		
Haliaeetus leucocephalus	bald eagle	SE, FP
Buteo jamaicensis	red-tailed hawk	
STRIGIDAE - TYPICAL OWL FAMILY		
Megascops kennicottii	western screech-owl	
Bubo virginianus	great horned owl	
PICIDAE - WOODPECKER FAMILY		
Melanerpes formicivorus	acorn woodpecker	
Picoides nuttallii	Nuttall's woodpecker	
Colaptes auratus	northern flicker	
FALCONIDAE - FALCON FAMILY		
Falco sparverius	American kestrel	
Falco peregrinus	peregrine falcon	FP
TYRANNIDAE - TYRANT FLYCATCHER FAMILY		
Sayornis nigricans	black phoebe	
Tyrannus vociferans	Cassin's kingbird	
CORVIDAE - JAY AND CROW FAMILY		
Aphelocoma californica	California scrub-jay	
Corvus brachyrhynchos	American crow	
Corvus corax	common raven	
ALAUDIDAE - LARK FAMILY		
Eremophila alpestris actia	California horned lark	
HIRUNDINIDAE - SWALLOW FAMILY		
Stelgidopteryx serripennis	northern rough-winged swallow	
Petrochelidon pyrrhonota	cliff swallow	
AEGITHALIDAE - BUSHTIT FAMILY		
Psaltriparus minimus	bushtit	
TROGLODYTIDAE - WREN FAMILY		
Troglodytes aedon	house wren	
Thryomanes bewickii	Bewick's wren	
POLIOPTILIDAE - GNATCATCHER FAMILY		
Polioptila caerulea	blue-gray gnatcatcher	
Polioptila californica	California gnatcatcher	FT, SSC (subsp. californica)
SYLVIIDAE - SILVIID WARBLERS FAMILY		
Chamaea fasciata	wrentit	
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY		
Toxostoma redivivum	California thrasher	
Mimus polyglottos	northern mockingbird	
STURNIDAE - STARLING FAMILY		
*Sturnus vulgaris**	European starling*	

WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species		Special Status
Scientific Name	**Common Name**	
FRINGILLIDAE - FINCH FAMILY		
Haemorhous mexicanus	house finch	
Spinus psaltria	lesser goldfinch	
PASSERELLIDAE - NEW WORLD SPARROW FAMILY		
Pipilo maculatus	spotted towhee	
Aimophila ruficeps	rufous-crowned sparrow	
Melozone crissalis	California towhee	
Melospiza melodia	song sparrow	
ICTERIDAE - BLACKBIRDS AND ORIOLES		
Sturnella neglecta	western meadowlark	
Icterus cucullatus	hooded oriole	
Agelaius phoeniceus	red-winged blackbird	
PARULIDAE - WOOD-WARBLER FAMILY		
Geothlypis trichas	common yellowthroat	
Setophaga coronata	yellow-rumped warbler	
MAMMALS		
SCIURIDAE - SQUIRREL FAMILY		
Otospermophilus beecheyi	California ground squirrel	
GEOMYIDAE - POCKET GOPHER FAMILY		
Thomomys bottae	Botta's pocket gopher	
CRICETIDAE - NEW WORLD RATS AND MICE FAMILY		
Neotoma bryanti	Bryant's woodrat	
LEPORIDAE - HARE AND RABBIT FAMILY		
Sylvilagus audubonii	desert cottontail	
CANIDAE - CANID FAMILY		
Canis latrans	coyote	
MEPHITIDAE - SKUNK FAMILY		
Mephitis mephitis	striped skunk	
PROCYONIDAE - PROCYONID FAMILY		
Procyon lotor	northern raccoon	
CERVIDAE - CERVID FAMILY		
Odocoileus hemionus	southern mule deer	

USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife

Species Status:

Federal (USFWS)	**State (CDFW)**
FT Threatened	SE Endangered
	ST Threatened
	FP Fully Protected
	SSC Species of Special Concern

ATTACHMENT C

YELLOW-BILLED CUCKOO SURVEY SUMMARY AND SITE DETECTION FORMS

Yellow Billed Cuckoo Survey Form

Site Name: Santiago Creek Dam Outlet Tower and S | County: Orange | State: California

USGS Quad Name: Black Star Canyon | Elevation: 657-956 feet

Creek, River, Wetland, or Lake Name: Santiago Creek/ Irvine Lake

Site Coordinates: Start: E 434398 N 3736108 | UTM Zone: NAD83

Stop: E 432612 N 3738297 | Datum: 11

Ownership: BLM Reclamation NPS USFWS USFS Tribal State Private ✓ Other (Municipal/County)

Was site surveyed in previous year? Yes ✓ No Unknown | If yes, what site name was used? Santiago Creek Dam Outlet Tower and Spillway Improvement P

Survey # Observer(s) (Last Name, First Initial)	Date (m/d/y) Survey, Time, Total Hours	Total Number of YBCUs detected.	Time Detected (AM):	Detect Type: I=Incidental P=Playback A=aural V=visual B=both	Voc. Type: CN=Contact CO=coo AL=alarm OT=other (describe)	Playback #: Number of times 'Kowlp' call played before YBCU responded	Behavior code	Surveyor Detection Coordinates		Distance (m)	Bearing	Cuckoo #	Corrected Coordinates	
								UTM E	UTM N				UTM E	UTM N
Survey Period #1	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2022													
Observer(s):	Start:													
Lindsay Messett	6:00													
	Stop:													
	10:50													
	Total hrs:	Total:												
	4.83	0												
Survey Period #2	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2022													
Observer(s):	Start:													
Lindsay Messett	5:50													
	Stop:													
	11:00													
	Total hrs:	Total:												
	5.17	0												
Survey Period #3	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/28/2022													
Observer(s):	Start:													
Lindsay Messett	6:00													
	Stop:													
	11:05													
	Total hrs:	Total:												
	5.08	0												
Survey Period #4	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/11/2022													
Observer(s):	Start:													
Lindsay Messett	6:00													
	Stop:													
	10:30													
	Total hrs:	Total:												
	4.50	0												
Survey Period #5	Date:													
Observer(s):	Start:													
	Stop:													
	Total hrs:	Total:												

Survey Summary:	# Det	#PO	#PR	#CO	#Nests found	Total Survey Hours:		
Total YBCUs*	n/a	n/a	n/a	n/a	n/a	19.58		

Notes (refer to Cuckoo # associated with individual detections): n/a

*Include justification for these designations.

Behavior Codes: AN = at nest, BI = brooding or incubating, CF = adult carrying food, CN = carrying nest material, COP = copulation, CP = catches prey, DD = distraction displays/defense of nesting area, EF = eats food, FL = recently fledged young of species incapable of flight, FLY = flying, FO = foraging, FS = adult carrying a fecal sac, FY = adults feeding nestlings, JUV = juvenile, NB = nest building, NE = active nest with unbroken eggs in it, NY = nest with young seen or heard in it, ON = occupied nest, PR = preening, SI = sitting, US = used, inactive nest with blue-green eggshells.

Fill in the following information completely

Name of Reporting Individual: Lindsay Messett

Date Report completed: _____

Affiliation: Psomas

Phone #: 714-751-7373

Email: lindsay.messett@psomas.com

USFWS Permit #: TE 067064-5

State Permit #: S-182810004-20009-001-01

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Length of area surveyed: _____ (in kilometers = km) _____

Did you survey the same general area during each visit to this site this year? ☑ Yes / No If no, summarize in comments below: _____

If site was surveyed last year, did you survey the same general area this year? ☐ Yes / No If no, summarize in comments below: n/a

Overall Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

Native broadleaf plants (>75% native)	X	Mixed native and exotic plants (mostly native 51%-	
Exotic/introduced plants (>75% exotic)		Mixed native and exotic plants (mostly exotic 51%-	

Average height of canopy (m): 10 (specify units): meters

Estimated Canopy Cover (percent): 75

Overstory Vegetation: (provide percent estimate of the following dominant species). Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.

20	Cottonwood	30	Goodding's Willow		Coyote Willow	15	Other (specify) arroyo willow
25	Tamarisk		Russian Olive		Other (specify)	10	Other (specify) sycamore

Average height of understory canopy (m): 2 (specify units): meters

Estimated Understory Cover (percent): 95

Understory Vegetation: (provide percent estimate of the following dominant species).Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.

	Cottonwood		Goodding's Willow		Coyote Willow	45	Other (specify) mustard
15	Tamarisk		Russian Olive		Other (specify)	40	Other (specify) nng
	Baccharis		New Mexico Oli				

Was surface water or saturated soil present at or adjacent to site within 300 meters? ☑ Yes ☐ No (circle one)

Was surface water or saturated soil present at or adjacent to all patches surveyed? ☑ Yes ☐ No (circle one)

Comments. Please provide comments regarding differences between the survey patches within the site. For example, if the average canopy for this site is 30% cover, but within one patch it is 60% cover - please note. Also, please note significant differences between dominant overstory and understory vegetation among the patches. Document these differences with photographs whenever possible. Make sure to reference comments to photo number whenever available.

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats (i.e., southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the Dam on the project site.

Specifically, western yellow-billed cuckoo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats were distributed throughout the survey area. These habitat types were generally dominated by Goodding's black willow (Salix gooddingii), red willow (Salix laevigata), arroyo willow (Salix laseolepis), Fremont cottonwood (Populus fremontii ssp. fremontii), western sycamore (Platanus racemosa), and white alder (Alnus rhombifolia). The understory and edges of these areas contained scattered mule fat (Baccharis salicifolia ssp. salicifolia), flatsedge (Cyperus sp.), broad-leaved cattail (Typha latifolia), saltcedar (Tamarix ramosissima), giant reed (Arundo donax), gum trees (Eucalyptus spp.), tree tobacco (Nicotiana glauca), and non-native grasses

Please provide USGS 7.5 minute quad (or similar)showing survey area to each survey form _____

Yellow-billed Cuckoo Survey and Detection Form, continued

Name of Reporting Individual Lindsay Messett

Phone # 714-751-7373

Affiliation Psomas

Email lindsay.messett@psomas.com

Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Survey # Observer(s) (Last Name, First Initial)	Date (m/d/y) Survey, Time, Total Hours	Time Detected (AM):	Detect Type: I=Incidental P=Playback A=aural V=visual B=both	Voc. Type: CN=Contact CO=coo AL=alarm OT=other (describe)	Playback #: Number of times 'Kowlp' call played before YBCU responded	Behavior code	Surveyor Detection Coordinates		Distance (m)	Bearing	Cuckoo #	Corrected Coordinates	
							UTM E	UTM N				UTM E	UTM N

Notes - Cont. (refer to Cuckoo # associated with individual detections)

Yellow Billed Cuckoo Survey Form

Site Name: Santiago Creek Dam Outlet Tower and S | County: Orange | State: California

USGS Quad Name: Black Star Canyon | Elevation: 657-956 feet

Creek, River, Wetland, or Lake Name: Santiago Creek/ Irvine Lake

Site Coordinates: Start: E 436208 N 3737311 | UTM Zone: NAD83

Stop: E 433195 N 3738344 | Datum: 11

Ownership: BLM Reclamation NPS USFWS USFS Tribal State Private ✓ Other (Municipal/County)

Was site surveyed in previous year? Yes ✓ No Unknown | If yes, what site name was used? Santiago Creek Dam Outlet Tower and Spillway Improvement P

Survey # Observer(s) (Last Name, First Initial)	Date (m/d/y) Survey, Time, Total Hours	Total Number of YBCUs detected.	Time Detected (AM):	Detect Type: I=Incidental P=Playback A=aural V=visual B=both	Voc. Type: CN=Contact CO=coo AL=alarm OT=other (describe)	Playback #: Number of times 'Kowlp' call played before YBCU responded	Behavior code	Surveyor Detection Coordinates		Distance (m)	Bearing	Cuckoo #	Corrected Coordinates	
								UTM E	UTM N				UTM E	UTM N
Survey Period #1	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2022													
Observer(s):	Start:													
Lindsay Messett	6:15													
	Stop:													
	10:45													
	Total hrs:	Total:												
	4.50	0												
Survey Period #2	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/13/2022													
Observer(s):	Start:													
Lindsay Messett	5:45													
	Stop:													
	10:55													
	Total hrs:	Total:												
	5.17	0												
Survey Period #3	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/29/2022													
Observer(s):	Start:													
Lindsay Messett	6:05													
	Stop:													
	10:45													
	Total hrs:	Total:												
	4.67	0												
Survey Period #4	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/12/2022													
Observer(s):	Start:													
Lindsay Messett	5:54													
	Stop:													
	11:00													
	Total hrs:	Total:												
	5.10	0												
Survey Period #5	Date:													
Observer(s):	Start:													
	Stop:													
	Total hrs:	Total:												
		4.5												

Survey Summary:	# Det	#PO	#PR	#CO	#Nests found	Total Survey Hours:		
Total YBCUs*	n/a	n/a	n/a	n/a	n/a	19.44		

Notes (refer to Cuckoo # associated with individual detections): n/a

*Include justification for these designations.

Behavior Codes: AN = at nest, BI = brooding or incubating, CF = adult carrying food, CN = carrying nest material, COP = copulation, CP = catches prey, DD = distraction displays/defense of nesting area, EF = eats food, FL = recently fledged young of species incapable of flight, FLY = flying, FO = foraging, FS = adult carrying a fecal sac, FY = adults feeding nestlings, JUV = juvenile, NB = nest building, NE = active nest with unbroken eggs in it, NY = nest with young seen or heard in it, ON = occupied nest, PR = preening, SI = sitting, US = used, inactive nest with blue-green eggshells.

Fill in the following information completely

Name of Reporting Individual: Lindsay Messett

Date Report completed: _____

Affiliation: Psomas

Phone #: 714-751-7373

Email: lindsay.messett@psomas.com

USFWS Permit #: TE 067064-5

State Permit #: S-182810004-20009-001-01

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Length of area surveyed: _____ (in kilometers = km) _____

Did you survey the same general area during each visit to this site this year? ☑ Yes / No If no, summarize in comments below: _____

If site was surveyed last year, did you survey the same general area this year? ☐ Yes / No If no, summarize in comments below: n/a

Overall Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

Native broadleaf plants (>75% native)	X	Mixed native and exotic plants (mostly native 51%-	
Exotic/introduced plants (>75% exotic)		Mixed native and exotic plants (mostly exotic 51%-	

Average height of canopy (m): 10 (specify units): meters

Estimated Canopy Cover (percent): 75

Overstory Vegetation: (provide percent estimate of the following dominant species). Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.

20	Cottonwood	30	Goodding's Willow		Coyote Willow	15	Other (specify) arroyo willow
25	Tamarisk		Russian Olive		Other (specify)	10	Other (specify) sycamore

Average height of understory canopy (m): 2 (specify units): meters

Estimated Understory Cover (percent): 95

Understory Vegetation: (provide percent estimate of the following dominant species).Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.

	Cottonwood		Goodding's Willow		Coyote Willow	45	Other (specify) mustard
15	Tamarisk		Russian Olive		Other (specify)	40	Other (specify) nng
	Baccharis		New Mexico Oli				

Was surface water or saturated soil present at or adjacent to site within 300 meters? ☑ Yes ☐ No (circle one)

Was surface water or saturated soil present at or adjacent to all patches surveyed? ☑ Yes ☐ No (circle one)

Comments. Please provide comments regarding differences between the survey patches within the site. For example, if the average canopy for this site is 30% cover, but within one patch it is 60% cover - please note. Also, please note significant differences between dominant overstory and understory vegetation among the patches. Document these differences with photographs whenever possible. Make sure to reference comments to photo number whenever available.

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats (i.e., southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the Dam on the project site.

Specifically, western yellow-billed cuckoo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats were distributed throughout the survey area. These habitat types were generally dominated by Goodding's black willow (Salix gooddingii), red willow (Salix laevigata), arroyo willow (Salix laseolepis), Fremont cottonwood (Populus fremontii ssp. fremontii), western sycamore (Platanus racemosa), and white alder (Alnus rhombifolia). The understory and edges of these areas contained scattered mule fat (Baccharis salicifolia ssp. salicifolia), flatsedge (Cyperus sp.), broad-leaved cattail (Typha latifolia), saltcedar (Tamarix ramosissima), giant reed (Arundo donax), gum trees (Eucalyptus spp.), tree tobacco (Nicotiana glauca), and non-native grasses

Please provide USGS 7.5 minute quad (or similar)showing survey area to each survey form _____

Yellow-billed Cuckoo Survey and Detection Form, continued

Name of Reporting Individual Lindsay Messett

Phone # 714-751-7373

Affiliation Psomas

Email lindsay.messett@psomas.com

Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Survey # Observer(s) (Last Name, First Initial)	Date (m/d/y) Survey, Time, Total Hours	Time Detected (AM):	Detect Type: I=Incidental P=Playback A=aural V=visual B=both	Voc. Type: CN=Contact CO=coo AL=alarm OT=other (describe)	Playback #: Number of times 'Kowlp' call played before YBCU responded	Behavior code	Surveyor Detection Coordinates		Distance (m)	Bearing	Cuckoo #	Corrected Coordinates	
							UTM E	UTM N				UTM E	UTM N

Notes - Cont. (refer to Cuckoo # associated with individual detections)

APPENDIX M

JURISDICTIONAL DELINEATION

Jurisdictional Delineation Report
for the Santiago Creek Dam Improvement Project in Unincorporated Orange County, California

Prepared for

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618
Contact: Fiona Sanchez, Director of Water Resources

Prepared by

Psomas
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707
Contact: Amber Heredia
Associate Principal, Resource Management

April 16, 2025

TABLE OF CONTENTS

Section **Page**

Executive Summary **ES-1**

1.0 Introduction **1**

1.1 Project Location and Environmental Setting 1

1.2 Project Background 2

1.3 Purpose and Need 3

1.4 Project Objectives 4

1.5 Project Description 4

1.5.1 Additional Geotechnical Investigations 7
1.5.2 Construction Activities 7

1.6 Operation and Maintenance 9

1.6.1 Additional Inundation During Operation 10

1.7 Regulatory Authority 10

1.7.1 U.S. Army Corps of Engineers 10
1.7.2 Regional Water Quality Control Board 11
1.7.3 California Department of Fish and Wildlife 12

2.0 Methods **13**

2.1 Survey Area 13

2.2 Literature Review 13

2.3 Jurisdictional Delineation 14

2.3.1 USACE Waters of the United States 15
2.3.2 RWQCB Waters of the State 15
2.3.3 CDFW Waters 16

3.0 Results **17**

3.1 Literature Review 17

3.2 Jurisdictional Analysis 19

3.2.1 Waters of the United States Determination 20
3.2.2 Regional Water Quality Control Board Jurisdiction 24
3.2.3 California Department of Fish and Wildlife Jurisdiction 25

4.0 Impact Analysis **26**

5.0 Regulatory Approval Process **32**

5.1 Regulatory Permit Requirements 32

5.1.1 U.S. Army Corps of Engineers 32

5.1.2 Regional Water Quality Control Board 32
5.1.3 California Department of Fish and Wildlife 33

6.0 Recommendations 34

7.0 Disclaimer Statement 34

8.0 References 35

TABLES

Table **Page**

1 IRWD/Lake Operational Modes 9
2 Mapped National Wetlands Inventory Resources 18
3 Water Quality Objectives for Irvine Lake 19
4 Summary of Jurisdictional Resources in the Survey Area 20
5 Project Impacts on USACE Jurisdictional Resources in the Survey Area* 28
6 Project Impacts on RWQCB Jurisdictional Resources in the Survey Area* 29
7 Project Impacts on CDFW Jurisdictional Resources in the Survey Area* 30
8 Summary of Project Impacts on Jurisdictional Resources in the Survey Area* 31

EXHIBITS

Exhibit **Follows Page**

1 Regional Location and Local Vicinity 1
2 Existing Dam Features 1
3 U.S. Geological Survey 7.5-minute Digital Quadrangle 1
4 Santiago Dam Construction Features 7
5 Soil Types 13
6 National Wetlands Inventory 13
7 Jurisdictional Resources USACE Waters of the United States 17
8 Jurisdictional Resources RWQCB Waters of the State 17
9 Jurisdictional Resources CDFW Jurisdictional Waters 17
10 Project Impacts USACE Waters of the United States 26
11 Project Impacts RWQCB Waters of the State 26
12 Project Impacts CDFW Jurisdictional Waters 27

ATTACHMENTS

Attachment

A Summary of Regulatory Authority
B National Wetland Inventory Definitions
C Representative Photographs
D RWQCB and CDFW Jurisdictional Resources Detail
E Datasheets
F Literature Review Details – Soils
G Literature Review Details – Basin Plan Beneficial Uses
H Impact Acreage by Landowner

This page intentionally left blank

EXECUTIVE SUMMARY

This report provides baseline data regarding the type and extent of jurisdictional resources for the Santiago Creek Dam Improvement Project. Jurisdictional resources considered for this report include wetland and non-wetland waters of the United States (WOTUS) regulated by the U.S. Army Corps of Engineers (USACE); waters of the State regulated by the Regional Water Quality Control Board (RWQCB); and waters, including the bed, bank, and channel of all lakes, rivers, and/or streams (and associated wetland and riparian vegetation), as regulated by the California Department of Fish and Wildlife (CDFW).

The limits of non-wetland WOTUS and waters of the State were identified by the presence of an Ordinary High Water Mark (OHWM). Wetland features were identified based on the USACE's three-parameter approach in which wetlands are defined by the presence of hydrophytic vegetation, hydric soils, and wetland hydrology indicators. There have been multiple changes to the definition of WOTUS in recent years resulting in substantial changes to areas under federal jurisdiction. The current definition of WOTUS excludes all waters that are not determined to be "relatively permanent" in their flow regime. Isolated drainages (i.e., those lacking connectivity to a downstream WOTUS) are also not considered WOTUS. The limits of waters of the State include ephemeral and isolated waters along with all WOTUS. The limits of CDFW jurisdictional waters were identified as either the top of bank or the outer drip line of riparian vegetation associated with the feature.

The jurisdictional delineation was performed by Psomas on March 24, 2020, for the portion of the survey area north (downstream) of the existing dam and on October 14, 20, and 21, 2020, for the portion of the survey area south (upstream) of the dam around Irvine Lake. Based on the results of the field work, and the most current regulatory guidelines, it was determined that the total amount of jurisdictional resources in the survey area are as follows:

- **USACE Jurisdiction:** 428.476 acres (101.706 acres wetland; 326.770 acres non-wetland)
- **RWQCB Jurisdiction:** 435.205 acres (101.706 acres wetland; 333.499 acres non-wetland)
- **CDFW Jurisdiction:** 669.630 acres

The proposed Project would consist of structural improvements to the dam, spillway, replacement of the outlet tower, and raising the spillway by six feet (i.e., two feet over the existing maximum water level with the flashboards installed). Based on preliminary project design, the following jurisdictional resources would be impacted by the Project[1]:

- **USACE Jurisdiction:**
    - 203.570 acres (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) and 0.673 acre

[1] The total impact by landowner (i.e., IRWD or County of Orange) is show in Attachment H.

within the additional inundation area (0.673 acre wetland; 0.000 acre non-wetland)

- **RWQCB Jurisdiction:**
    - 203.641 acres (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary) and 0.711 acre within the additional inundation area (0.673 acre wetland; 0.038 acre non-wetland)
- **CDFW Jurisdiction:**
    - 233.774 acres (3.924 acres permanent, 229.850 acres temporary and 8.980 acres within the additional inundation area

The following permits/certifications/agreements are anticipated to be required for project impacts:

- USACE Section 404 Individual Permit
- RWQCB Waste Discharge Requirements
- CDFW Section 1602 Lake or Streambed Alteration Agreement

1.0 INTRODUCTION

This Jurisdictional Delineation Report (report) has been prepared to provide baseline data concerning the type and extent of water resources under the jurisdiction of the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) in support of the Santiago Creek Dam Improvement Project (hereinafter referred to as the "Project") proposed by the Irvine Ranch Water District (IRWD). This information has been reported in accordance with accepted scientific and technical standards that are consistent with the requirements of these agencies.

1.1 PROJECT LOCATION AND ENVIRONMENTAL SETTING

Santiago Creek Dam is located at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Project is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the embankment dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, a portion of the Irvine Lake pipeline, and dam access road (Exhibit 2).

The Project is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle map (Exhibit 3). It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. The Project is within the Santa Ana Watershed (Hydrologic Unit Code 18070203). Irvine Lake (named the Santiago Creek Reservoir by the USGS) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project site in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project site. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level (msl).

Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Orange County Waste and Recycling (OCWR) Landfill Facility (i.e., Santiago Canyon Landfill) is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_LV_RL

Regional Location and Local Vicinity

Exhibit 1

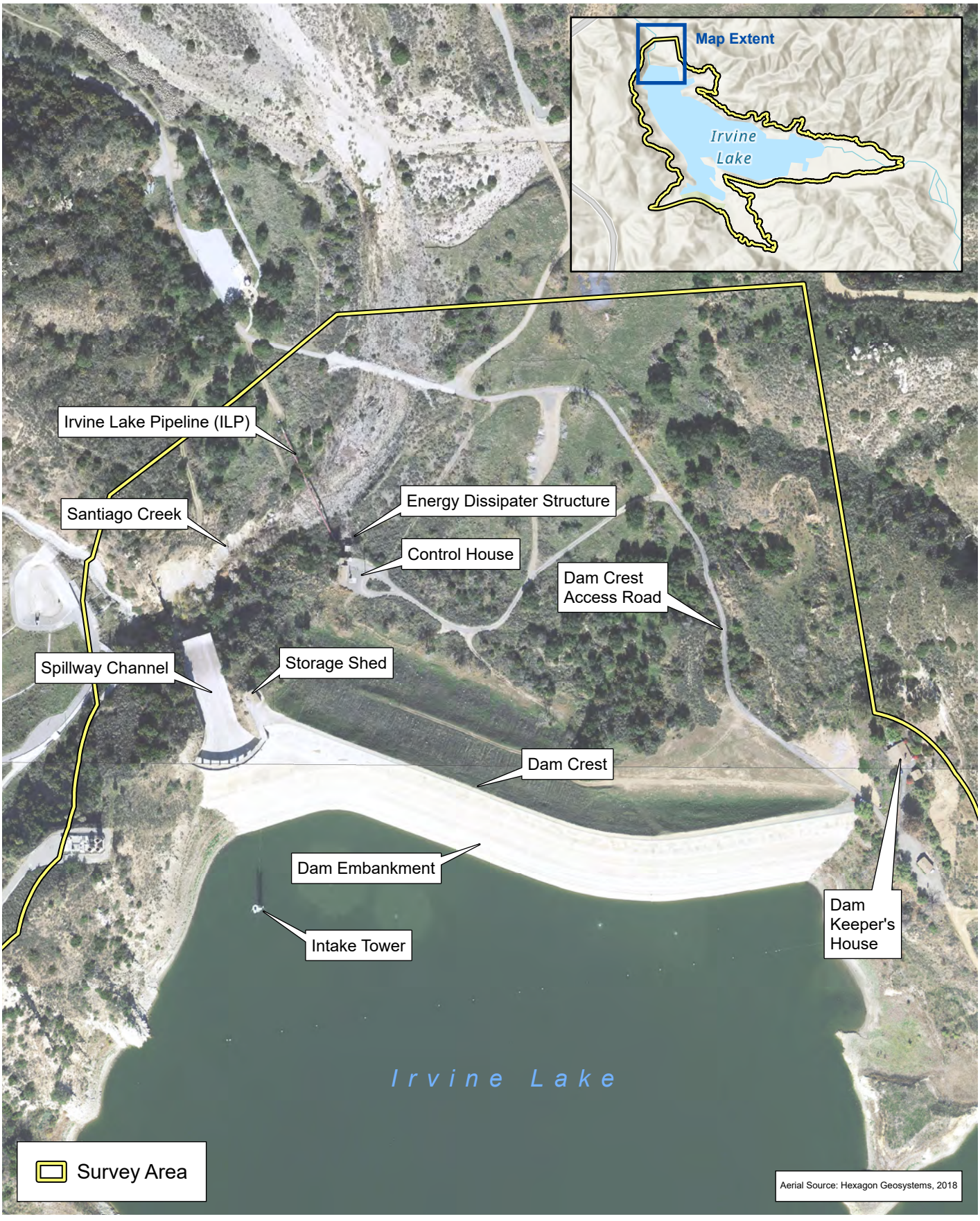
Santiago Creek Dam Improvement Project

N
W
E
S

0 2,000 4,000 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_LV_RL.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Existing_Dam_Features

Existing Dam Features

Exhibit 2

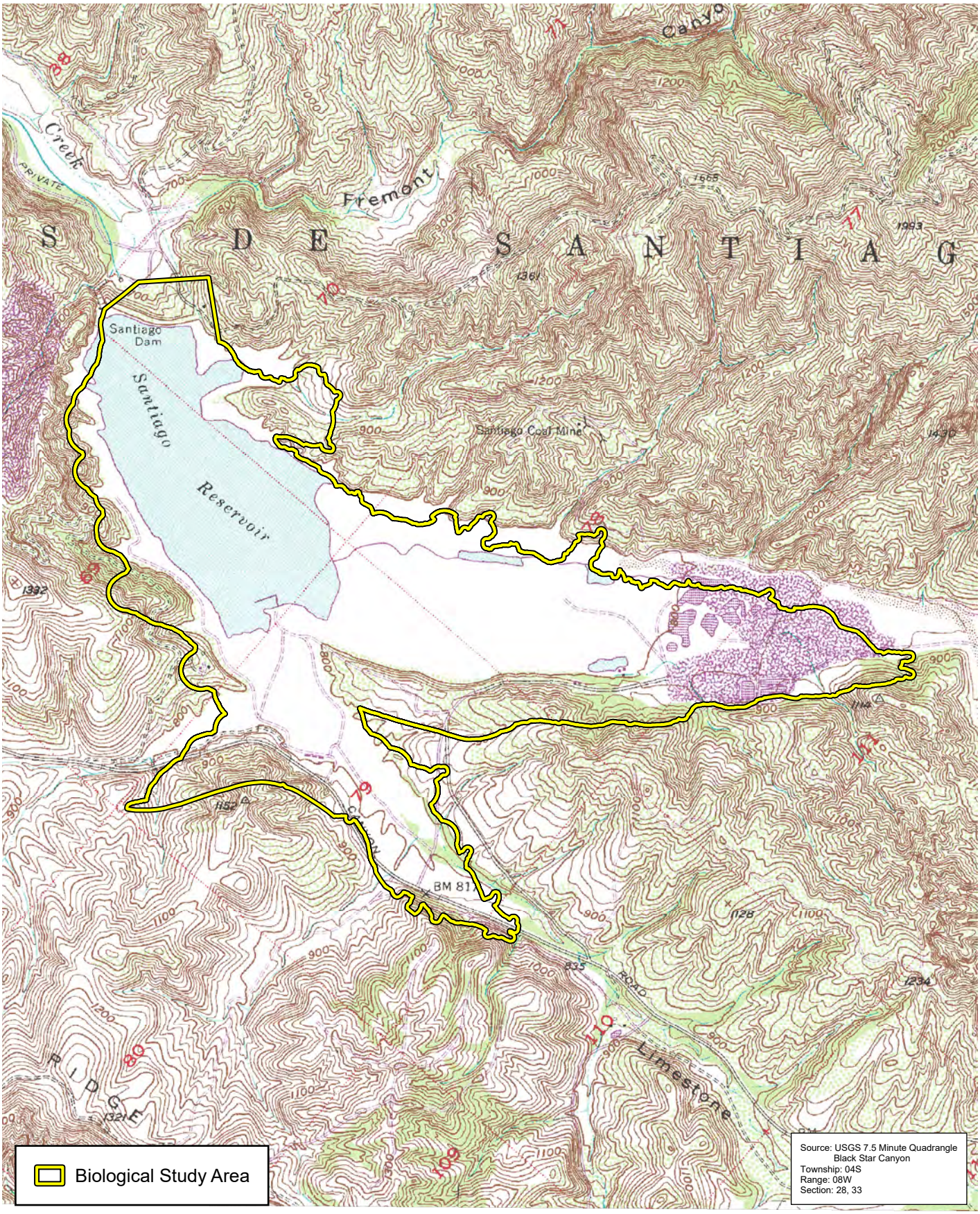
Santiago Creek Dam Improvement Project

N W E S

0 150 300 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_ExistingDamFeatures.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_USGS

U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 3

Santiago Creek Dam Improvement Project

N W E S

0 1,000 2,000 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_USGS.pdf

The following vegetation types occur in the survey area: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore. Other landcover includes cliff, open water, fluctuating shoreline, vegetated fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

1.2 PROJECT BACKGROUND

IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serve as a critical water supply reservoir for IRWD's service area. The Santiago Creek Dam impounds water for Irvine Lake from Santiago Creek, local storm water runoff, and raw water from Metropolitan Water District of Southern California (MWD). It serves as a domestic and non-potable water supply for various cities in Orange County.

Irvine Lake is a reservoir of untreated water located east of Irvine Regional Park. The lake's capacity is currently approximately 24,000 acre-feet (AF) but it can hold an additional 2,700 AF when flash boards are installed on the spillway, temporarily raising the maximum water elevation an additional 4 feet to 795.9 feet. IRWD uses water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation uses, and 2) as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. IRWD can also provide water from Irvine Lake to Serrano Water District (SWD) through the Howiler Treatment Plan, which is owned and operated by IRWD, to serve SWD customers in the City of Villa Park and portions of the City of Orange. Per the terms of the Water Service Reliability Agreement executed between IRWD and SWD on December 12, 2024, IRWD can backstop and/or augment use of groundwater to enhance SWD's water supply reliability using water sourced from Irvine Lake. In the future, IRWD will construct an interconnection between SWD's and IRWD's potable system, which will allow IRWD to serve water from the Howiler Treatment Plant to IRWD customers. The construction and operation of the interconnection will be subject to separate environmental review.

Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000. Santiago Creek Dam is located in Orange County, California and impounds water for Irvine Lake from Santiago Creek, a tributary to the Santa Ana River. Santiago Creek Dam is approximately 136 feet high and 1,425 feet long. It is roughly 760 feet wide at the base and contains approximately 800,000 cubic yards of materials. IRWD has appropriative rights to the flows of Santiago Creek including a right to diversion by storage in Irvine Lake for municipal, domestic, and agricultural uses. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level varies throughout the lake; however, it is estimated that the accumulated sediment currently occupies approximately 2,150 AF of the lake.

The sources of water for the Lake are flows from Santiago Creek, local runoff captured during rainfall events and untreated (imported) water purchased from MWD. The imported water is conveyed to the Lake through MWD's Santiago Lateral Pipeline (SLP). When water is drawn from the Lake from the existing outlet tower, water is conveyed via the Irvine Lake Pipeline (ILP) to downstream customers.

The outlet works for the dam consists of a tower, an outlet conduit, and a downstream control house. The outlet works are the normal means of releasing water impounded by the dam. The tower sits above the outlet pipe, or tunnel, and is used to transport water out of the reservoir. The outlet conduit conveys water from the reservoir through, under, or around a dam in a controlled manner. The downstream control house contains, or houses, electrical or other equipment. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where the pipeline splits in a bifurcation valve vault to permit water to flow into a 36-inch main pipe and 30-inch diverter pipe. The main pipe supplies water to IRWD and the Howiler Water Treatment Plant. The diverter pipe can release water from the lake into the streambed immediately downstream of the control house for dam safety purposes.

The existing dam spillway[2] is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, broad-crested weir control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years).

Irvine Lake is held at varying levels depending on the time of year. In the wet winter months, water can be stored up to the 791.9-foot elevational contour[3]. The height of the existing spillway with flashboards installed is at the 795.9-foot elevation contour; this is the current maximum capacity of the reservoir and is only permitted in the summer months. Historically, the inflow into the reservoir during storm events is high enough to cause the water to flow over the spillway crest, located at the 791.9-foot elevation, approximately once every four to five years (1937 to 2019). From October 2002 to September 2020, the reservoir has been filled to the spillway crest four times and water has been high enough to flow over the spillway twice. The water levels in the lake during this period (2002 to 2020) fluctuated between the approximately 736-foot elevation contour and the 795-foot elevation contour. Between 2002 and 2020, the longest consecutive period of time that water was stored in the upper two feet of the reservoir (i.e., 793.9 to 795.9 feet) was approximately 35 days.

1.3 PURPOSE AND NEED

In 2012, and in collaboration with DSOD, IRWD initiated seismic evaluations of the existing outlet tower that resulted in a determination that the free-standing structure was seismically unstable. In 2017, at the request of DSOD, IRWD initiated a multi-phase spillway condition assessment. The assessment found that the spillway is nearing the end of its useful life and

[2] A spillway is a structure on a dam that allows water to flow around the dam to safely release excess water from a reservoir.

[3] NAVD88 Datum is used throughout this document.

its design, while acceptable at the time of construction, does not meet current design standards (URS 2015). IRWD has also conducted an assessment of seismic performance of the dam embankment and has determined that modifications to the Santiago Creek Dam embankment are necessary.

In view of the findings of the seismic evaluation for the existing outlet tower and dam embankment, as well as the comprehensive assessment of the existing spillway, IRWD has elected to develop designs for an inclined outlet structure that will be placed near the left abutment of the existing dam, to modify the embankment, and to replace the existing spillway with a side-channel spillway on the left abutment. The spillway crest will also be raised by six feet, which is two feet higher than the top of the flashboards when installed, to regain operational storage capacity that was lost over the years due to sedimentation. The existing outlet tower would be demolished, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir. The dam embankment would be modified to include a filter drain system.

1.4 PROJECT OBJECTIVES

The primary objective of the proposed Project is to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities to modify the dam embankment to permit operation of the facilities to provide for a long-term water resource benefit. In implementing the proposed Project, IRWD would also obtain the following benefits:

- Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety, and design requirements established by DSOD, which is the governing state agency associated with this Project;
- Satisfy IRWD's operational requirements in the present and the future;
- Extend the useful life of the facilities;
- Improve regional water supply reliability; and
- Minimize impacts to local environmental resources and surrounding property owners.

1.5 PROJECT DESCRIPTION

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Environmental Impact Report (EIR). The Project Description represents a conservative analysis to accommodate the range of uncertainty regarding the final design. Therefore, the quantities and measurements used throughout the analysis are estimates based on the best available information.

- The existing outlet tower would be demolished; with the portion of the tower located below the sediment to be filled with concrete and capped with a concrete plug or completely removed. A new inclined outlet structure would be constructed on the left abutment, including an approximately 54-inch steel pipe inclined along the slope that would act as the conveyance pipe for water into and out of the reservoir. The concrete-encased steel pipe would be situated in firm bedrock and anchored to the

slope by drilled foundation anchors. A series of steel riser pipes would extend vertically from the inclined 54-inch steel pipe and would act as intakes for reservoir water into the 54-inch pipe. Each riser would include an intake fish screen that would inhibit debris, silt, and aquatic life from entering the pipe.

- The inlet/outlet works would be configured to incorporate the new structure, including new valves and fittings. Water from the lake would enter into the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow either to the ILP or the emergency outlet pipeline. Water that enters the ILP would reach IRWD's distribution system. Water that enters the emergency outlet pipeline would be released to the creek at the end of the new spillway.
- The ILP would be increased from 36 inches to 54 inches to match the pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line to improve the system's hydraulics. The relocation and upsizing improvements would also protect the ILP from future flood events, thereby enhancing the overall reliability of delivering water from Irvine Lake to customers.
- The existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment. The alignment for the new spillway was selected as a result of several constraints including the footprint of the dam embankment, the location of the sloped outlet structure, and the steeply sloped hillside along the left abutment.
- To ensure the spillway structure is constructed on sound foundational material, many areas under the spillway structure would include the placement of roller compacted concrete. In addition, the floor of the spillway would be anchored into bedrock materials that would include drilling, grouting, post-tensioning and securing the anchors into the spillway slab.
- The end of the new spillway would include a stilling basin before discharging to a concrete and riprap apron. At the end of the stilling basin, a scour protection cutoff is included for additional mitigation of head cutting that may occur during significant discharges.
- The dam embankment improvements include removing the upper portion of the dam on the downstream side of the embankment, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material composed of pervious material.
- A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new shotcrete tie-back wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.
- A new dam control building would be constructed to house the valve system at the end of the existing dam crest. The preliminary layout shows a fire-hardened building with the approximate dimensions of 60 feet by 20 feet with a height of approximately 18 feet.

- The dam crest would be widened from 10 feet to between approximately 35 and 45 feet, the dam crest elevation would be raised approximately one foot, which would improve access and safety for dam maintenance. The paved dam crest would include protective railings on both sides of the road and replacement of piezometers to monitor the performance of the embankment dam. These embankment improvements would require excavations along the toe of the dam to key in the earthwork improvements to the face of the dam.
- The dam crest would be raised approximately one foot on the upstream side of the dam crest. This would raise the effective dam crest from an elevation of 811.9 feet up to approximately 812.9 feet for DSOD freeboard requirements during a probable maximum flood event.
- The Project would raise the spillway six feet to 797.9 feet, which is two feet higher than the existing maximum water storage elevation of 795.5 feet. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water.
- A new emergency access walkway (five feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent closed OCWR landfill facility during a spillway event. The walkway would connect to the new access road (described above).
- A new steel bridge structure would be included for vehicles across the new spillway.
- Existing structures would be demolished, including the existing vertical outlet tower and portions of 60-inch outlet conduit, significant portions (or possibly all) of the existing spillway chute and walls, spillway bridge and piers, portions of the upstream dam embankment concrete facing, storage building on the dam crest, outlet works control building and valve vault, outlet works energy dissipator vault, portions of the ILP, catwalk and stairs assembly across Santiago Creek, the dam keeper's house, boat shop (unless re-purposed for IRWD use), and piezometers/monitoring wells. Site demolition activities are anticipated to occur in 2027/2028, and spillway demolition is expected to occur in 2028. The potential removal of the boat shop building would occur at the end of the construction period in 2030. When feasible, demolished materials would be recycled or reused.
- The existing Southern California Edison (SCE) overhead power lines and power poles in the vicinity would be relocated outside the construction limits. This relocation would be completed by SCE. There would be an approximately 15-foot-wide right-of-way (ROW) easement for long-term maintenance.
- Before beginning construction of the dam improvements, the lake would be dewatered, and an access road would be graded along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.
- IRWD would maximize withdrawals from Irvine Lake in the time leading up to construction initiation to minimize the amount required to be dewatered. The dewatering process would combine several methods including dewatering using the valves and outlet tower to allow water to flow downstream, implementing a

temporary pumping system, and installing a subgrade dewatering system (e.g., dewatering wells). The temporary pumping system would include diesel-driven pumps and temporary above ground piping that would convey the water from the lake to a discharge point along Santiago Creek near the existing Arizona crossing (a type of culvert crossing). Dewatering would be used throughout the year as needed to manage the water level during and after storm events and to maintain a dry work environment. IRWD would coordinate downstream releases with impacted agencies and entities.

- Once the lake is dewatered and before the first dry season, the contractor would construct a temporary diversion berm and access ramp. The temporary diversion would provide a physical barrier to protect the work area from seasonal storms and would provide an elevated access road to allow construction equipment to access the downstream side of the dam.
- During construction, concrete crushing would occur in one of the staging areas. Concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may also occur at various stages of the Project as concrete is removed from the existing spillway or dam. When feasible, demolished and removed materials would be recycled or reused.

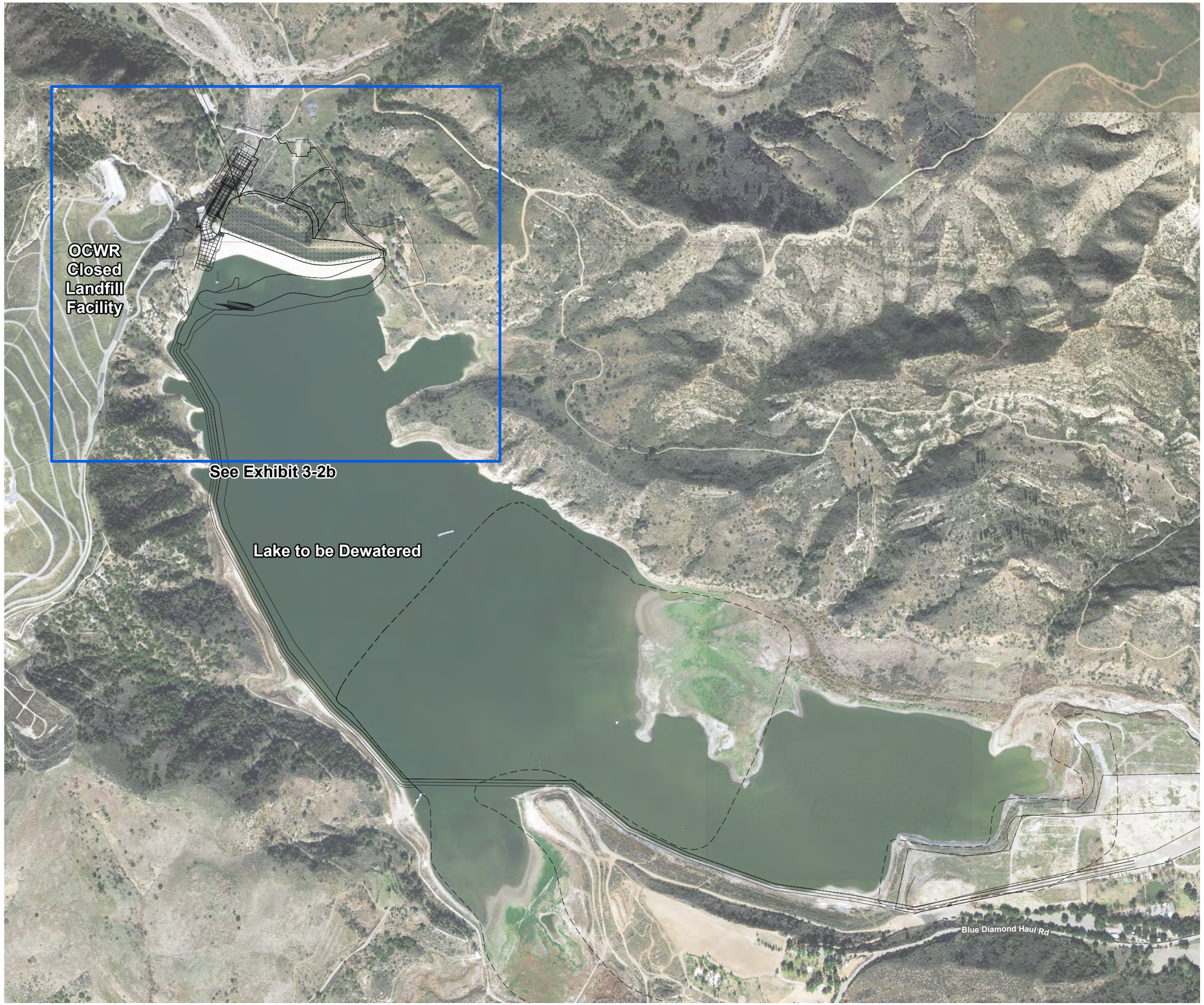
1.5.1 Additional Geotechnical Investigations

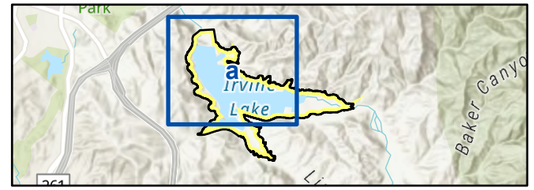
Although IRWD previously completed geotechnical investigations to support Project design and the development of detailed construction documents (2021–2024), additional geotechnical investigations were conducted in early 2025 to support the final design. These investigations included the performance of exploratory test pits, soil borings, packer testing, and non-intrusive geologic investigations and observations. The additional geotechnical investigations remained within the proposed limits of disturbance defined by the Project and will be mitigated as part of the overall Project.

1.5.2 Construction Activities

Construction Access and Staging

The primary construction access would lead into the lake from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area, as well as the required concrete batch plant and construction trailers, would be located in the large, flat plateau area (known as “the Flats”) at the upstream end of the reservoir (Exhibit 4). The primary construction access/haul road would connect the staging area to the existing dam within the lakebed after the lake is dewatered. An earthen ramp would be constructed up the right abutment of the existing dam to allow construction vehicles to access the downstream side of the dam. To facilitate construction of the downstream features, a secondary staging area would be located on the downstream toe of the dam near the existing outlet structure building. It is anticipated that the secondary staging area would be utilized by the contractor to mobilize the roller compacted concrete batch plant. The secondary staging area may also be used to stage formwork, rebar, raw materials, and other related materials and equipment required to successfully construct the dam improvements. Material from the embankment would be removed, staged, and repurposed within the Project site.





Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.

N
W E
S

0 400 800
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Santiago Dam Construction Features

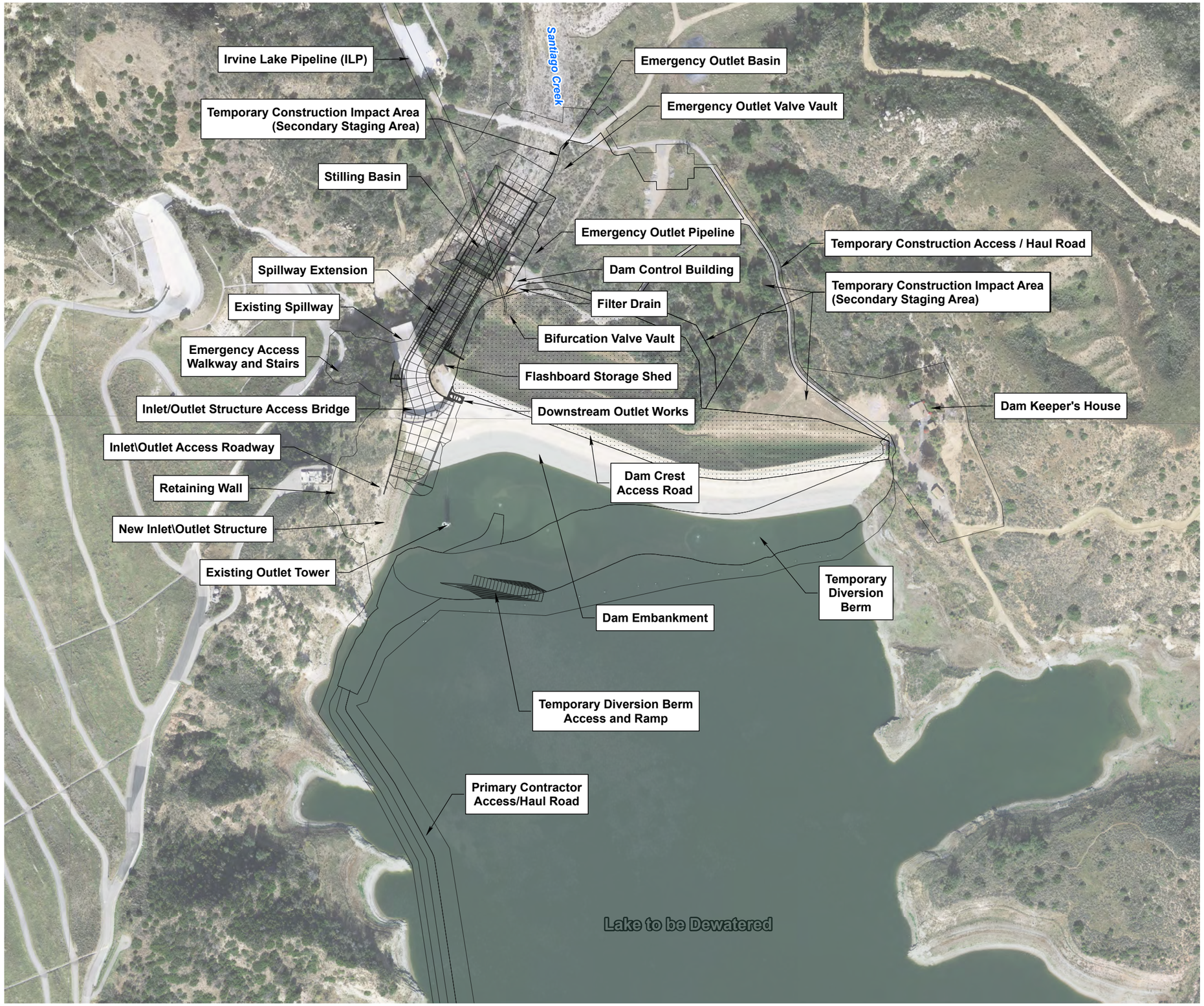
Exhibit 4a

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) <LINK>R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_Dam_Features_A.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Construction_Dam_Area_A



*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.

N
W E
S

0 150 300
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Santiago Dam Construction Features

Exhibit 4b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_Dam_Features.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_Construction_Dam_Area_B

Temporary Construction Water

Water would be utilized for various construction activities. The available water source in the Project vicinity is a 12-inch potable water line running along East Santiago Canyon Road south of Irvine Lake. IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road to the staging area. The temporary construction water line would be routed above-ground through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work areas. Construction activities may also use untreated water from the ILP as an additional water source.

Borrow Areas

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would include importing approximately 200,000 CY of material and exporting approximately 315,000 CY of material over the four-year construction period.

Construction Schedule

Construction work is anticipated to begin in Fall 2027 and the Project is expected to be completed within approximately four years. The approximately four-year construction window assumes down-time associated with weather restrictions and assumes working double 10-hour shifts (i.e., 20-hour workdays with nighttime work). The construction schedule assumes that a minimum of three dry seasons, which are generally between April to October, would be required to build the dam improvements in a systematic and phased fashion. It also assumes that the embankment improvements would be built concurrently with the spillway improvements. The exact date that construction begins is subject to change. The construction schedule will be refined as Project design plans are developed and finalized.

During construction, concrete crushing would occur in the staging area at the upstream end of the lake. Concrete crushing would be expected to occur during the day from April through November during the demolition phase of the Project. As mentioned above, concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may occur at various stages of the Project as concrete is removed from the existing spillway or dam.

Various public agencies (e.g., Orange County Fire Authority, Orange County Sheriff's Department, etc.) currently use portions of the proposed staging area for takeoff and landings associated with training and operational activities. During construction of the proposed Project, HeloPods[4] would be designated near the eastern edge of the lake near the Flats area at the upstream end of the reservoir for their continued use.

[4] Portable, tactical helicopter dip sources which provide fire crews a water source to refill the helicopters water tanks closer to the location of a wildfire.

1.6 OPERATION AND MAINTENANCE

Once operational, all Project components would operate and be monitored through IRWD's Supervisory Control and Data Acquisition (SCADA) system. Reservoir level sensors would continue to monitor water levels in the reservoir. In addition, instrumentation and monitoring systems would continuously monitor the stability of the dam and identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. Any upgrades to instrumentation and monitoring equipment would be determined during final design and may include, but are not limited to, survey monuments, inclinometers, seepage weirs, piezometers, reservoir level sensors, strong motion accelerographs, and a weather station.

Irvine Lake is generally operated in four IRWD operational modes as outlined in Table 1. Each mode has general operating parameters that allow for the safe, cost-effective operation of the lake while maximizing the potential average annual water runoff from storm events.

TABLE 1
IRWD/LAKE OPERATIONAL MODES

Season	
Winter	During the Winter Mode any available rainfall is captured in the lake and stored for use. This period begins with the first rainfall event in November/December and reduces or eliminates the need to purchase untreated imported water from MWD if runoff equals or is greater than demands.
Spring	During the Spring Mode under the first option, lake storage is evaluated to determine if available runoff captured during the winter will meet demands through October 1. If additional water is needed during a dry year, untreated imported water from MWD is purchased prior to May 1. Under the second option, water is not purchased prior to the summer season.
Summer	During the Summer Mode beginning May 1, under the first option, the lake is drafted down to meet IRWD demands. Under the second option water is purchased on a month-by-month basis to meet demands, which minimizes evaporation losses applied to imported supplies.
Fall	During the Fall Mode beginning October 1, purchased untreated imported water from MWD is used to maintain the Lake at the minimum operational level while maximizing available storage. Once sufficient runoff is received to meet demands or to begin filling the lake, staff transitions to the Winter Mode.
Under some water level and rain event conditions, the spillway may be utilized to pass storm flows around the dam. When the spillway is activated, the emergency outlet valve to Santiago Creek may be opened to release water and lower the water level in the reservoir and orders for untreated imported water are ceased. Source: IRWD 2020.	

Similar to the current reservoir, operation of the proposed Project would not require daily onsite staffing but would require only periodic maintenance. Water levels at Irvine Lake would fluctuate seasonally; water would be stored in winter when water supply exceeds demand, and the reservoir would be drawn down in summer when water demand exceeds supply. However, IRWD would develop a new operating plan for Irvine Lake that would be

updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time based upon a wide variety of factors, such as: seasonal storage needs, water quality considerations, and impoundment requirements based on rainfall projections.

During precipitation events, IRWD may maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify an operating strategy that would reduce the potential for utilizing the spillway and maximize stormwater capture. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands and other factors as needed.

Under normal operating conditions, all flow out of the reservoir would be conveyed through the inlet/outlet pipeline. In the event of an emergency or for dam safety reasons, IRWD would release water through the cone valve to the creek. IRWD staff would continue to conduct routine safety and security checks of the site, similar to existing protocols.

1.6.1 Additional Inundation During Operation

The Project includes raising the spillway six feet to 797.9 feet, which is 2 feet higher than the existing maximum water storage elevation with the flashboards installed (759.9 feet). Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water. Under current operations, if Irvine Lake was full and the water was conveyed to the Baker Water Treatment Plant at full production while also feeding the Howiler Water Treatment Plant, the water level in the lake would be lowered by approximately 2 feet in approximately 18 days, assuming no additional inflow into the reservoir and excluding evaporation. IRWD estimates that the upper 2 feet of the reservoir (i.e., 795.9 to 797.9 feet in elevation) could be inundated for an approximate maximum of 30 to 45 days per year but typically would be inundated less often, and in some years not at all. As previously discussed, the existing lake capacity is currently approximately 24,000 AF, but it can hold an additional 2,700 AF when the flash boards are installed on the spillway. With proposed improvements, the lake would hold a maximum of 28,000 AF.

Other than raising the spillway, all other operations would remain similar to the existing operations of the dam.

1.7 REGULATORY AUTHORITY

This section summarizes the regulations of those federal and state agencies that have regulatory authority over activities that occur within their areas of jurisdiction. A detailed explanation of each agency's regulatory authority is provided in Attachment A.

1.7.1 U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into waters of the United States (WOTUS) under Section 404 of the federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. The USACE's authority applies to all

WOTUS where the material (1) replaces any portion of a WOTUS with dry land or (2) changes the bottom elevation of any portion of any WOTUS. Activities that result in fill or dredge of WOTUS require a permit from the USACE.

The definition of WOTUS has been the subject of shifting regulations. Past federal revisions to regulations addressing the extent of USACE jurisdiction and the definition of WOTUS have been issued by the Obama Administration in 2015 and the Trump Administration in 2020. On January 18, 2023, the United States Environmental Protection Agency (USEPA) published a final Water Rule in the Federal Register that went into effect on March 20, 2023 ("the 2023 Rule") (USACE and USEPA 2023a).

The definition of WOTUS changed again in response to the Supreme Court decision in the case of *Sackett v. USEPA*. On September 8, 2023, the USEPA and the USACE amended the Code of Federal Regulations to conform the definition of WOTUS to the Supreme Court decision (USACE and USEPA 2023b). This conforming rule amends the provisions of the agencies' definition of WOTUS that were invalid under the Supreme Court's interpretation of the CWA under *Sackett*.

Based on these changes, tributaries must have at least relatively permanent flow to be considered WOTUS from the federal definition. This would exclude ephemeral drainages from being WOTUS. This represents a substantial change to areas under federal jurisdiction in the arid west. This report provides interpretations of WOTUS under the Amended 2023 Rule. The current definition of WOTUS is provided in Attachment A.

1.7.2 Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB), in conjunction with the nine RWQCBs, is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The SWRCB's and RWQCBs' jurisdictions extend to all WOTUS as well as waters of the State that are outside federal jurisdiction, including wetlands.

The Porter-Cologne Act broadly defines "waters of the State" as any surface water or groundwater, including saline waters, within the boundaries of the State." On August 28, 2019, the Office of Administrative Law (OAL) approved the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to waters of the State. The procedures went into effect on May 28, 2020. Under these regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS, and all waters that would have been considered WOTUS under any historical definition. Impacts to WOTUS are authorized by the RWQCBs through a Water Quality Certification per Section 401 of the CWA. For isolated waters (i.e., waters that are not subject to USACE jurisdiction under section 404 of the CWA) the state takes jurisdiction under the Porter-Cologne Act. The permit required for impacts to waters of the state is a Report of Waste Discharge (ROWD).

To obtain ROWDs, file the ROWD Form 200 with the necessary supplemental information with the RWQCB at least 120 days before beginning to discharge waste. The RWQCB reviews the application for completeness and may request additional information. Once the

application is complete, the RWQCB determines whether they should adopt Waste Discharge Requirements (WDRs), prohibit the discharge, or waive the WDRs. If WDRs should be issued, the RWQCB prepares proposed WDRs and distributes them to persons and public agencies with known interest in the project for a minimum 30-day comment period. RWQCB staff members may modify the proposed WDRs based on comments received from the discharger and interested parties. The RWQCB holds a public hearing with at least a 30-day public notification. The RWQCB may adopt the proposed WDRs or modify and adopt them at the public hearing by majority vote. The entire process for developing and adopting the requirements normally takes about three months. WDRs are in effect until such time as the discharge is terminated or until revoked by the RWQCB. NPDES permits expire after five years and must be reissued.

There is no application fee for Form 200 (except for dairies). Instead, there is an annual fee that will be paid to the RWQCB.

1.7.3 California Department of Fish and Wildlife

The CDFW regulates activities that may affect rivers, streams, and lakes pursuant to the *California Fish and Game Code* (§§1600–1616). According to Section 1602 of the *California Fish and Game Code,* the CDFW has jurisdictional authority over any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. A Lake or Streambed Alteration (LSA) Agreement would be required for the aforementioned activities.

2.0 METHODS

2.1 SURVEY AREA

The survey area for the jurisdictional delineation includes the perimeter of Irvine Lake and an area north (downstream) of the dam (Exhibit 3). The survey area north of the dam was provided by IRWD and the survey area south of the dam was determined by adding a 250-foot buffer from the 797.9-foot elevation contour around the lake. Where the 250-foot buffer did not include the 811.9-foot contour, the survey area was extended 50-feet beyond the 811.9-foot contour to assess indirect effects on biological resources[5]. The survey area was truncated at the ridgeline around Irvine Lake and at Santiago Canyon Road because no impacts are expected to extend past the ridgeline or arterial roadway, respectively.

2.2 LITERATURE REVIEW

Prior to conducting the jurisdictional delineation and during report preparation, Psomas reviewed the following documents to aid in the identification of areas that may fall under agency jurisdiction: the USGS' Black Star Canyon 7.5-minute quadrangle map, color aerial photography provided by the Hexagon Geosystems (flown in 2017 and 2018) and ESRI, Maxar (flown in 2019); soil data provided by the U.S. Department of Agriculture's Natural Resources Conservation Service (Exhibit 5); the National Hydric Soils List (USDA NRCS 2020); the National Wetlands Inventory's Wetland Mapper (Exhibit 6); the USGS National Water Information System Mapper (USGS 2020a); and the Water Quality Control Plan for the Santa Ana River Basin (Santa Ana RWQCB 1995).

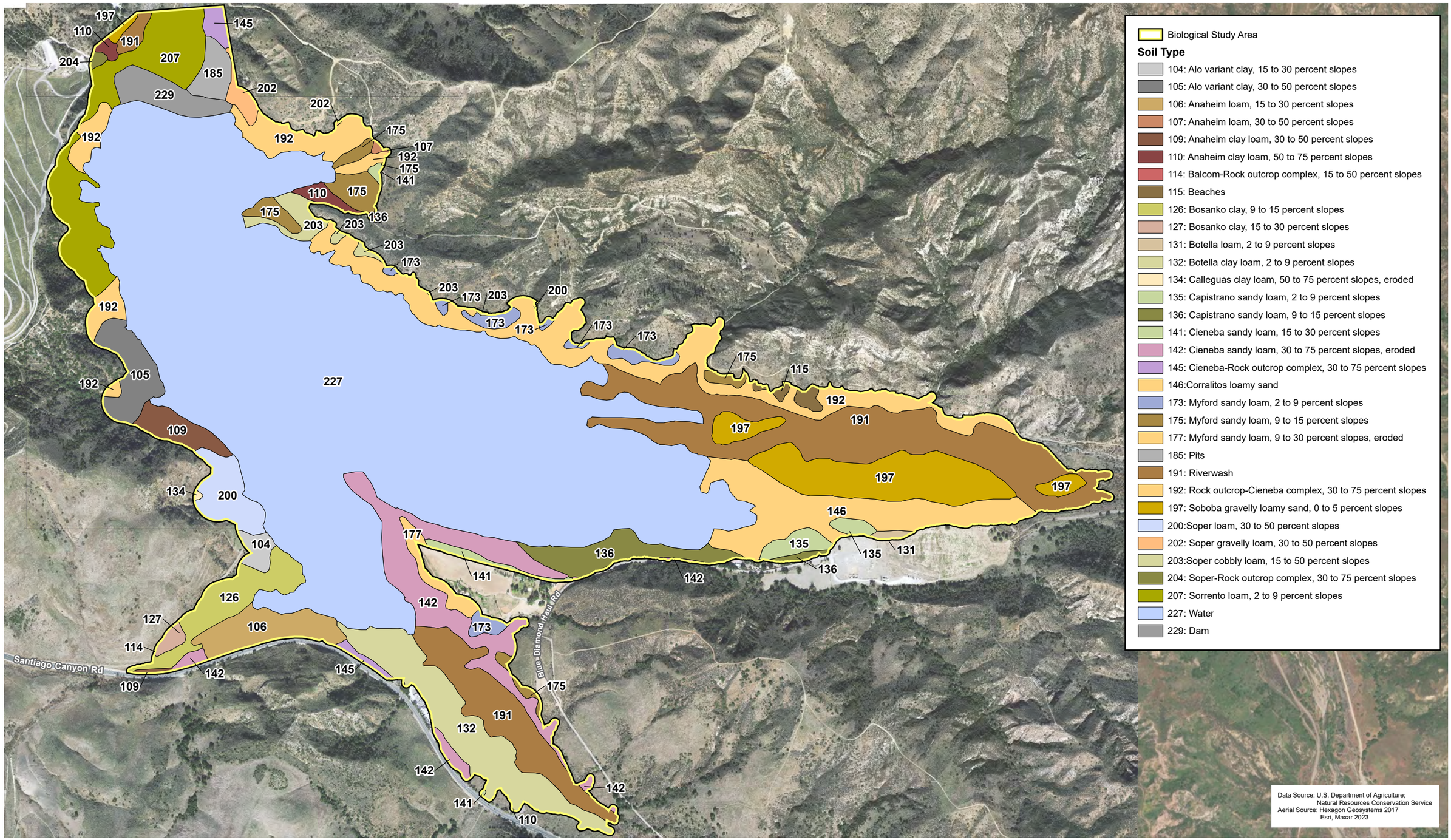
USGS Topographic Quadrangle. USGS quadrangle maps show geological formations and their characteristics and describe the physical settings of an area through topographic contour lines and other major surface features. These features include lakes, streams, rivers, buildings, roadways, landmarks, and other features that may fall under the jurisdiction of one or more regulatory agencies. In addition, the USGS maps provide topographic information that is useful in determining elevations; connectivity of streams, rivers, and other water features; latitude and longitude; and Universal Transverse Mercator Grid coordinates for the survey area.

Color Aerial Photography. Color aerial photographs were reviewed prior to conducting the field delineation to identify the extent of any drainages and riparian vegetation occurring in the survey area.

U.S. Department of Agriculture, Natural Resources Conservation Service. The presence of hydric soils is one of the chief indicators of jurisdictional wetlands. Psomas reviewed U.S. Department of Agriculture (USDA) soil data for the survey area.

U.S. Fish and Wildlife Service, National Wetlands Inventory: The Wetlands Mapper shows wetland resources available from the Wetlands Spatial Data Layer of the National

[5] The study area extended to the 811.9-foot elevation because the impact boundary had not yet been developed when the surveys began.



D:\Projects\3IRW\SantiagoCreek\PROS\GD\SCD_Project.aprx\ex_Soils

Soil Types

Santiago Creek Dam Improvement Project

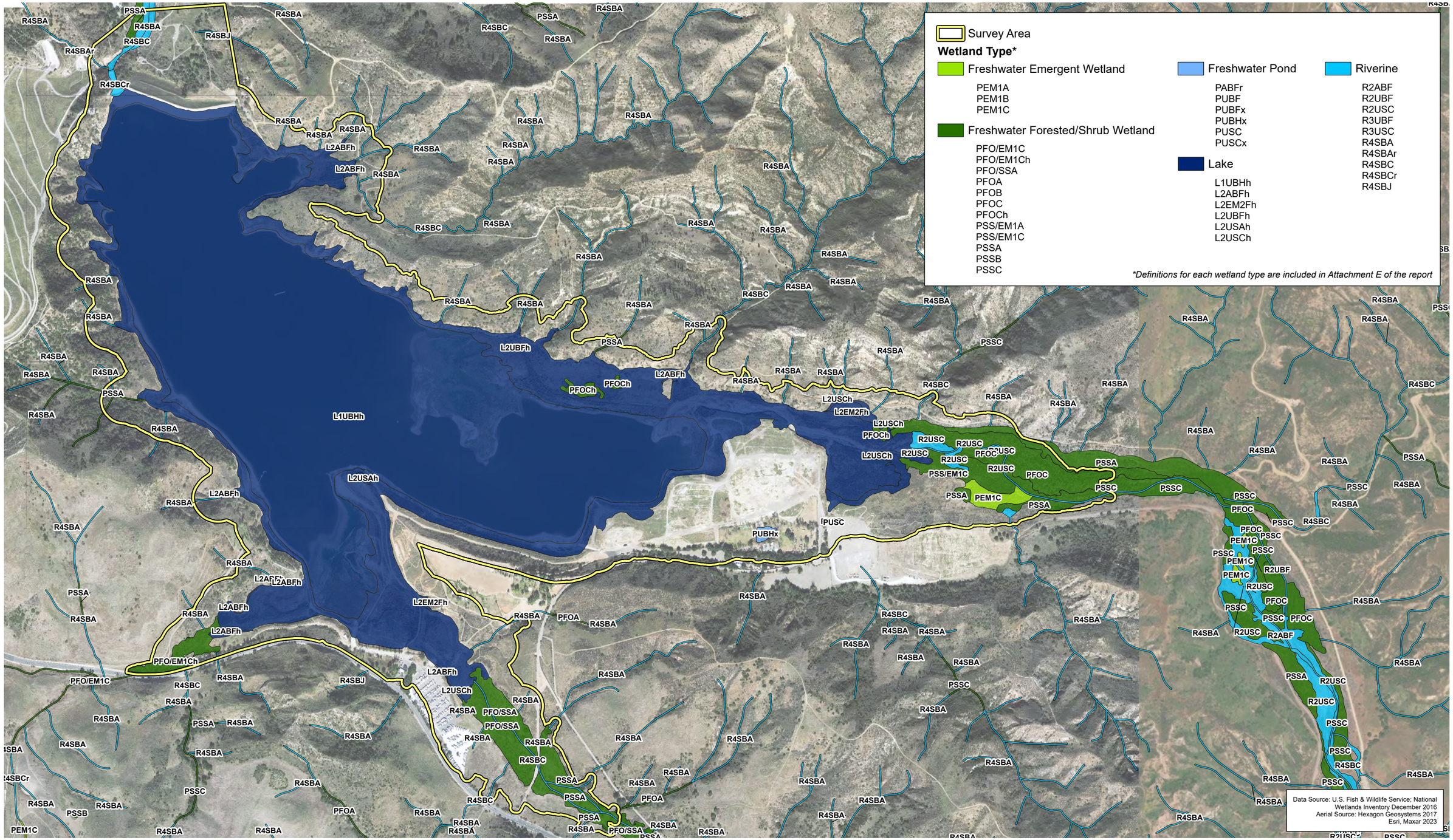
Exhibit 5

N W E S

0 550 1,100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_SoilTypes.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project aprxex_NWI

National Wetlands Inventory

Santiago Creek Dam Improvement Project

Exhibit 6

N W E S

0 550 1,100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_NWI.pdf

Spatial Data Infrastructure (USFWS 2020). This resource provides the classification of known wetlands following the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013). This classification system is arranged in a hierarchy of (1) Systems that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors (i.e., Marine, Estuarine, Riverine, Lacustrine, and Palustrine); (2) Subsystems (i.e., Subtidal and Intertidal; Tidal, Lower Perennial, Upper Perennial, and Intermittent; or Littoral and Limnetic); (3) Classes, which are based on substrate material and flooding regime or on vegetative life forms; (4) Subclasses, which recognize finer differences in life forms or substrate material than the Class; and (5) Dominance Types, which are named for the dominant plant or wildlife forms. In addition, modifying terms are applied to Classes or Subclasses. Full definitions of National Wetland Inventory (NWI) terms are found in Attachment B.

The mapped water resources are used to provide additional guidance on planning the field surveys. Given that wetland features mapped by the NWI may or may not exist at a site because of changing conditions and development, this resource provides only preliminary data and historic data based on aerial photographic interpretation and, therefore, must be ground-truthed.

USGS National Water Information System Mapper. The National Water Information System Mapper provides data from surface water sites, groundwater sites, springs, and atmospheric sites. Available data from surface water sites include daily, monthly, and annual discharge; peak streamflow; and water-year summaries.

Regional Water Quality Control Plans. California has nine RWQCBs. The survey area is located in RWQCB Region 8, the Santa Ana Region. The Santa Ana RWQCB has adopted a Water Quality Control Plan (or "Basin Plan") for this region. The Basin Plan contains goals and policies, descriptions of conditions, and proposed solutions to surface and groundwater issues. The Basin Plan also establishes water quality standards for surface and groundwater resources and includes beneficial uses and levels of water quality that must be met and maintained to protect these uses. These water quality standards are implemented through various regulatory permits pursuant to the CWA, specifically Section 401 for Water Quality Certifications and Section 402 for Report of Waste Discharge (ROWD) permits.

2.3 JURISDICTIONAL DELINEATION

The analysis contained in this report relies on a jurisdictional delineation conducted by Psomas on March 24, 2020, for the portion of the survey area north (downstream) of the existing dam and on October 14, 20, and 21, 2020, for the portion of the survey area south (upstream) of the dam around Irvine Lake. Psomas Senior Regulatory Specialist Allison Rudalevige performed all surveys with assistance from Psomas Senior Biologist Jonathan Aguayo on October 14 and 20, 2020, and Psomas Senior Biologist Lindsay Messett on October 21, 2020. Areas under USACE, RWQCB, and CDFW authority were delineated using an aerial photograph (scale of 1-inch equals 175 feet [1″ = 175′] north of the dam and scale of 1-inch equals 275 feet [1″ = 275′] south of the dam) overlaid with 5-foot topographic contour data loaded onto Avenza Maps application on an Apple iPad. Large drainage features and waterbodies were delineated as polygons and narrow drainages were delineated as centerlines with corresponding width measurements. Soil test pits were dug in areas that

exhibited potential hydrophytic vegetation and wetland hydrology. Representative photographs of the survey area are included in Attachment C.

2.3.1 USACE Waters of the United States

Psomas assessed the presence of WOTUS by determining connectivity or adjacency of on-site features to points of discharge at Traditional Navigable Waters (TNW) and whether they are relatively permanent tributaries or wetlands adjacent to such waters that meet the current definition of WOTUS. Non-wetland WOTUS are delineated based on the limits of the OHWM, which can be determined by a number of factors, including (1) the presence of a clear, natural line impressed on the bank; (2) shelving; (3) changes in the character of the soil; (3) destruction of terrestrial vegetation; and (4) the presence of litter and debris. The OHWM limits of drainages occurring in the survey area were further verified using methods contained in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*, *A Delineation Manual* (Lichvar and McColley 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010). The elevation of the median reservoir level (as recorded between 2002 and 2020) was used to determine the OHWM limits around Irvine Lake.

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). This Regional Supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Both documents prescribe using a three-parameter approach to identify wetlands. The three parameters needed to assign a site as a wetland include evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability or the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the Regional Supplement.

2.3.2 RWQCB Waters of the State

Psomas determined the limits of RWQCB jurisdiction in the field following the methods described for USACE jurisdiction, above.[6] The RWQCB shares USACE jurisdiction unless isolated conditions are present or waters are ephemeral. If isolated or ephemeral waters are present, the RWQCB takes jurisdiction using the USACE's definition of the OHWM. The SWRCB defines wetlands as areas that include (1) continuous or recurrent saturation of the upper substrate of sufficient duration to cause anaerobic conditions and (2) vegetation dominated by hydrophytes or lacking vegetation (SWRCB 2019).

[6] RWQCB limits of jurisdiction are normally determined by the presence of the OHWM per USACE methods for the arid southwest. The limits of RWQCB jurisdiction are not affected by the September 8, 2023, Amended 2023 Rule published by the USEPA and USACE (USACE 2023b).

2.3.3 CDFW Waters

CDFW's jurisdiction was determined by measuring the distance from the top of one bank to the top of the opposite bank for the water features; if riparian vegetation is present, jurisdiction is extended to the outer limit of riparian vegetation located along the feature. CDFW jurisdiction within Irvine Lake generally extended to the 795.9-foot elevation contour around the lake, which is the current maximum elevation of the lake with the flashboards installed.

3.0 RESULTS

Seventeen potential jurisdictional features were mapped in the survey area: Irvine Lake, Santiago Creek, and 15 smaller drainages that discharge into Irvine Lake or Santiago Creek (referred to as Drainage 1, Drainage 2, et seq.) (Exhibits 7, 8, and 9; detailed mapping for USACE, RWQCB and CDFW is provided in Attachment D). Results of the literature review are provided in Section 3.1, and a detailed analysis of each regulatory agency's jurisdiction is provided in Section 3.2. Attachment E provides datasheets that summarize the overall condition of the individual wetlands, drainages, and indicators of OHWM.

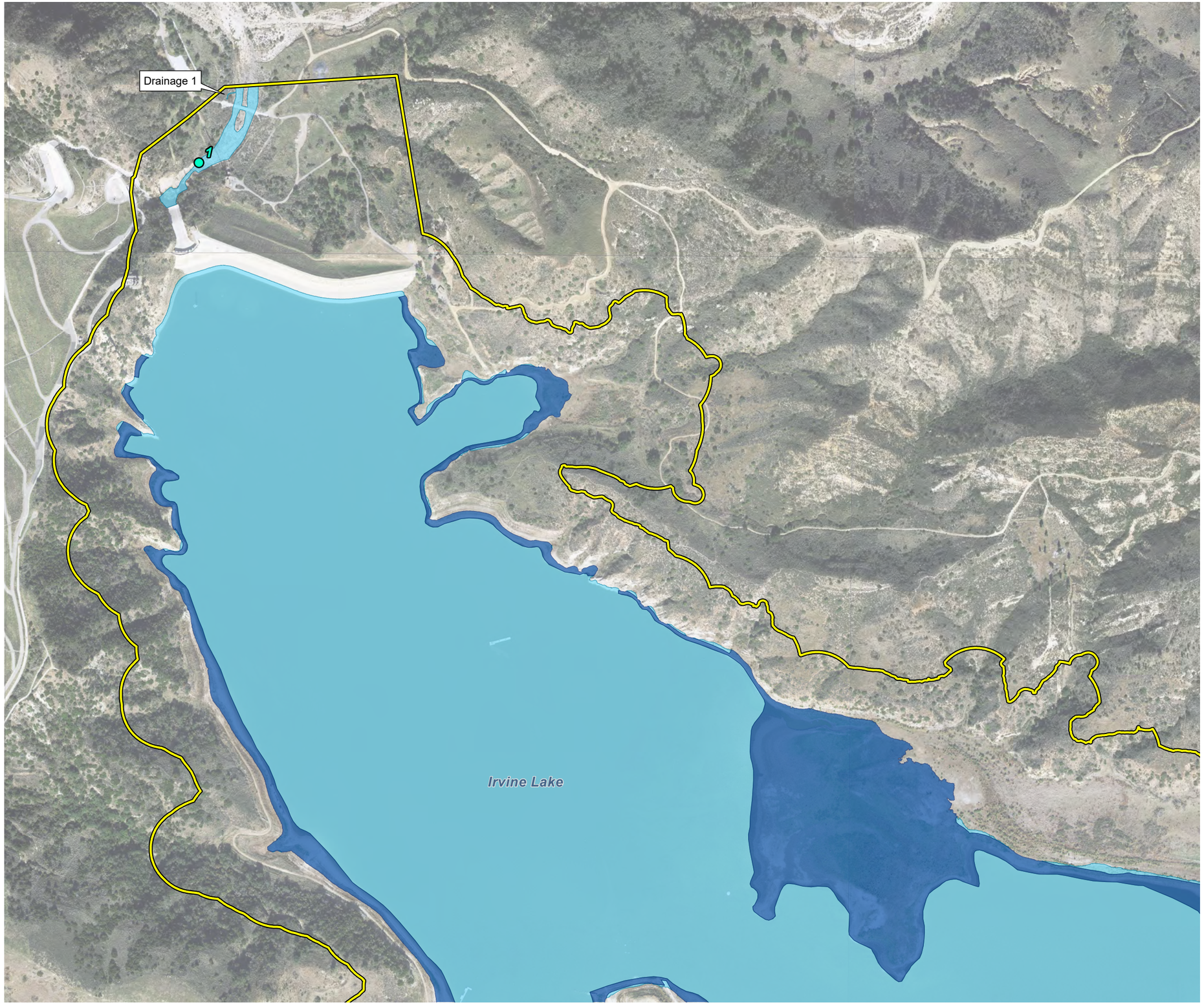
3.1 LITERATURE REVIEW

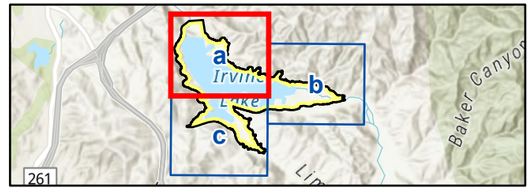
USGS Topographic Quadrangle. Topography in the survey area consists of relatively steep slopes around Irvine Lake with Santiago Creek encompassing a relatively broad floodplain both above and below the dam. Elevations range from approximately 657 to 996 feet above mean sea level (msl) in the survey area. Santiago Creek Dam is labeled on the USGS quadrangle map with Santiago Creek, a named blueline stream, and Irvine Lake (labeled as Santiago Reservoir on the quadrangle map) encompassing the majority of the survey area. One, unnamed blueline stream enters the survey area from the western edge north of the dam, and nine unnamed blueline streams enter Irvine Lake from the surrounding slopes.

Color Aerial Photography. Santiago Creek Dam, including the spillway; Irvine Lake; Santiago Creek; and multiple smaller drainages are clearly visible on aerial imagery. Fluctuations in the lake level are visible across historic aerials. Upstream of Irvine Lake, Santiago Creek encompasses a relatively broad floodplain that appears to contain dense, riparian vegetation. Below the spillway, Santiago Creek is confined to a narrow channel. The channel then broadens, and sparse vegetation is visible. Drainage 3 appears lined with concrete and riprap on the aerial imagery. The remaining drainages appear to contain varying degrees of associated riparian vegetation.

U.S. Department of Agriculture, Natural Resources Conservation Service. The survey area occurs in the following soil survey area: Orange County and Part of Riverside County, California. Within this survey area, the USDA NRCS has delineated the boundaries of "soil map units", which often contain components of multiple soil types that may be classified as hydric or non-hydric. The National Hydric Soils List identifies a soil map unit as "hydric" if it contains either a major or minor component that is at least in part hydric.

Soils mapped in the survey area include Alo variant clay, Anaheim loam, Anaheim clay loam, Balcom-rock outcrop complex, beaches, Bosank clay, Botella loam, Botella clay loam, Calleguas clay loam, Capistrano sandy loam, Cieneba sandy loam, Cieneba–rock outcrop complex, Corralitos loamy sand, Myford sandy loam, pits, riverwash, rock outcrop–Cieneba complex, Soboba gravelly loamy sand, Soper loam, Soper gravelly loam, Soper cobbly loam, Soper–rock outcrop complex, Sorrento loam, water, and dam (Exhibit 5). Of these soils, beaches, Corralitos loamy sand, pits, riverwash, and Soboba gravelly loamy sand (0 to 5 percent slopes) are considered hydric (USDA NRCS 2020). These soils are primarily found along Santiago Creek and the other main drainage entering Irvine Lake from the south. A description of the soils mapped in the survey area is provided in Attachment F of this report.





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

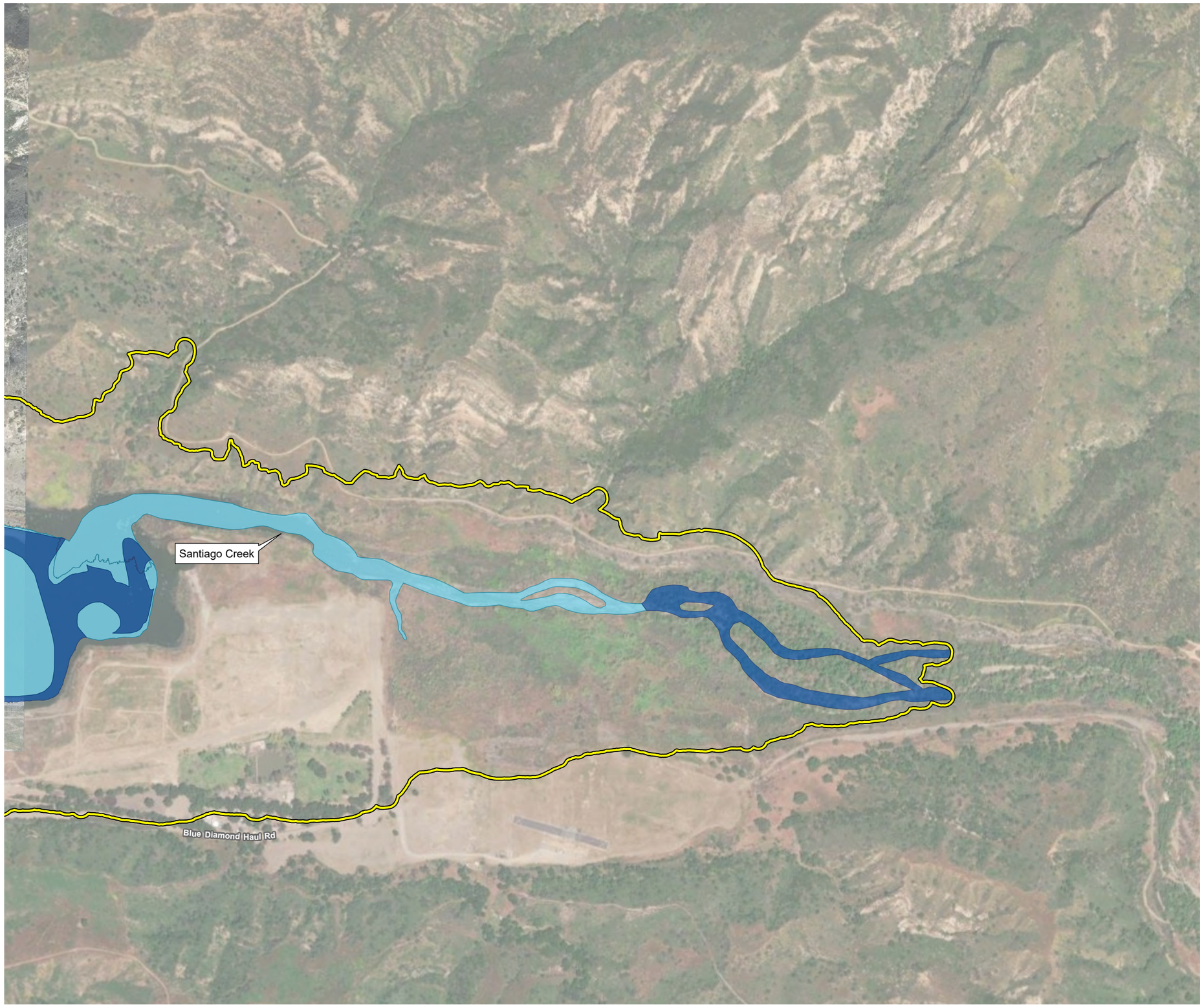
Exhibit 7a

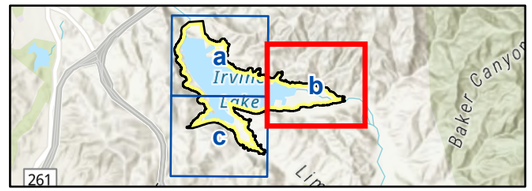
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

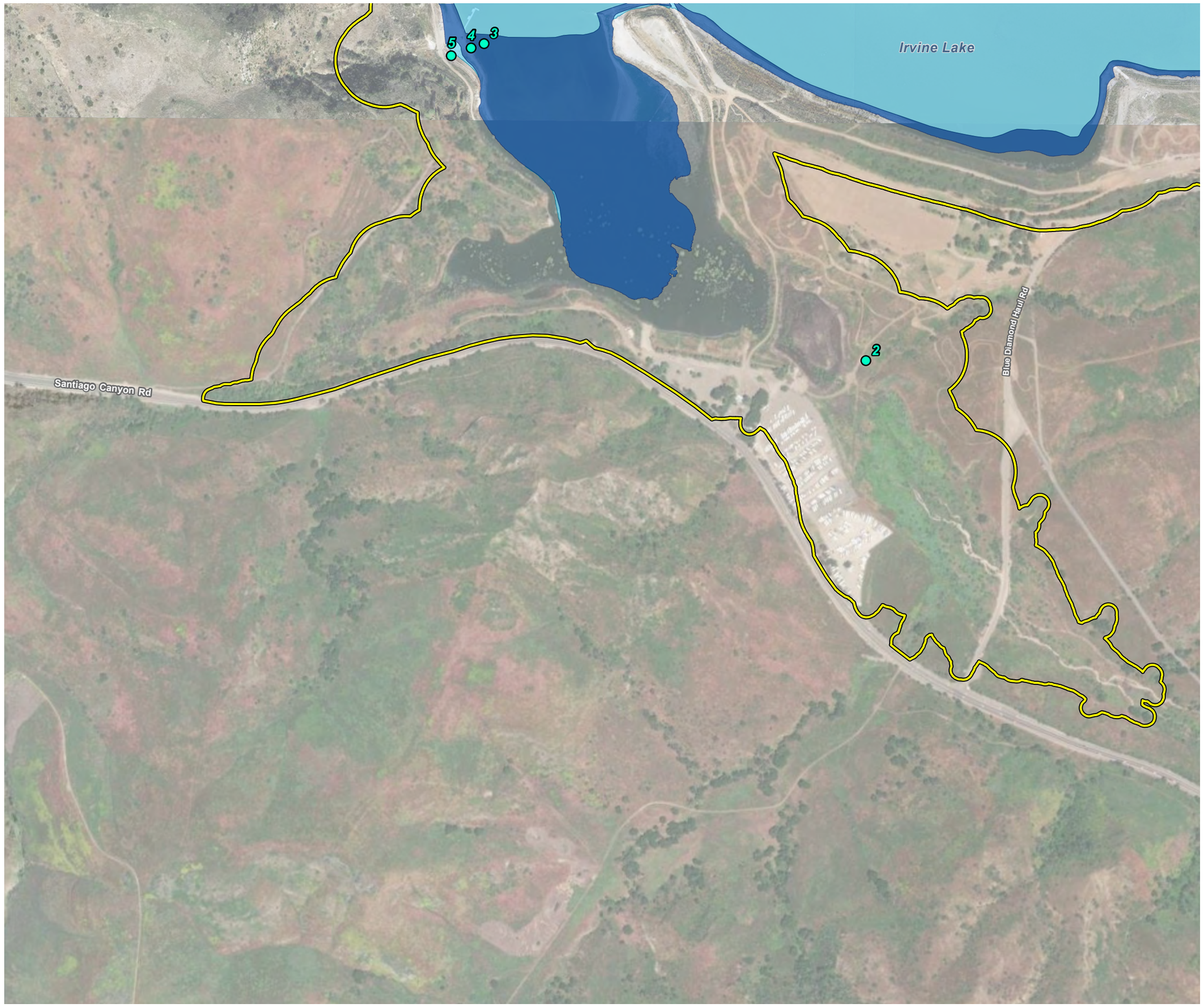
Exhibit 7b

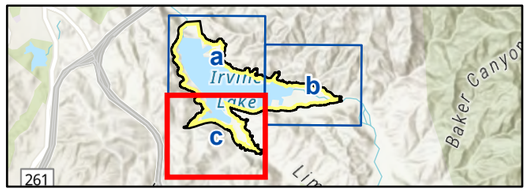
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE





Survey Area

Sampling Point Location

Waters of the United States

Wetland

Non-Wetland

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – USACE Waters of the United States

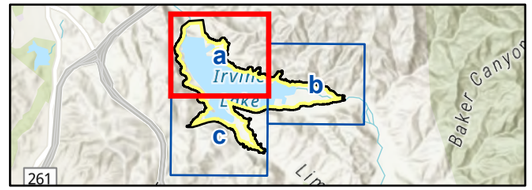
Exhibit 7c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE



- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)

Waters of the State

- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

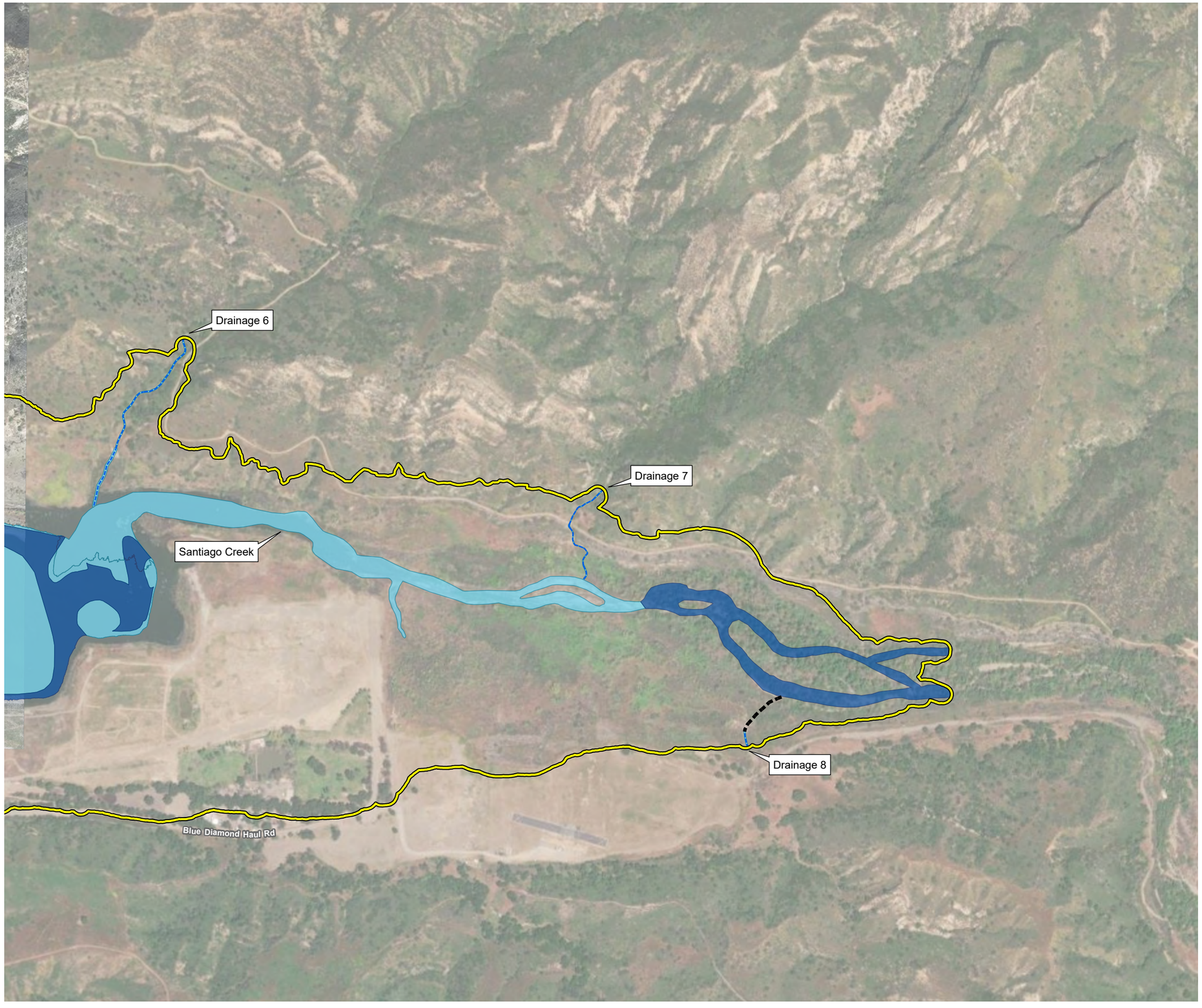
Exhibit 8a

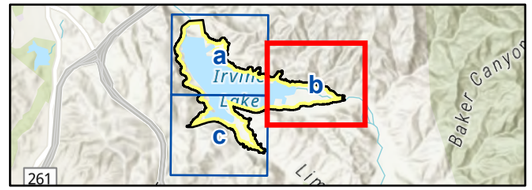
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

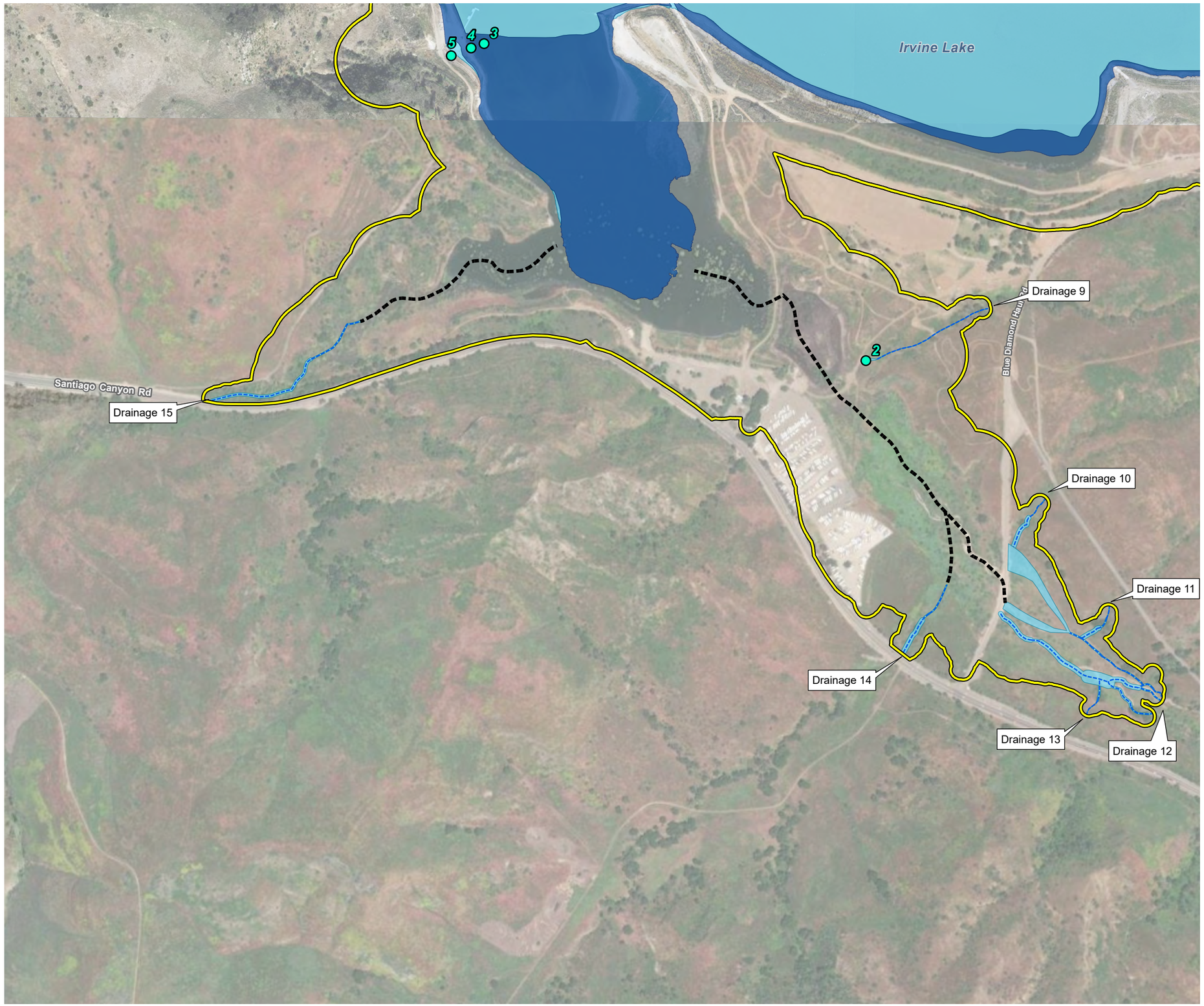
Exhibit 8b

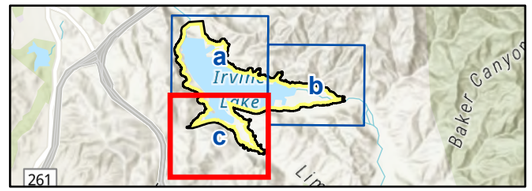
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDSCD_Project.aprx\ex_JD_RWQCB





Survey Area

Sampling Point Location

Sheet Flow (non-jurisdictional)

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – RWQCB Waters of the State

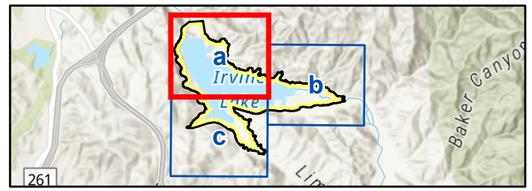
Exhibit 8c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCDS\SCD_Project.aprx\ex_JD_RWQCB



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N

W E

S

0 300 600

Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

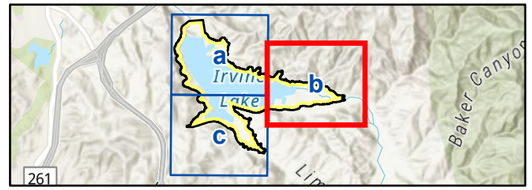
Exhibit 9a

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

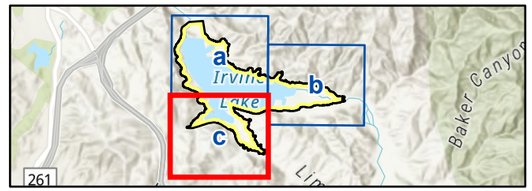
Exhibit 9b

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW



Survey Area

Sampling Point Location

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

N
W
E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources – CDFW Jurisdictional Waters

Exhibit 9c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_CDFW

U.S. Fish and Wildlife Service, National Wetlands Inventory. The NWI mapped various features in the survey area, including Irvine Lake, the spillway, Santiago Creek, Drainage 1, and Drainages 3 through 15 (Table 2; Exhibit 6). Various features are considered Lacustrine (i.e., lakes), Riverine (i.e., channelized areas like rivers and streams), and Palustrine (i.e., areas generally dominated by trees, shrubs, and emergent vegetation, but also including ponds). Additional areas mapped by the NWI did not exhibit bed, bank, or OHWM indicators during the field visit and were not considered jurisdictional waters. Irvine Lake and the downstream ends of Santiago Creek, Drainage 12, and Drainage 15 where they discharge into Irvine Lake were mapped as Lacustrine features. The main channel of Santiago Creek and Drainage 12 were mapped as Riverine with surrounding areas mapped as Palustrine. The upstream end of Drainage 15 was mapped as Palustrine. The spillway and smaller drainages were mapped as Riverine. The description for NWI mapped wetland resources is provided in Attachment B of this report.

TABLE 2
MAPPED NATIONAL WETLANDS INVENTORY RESOURCES

Feature	National Wetlands Inventory Classification(s)[1]
Irvine Lake	L1UBHh, L2ABFh, L2UBFh, L2USAh, PFOCh
Existing Spillway	R4SBCr
Santiago Creek (Upstream of Irvine Lake)	L2UBFh, L2USCh, L2EM2Fh, R2UBF, R2USC, PFOC, PFOCh, PSSA, PSSC, PSS/EM1C, PEM1C
Santiago Creek (Downstream of Irvine Lake)	R4SBA, R4SBC, PSSA
Drainages 1	PSSA
Drainage 2	Not mapped
Drainage 3	R4SBAr
Drainages 4, 8, 9, 10, 11, and 13	R4SBA
Drainages 5, 6, 7, and 14	R4SBC
Drainage 12	L2EM2Fh, L2UBFh, R4SBC, PFO/SSA, PSSA
Drainage 15	PFO/EM1Ch, L2ABFh, L2UBFh

[1] Descriptions of NWI classifications are provided in Attachment B.

The NWI data was used to provide additional guidance on planning the field surveys. Given that wetland features mapped for the NWI may or may not exist at present because of changing conditions and development, this resource provides preliminary data and historic data. These features were ground-truthed in the field during the delineation.

Regional Water Quality Control Plans. The Basin Plan discusses Santiago Creek (Reach 1 occurs downstream of Irvine Lake) and Irvine Lake. According to the Basin Plan, the water quality objective for Reach 1 of Santiago Creek is 600 milligrams per liter (mg/l) of total dissolved solids. Water quality objectives for Irvine Lake are shown in Table 3.

TABLE 3
WATER QUALITY OBJECTIVES FOR IRVINE LAKE

Water Quality Objectives (mg/l)					
Total Dissolved Solids	**Hardness**	**Sodium**	**Chloride**	**Total Inorganic Nitrogen**	**Sulfate**
730	360	110	130	6	310
mg/l: milligrams per liter					

Beneficial uses are defined in the Porter-Cologne Act as those uses of water that are necessary for tangible and intangible economic, social, and environmental benefits. Beneficial uses for Reach 1 of Santiago Creek include Municipal and Domestic Water Supply (MUN) waters, Groundwater Recharge (GRW) waters, Water Contact Recreation (REC-1) waters, Non-contact Water Recreation (REC-2) waters, Warm Fresh Water Habitat (WARM) waters, and Wildlife Habitat (WILD) waters. Beneficial uses for Irvine Lake include MUN waters, Agricultural Supply (AGR) waters, REC-1 waters, REC-2 waters, WARM waters, Cold Freshwater Habitat (COLD) waters, and WILD waters. Descriptions of the beneficial uses applicable to waters in the survey area are provided in Attachment G of this report.

3.2 JURISDICTIONAL ANALYSIS

Table 4 summarizes the type and extent of the jurisdictional features delineated in the survey area.

TABLE 4
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

Feature	Jurisdiction (acres)						
	USACE WOTUS			RWQCB Waters of the State			CDFW Jurisdictional Resources
	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Total
Irvine Lake	94.582	312.959	407.541	94.582	312.959	407.541	614.135
Santiago Creek	7.124	13.803	20.927	7.124	13.803	20.927	36.024
Drainage 1	—	0.008	0.008	—	0.008	0.008	0.027
Drainage 2	—	—	—	—	0.025	0.025	0.074
Drainage 3	—	—	—	—	0.071	0.071	0.168
Drainage 4	—	—	—	—	0.048	0.048	0.094
Drainage 5	—	—	—	—	0.144	0.144	0.359
Drainage 6	—	—	—	—	0.369	0.369	0.149
Drainage 7	—	—	—	—	0.100	0.100	0.148
Drainage 8	—	—	—	—	0.024	0.024	0.042
Drainage 9	—	—	—	—	0.066	0.066	1.237
Drainage 10	—	—	—	—	0.167	0.167	0.245
Drainage 11	—	—	—	—	0.114	0.114	0.318
Drainage 12	—	—	—	—	4.894	4.894	13.517
Drainage 13	—	—	—	—	0.039	0.039	0.114
Drainage 14	—	—	—	—	0.235	0.235	0.416
Drainage 15	—	—	—	—	0.433	0.433	2.563
Total	**101.706**	**326.770**	**428.476**	**101.706**	**333.499**	**435.205**	**669.630**

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.

3.2.1 Waters of the United States Determination

Connectivity to a Traditional Navigable Water

Santiago Creek is a tributary of the Santa Ana River, which discharges into the Pacific Ocean (a TNW) approximately 23 river miles downstream from Santiago Creek Dam. Tributaries to TNWs that meet the relatively permanent standard, are also WOTUS. Data from the NWI and USGS stream gauge data were used to assist in the determination of whether Santiago Creek is relatively permanent water. According to the NWI, the central channel of Santiago Creek above the dam was classified as R2UBF, which has a semi-permanent flooding water regime. Stream gauge data was not available downstream or immediately upstream of Santiago Creek Dam, but a station was located at Modjeska Canyon. Average monthly discharge for January, February, and March (as recorded between 1961 and February 2020) was 15, 30, and 18 cubic feet per second (cfs), while discharge was less than 6 cfs for the remaining months (USGS 2020a), indicating increased flow for three months of the year (i.e.,

seasonally). The main channel of Santiago Creek below the dam is classified as R4SBC, which indicates that it is seasonally flooded (i.e., surface water is present for extended periods of time, see Attachment B). In addition, on-site observations indicate that Santiago Creek should be considered an intermittent stream. The area below the spillway had patches of obligate wetland plants (e.g., cattails [*Typha* sp.]), indicating that water is present for extended periods of time. Surface water was observed in portions of the creek both above and below the dam during various survey visits. For these reasons, Santiago Creek can be considered to meet the relatively permanent standard; thus, it is a WOTUS.

Irvine Lake is an impoundment of Santiago Creek, which has its headwaters in the Santa Ana Mountains. Impoundments of jurisdictional waters are WOTUS; therefore, Irvine Lake would be considered WOTUS.

Drainage 1, as shown on Exhibit 7, carries flow from the west side of Santiago Creek via a pipe culvert under an access road adjacent to an Arizona crossing. As an underground offshoot of Santiago Creek, this drainage would also be considered to have relatively permanent flow; thus, it is a WOTUS.

Drainage 2, as shown on Exhibit 7, is an outlet from Irvine Lake used to release lake water to the creek (IRWD 2020b). Additionally, IRWD conducts valve tests twice per year that release water into the channel. Given that release of flow in this drainage is limited, this drainage is considered to be ephemeral; thus, it is not a WOTUS.

Drainage 3, as shown on Exhibit 7, appears to drain flow from the hills west of the survey area and overflows from basins located along its length. The NWI classifies this drainage as R4SBAr, which indicates that it is temporarily flooded (Appendix B). During the March site visit, which occurred immediately following a rain event, surface water was not observed in this drainage. Therefore, it is considered to carry ephemeral flow and is not considered a WOTUS.

Drainages 4, 8, 9, 10, 11, and 13, as shown on Exhibit 7, drain flow from the hills surrounding Santiago Creek and Irvine Lake and are classified by the NWI as R4SBA, which indicates that they are temporarily flooded (Appendix B) With the exception of a small inundated area at the downstream end of Drainage 9, these areas were dry during the October site visits. Therefore, these drainages are considered to carry ephemeral flow and are not WOTUS.

Drainages 5, 6, 7, and 14, as shown on Exhibit 7, are classified by the NWI as R4SBC, which indicates that they are seasonally flooded (Appendix B) These areas were all dry at the time of the October site visits and historic aerial imagery does not show surface water in these areas. The streambeds are similar in appearance to Drainages 4, 8, 9, 10, 11, and 13, with sandy sediment in the channel and no hydrophytic vegetation present. Therefore, it is likely that these drainages only experience ephemeral flow; therefore, they are not WOTUS.

The low flow channels of Drainage 12 are classified as R4SBC, as shown on Exhibit 7, and are surrounded by PSSA, which indicates that the main drainage has a water regime considered to be seasonally flooded (Appendix B). Drainage 15, is classified as PFO/EM1Ch, as shown on Exhibit 7, which indicates that it has a water regime also considered to be seasonally flooded (Appendix B). These areas were all dry at the time of the October site visits. Historic

aerial imagery does not show surface water in these areas except at the downstream ends of Drainages 12 and 15 during periods of high reservoir levels and in April 2005 in Drainage 12. The low flow channels lack hydrophytic vegetation that would indicate regular flow, in contrast to Santiago Creek which has water cress (*Nasturtium officinale*), an obligate wetland species, along portions of its length. Therefore, while the NWI indicates that these areas may be seasonally flooded, field observations suggest that they are ephemeral; therefore, they are not WOTUS.

Limits of Waters of the United States

As discussed above, Irvine Lake, Santiago Creek, and Drainage 1 would be considered WOTUS. The limits of WOTUS were based on indicators of OHWM.

Jurisdictional limits for Irvine Lake were identified as the median reservoir level (762.2 above msl) and OHWM was confirmed during the October 2020 field visits. Indicators of OHWM include a defined water mark on the existing dam embankment, a change in vegetation species and cover around the reservoir, and a line of depositional material in unvegetated areas around the reservoir.

An Arid West Ephemeral and Intermittent Streams OHWM Datasheet was completed for a representative area in Santiago Creek showing evidence of an OHWM to determine extent of WOTUS (see Attachment E). Evidence of OHWM observed in the survey area included the presence of bed and bank, benches, drift deposits, sediment deposits, a change in average sediment texture, a change in vegetation species and cover, and a break in bank slope. Low terraces within the active floodplain of Santiago Creek were excluded from WOTUS jurisdiction. These areas were at a higher elevation and contained upland species, such as California buckwheat (*Eriogonum fasciculatum*). The OHWM in Santiago Creek was directly observed from Irvine Lake to approximately 300 feet upstream of the confluence with Drainage 7. Upstream of this area, dense riparian vegetation impeded access and the OHWM extent was not directly observed. Historic aerial imagery over multiple years was used to map the OHWM extent in Santiago Creek upstream of this point.

The OHWM indicators for Drainage 1 included the presence of bed and bank, a change in average sediment texture, and a change in vegetation cover.

Based on an assessment of jurisdictional waters, a total of 428.476 acres of WOTUS under the regulatory authority of the USACE occurs in the survey area (Table 4; Exhibit 7).

Wetlands Determination

Irvine Lake, Santiago Creek, and Drainage 1 are WOTUS and may be considered wetland or non-wetland.

Irvine Lake has water levels that change based on inflow, precipitation, and releases from the dam. At the time of the survey visit, the exposed lakebed included both vegetated and unvegetated areas. Vegetated areas within the OHWM were dominated by: (1) a variable cover of swamp prickle grass (*Crypsis schoenoides*, facultative wetland) close to the lake bottom; (2) a variable cover of cocklebur (*Xanthium strumarium*; facultative) primarily along

the edge of the OHWM, and (3) cocklebur with scattered Goodding's black willow (*Salix gooddingii*; facultative wetland). These areas would all be considered dominated by hydrophytic vegetation. A series of three sampling points (Sampling Points 3, 4, and 5 on Exhibit 7; Attachment E) were assessed along the western edge of the lake, two were below the mapped OHWM and one was just above the OHWM. Indicators of hydrophytic vegetation, hydric soils, and wetland hydrology were observed at the two sampling points below the OHWM; hydric soils were not observed above the OHWM. Given the lack of hydric soil indicators, areas above the OHWM were not considered wetland WOTUS. Areas along the shoreline below the OHWM that are dominated by hydrophytic vegetation are considered wetland WOTUS because they meet all three wetland criteria. Unvegetated areas below the OHWM represent a "problematic wetland situation" according to USACE (2008) guidelines and can be considered wetland WOTUS meeting two of the three wetland criteria (i.e., hydrology and soils) because temporal shifts in vegetation would meet the third wetland criteria periodically. During the site visit, it was observed that the lakebed within the OHWM had various stages of growth of swamp prickle grass, with young individuals in areas that were recently inundated and mature individuals growing in areas that were not as recently inundated. As vegetation fluctuates with the lake levels, the currently unvegetated areas are expected to contain hydrophytic vegetation periodically. Therefore, the unvegetated shoreline below the OHWM is also considered wetland WOTUS.

Wetland hydrology indicators (e.g., surface water, drift deposits, inundation visible on aerial imagery) are present along the length of Santiago Creek upstream of Irvine Lake. Immediately upstream of Irvine Lake, Santiago Creek is confined to a narrow channel with vertical banks. The area within the OHWM is sparsely vegetated and has a sandy substrate. Vegetation increases in density farther upstream. These upstream areas have a canopy dominated by hydrophytic vegetation, consisting primarily of Goodding's black willow, western sycamore (*Platanus racemosa*; facultative), and mule fat (*Baccharis salicifolia* ssp. *salicifolia*; facultative); water cress (*Nasturtium officinale*; obligate wetland) is scattered along the waterline. The soils are sandy with rock and cobbles present in the channel. Riparian areas represent a problematic vegetation situation. The USACE (2008) recommends that where hydric soils and/or hydrology are problematic, "emphasis should be placed on the understory, which may be more indicative of current wetland or non-wetland conditions". Therefore, the upstream portions of the channel exhibiting obligate wetland species in the understory (i.e., water cress) were mapped as wetland WOTUS. However, it should be noted that portions of the creek were inaccessible due to thick vegetation and could not be delineated in the field; therefore, these areas were mapped using aerial photographs and the designation as a wetland WOTUS is assumed. Given the sparse vegetation in the downstream portions of the channel, these areas are not considered wetland WOTUS.

A sampling point was assessed in a portion of Santiago Creek north of the dam that contained obligate wetland vegetation and adjacent surface water (Sampling Point 1 on Exhibit 7; Attachment E). Indicators of hydrophytic vegetation and wetland hydrology were present, but hydric soils were not present. Therefore, this area was not considered to be a wetland. The remaining portions of Santiago Creek and Drainage 1 had fewer indicators of wetland hydrology; vegetation was sparse and primarily consisted of facultative species (e.g., mule fat) and facultative upland or upland species (e.g., scalebroom [*Lepidospartum squamatum*]

and fennel [*Foeniculum vulgare*]). Therefore, these areas were not considered wetland WOTUS.

Based on an assessment of jurisdictional waters, a total of 101.706 acres of wetland WOTUS under the regulatory authority of the USACE occurs in the survey area (Table 4; Exhibit 7).

3.2.2 Regional Water Quality Control Board Jurisdiction

The RWQCB asserts jurisdiction over all WOTUS so that the extent of RWQCB "waters of the State" matches the USACE's jurisdiction. Therefore, all features with USACE jurisdiction (i.e., Irvine Lake, Santiago Creek, and Drainage 1) are also subject to the jurisdiction of the RWQCB. The Porter-Cologne Act provides the State with the authority to regulate waters of the State that are not under USACE jurisdiction (i.e., isolated or ephemeral waters). This provision allows Drainages 2 through 15 to be considered waters of the State.

Limits of Waters of the State

The limits of waters of the State for Santiago Creek, Irvine Lake, and Drainage 1 are the same as for USACE. Drainages 2, 3, 6, 7, 10, 11, and 13 have indicators of an OHWM for their entire extent. This includes a break in bank slope, change in sediment texture, change in vegetation type and cover, and the presence of sediment and drift deposits at or below the OHWM. However, Drainages, 4, 5, 8, 9, 12, 14, and 15 only exhibit indicators of OHWM at their upstream ends. Drainages 4 and 5 are channelized until they reach a broad, relatively flat area above the median lake level. At this point, it appears that water sheet flows across the area and indicators of OHWM are lacking. Drainage 8 is channelized until it reaches the edge of riparian vegetation along Santiago Creek. At that point, the drainage broadens and is not confined to a channel. Drainage 9 ends at a slightly depressional area at the edge of an access road. There are no indicators of OHWM beyond this point. While the upstream ends of Drainages 12 and 15 are channelized, the downstream ends do not appear to have a defined bed, bank, or channel. The drainages are also disrupted by the presence of above-grade access roads. Water appears to sheet flow across the area and many potential indicators of OHWM are lacking (e.g., leaf litter is dense under the riparian canopy of Drainage 12 and has not been washed away, there is no hydrophytic herbaceous vegetation in Drainage 12, vegetation in Drainage 15 is predominantly facultative, and there is no evidence of scour). In addition, while periodic inundation of these areas occurs during high reservoir levels, the elevation is above the median reservoir level. Like Drainage 8, Drainage 14 is channelized until it reaches the edge of the riparian canopy surrounding Drainage 12. Therefore, only the upstream, channelized portions of Drainages 4, 5, 8, 9, 12, 14, and 15 are considered to have an OHWM and would be considered waters of the State.

Based on an assessment of jurisdictional waters, a total of 435.205 acres of non-wetland waters of the State under the regulatory authority of the RWQCB occur in the survey area (Table 4; Exhibit 8).

Wetlands Determination

Sampling Point 2 (Exhibit 8; Attachment D) was assessed at the downstream end of Drainage 9 in order to determine if it was an isolated or adjacent wetland. This area contained surface water and hydrophytic vegetation (primarily tall flatsedge [*Cyperus* cf. *eragrostis*; facultative wetland]). This area did not have indicators of hydric soil and would not be considered an isolated or adjacent wetland.

The remaining drainages (Drainages 2 through 15) were dominated by facultative, facultative upland, upland vegetation or were unvegetated, and so did not meet the hydrophytic vegetation criterion for wetlands.

Therefore, wetland waters of the State are the same as those under USACE regulatory authority. Based on an assessment of jurisdictional waters, a total of 101.706 acres of wetland waters of the State under the authority of the RWQCB occur in the survey area (Table 4; Exhibit 8).

3.2.3 California Department of Fish and Wildlife Jurisdiction

The top of the existing spillway with the flashboards installed, which is at an elevation of approximately 795.9 feet above msl, is generally considered the top of bank for Irvine Lake. This limit of CDFW jurisdiction was confirmed during the field visit and corresponded to a break in slope and/or the upper extent of riparian vegetation around the edge of the reservoir. The spillway is also included as part of Irvine Lake/Santiago Creek. The 795.9-foot elevation contour extends up Santiago Creek and various drainages in the survey area; however, on-site conditions do not support extending CDFW jurisdiction to that elevation for all these features. Santiago Creek is confined to steep, almost vertical banks where it discharges into Irvine Lake; in this case, CDFW jurisdiction was limited to the area between those banks instead of the 795.9-foot elevation contour. Similarly, CDFW extent was mapped along the outer edge of riparian vegetation where Drainage 12 discharges into Irvine Lake. The existing parking lot and ornamental planting areas where Drainage 12 discharges into Irvine Lake were also excluded from CDFW jurisdiction.

Santiago Creek and Drainages 1 through 15 have defined beds and banks over most of their length; a riparian canopy occurs along portions of these drainages. These features would be under the regulatory authority of the CDFW.

Based on an assessment of jurisdictional waters, a total of 669.630 acres of waters under the regulatory authority of the CDFW occur in the survey area (Table 4; Exhibit 9).

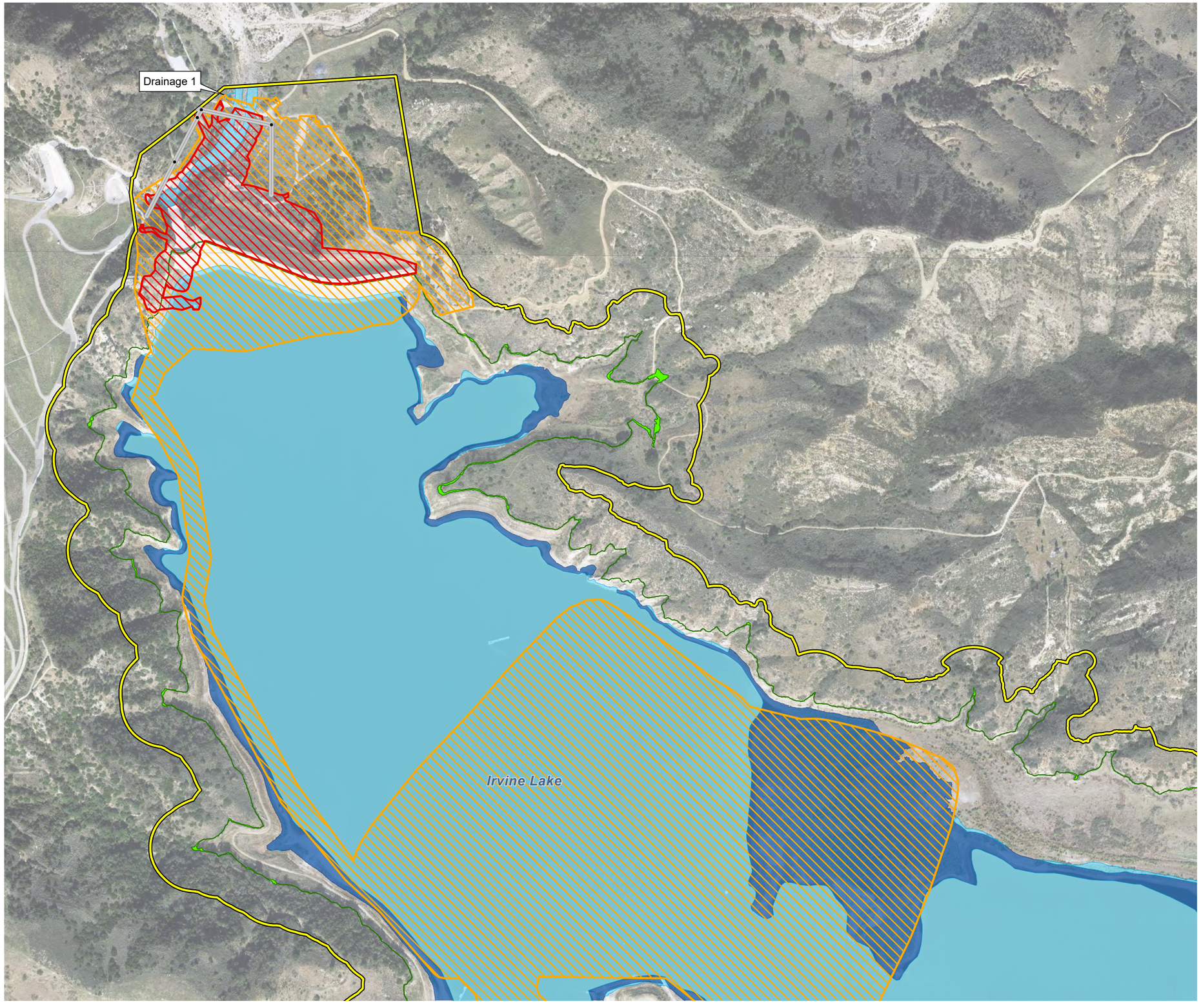
4.0 IMPACT ANALYSIS

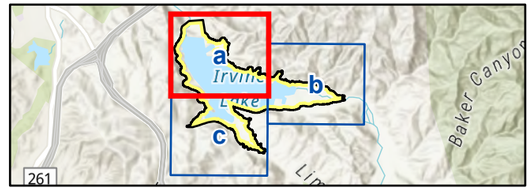
Project impacts include permanent structural impacts in the vicinity of the dam and spillway. Temporary impacts include construction access, staging areas, etc. that will occur during construction activities. It should be noted that Irvine Lake will be partially or completely dewatered prior to construction of the access road on the lake bottom. A portion of the lake bottom would be used as a borrow site. The proposed Project would consist of structural improvements to the dam and spillway, replacement of the outlet tower, and raising the spillway by six feet to the 797.9-foot elevation. Jurisdictional resources that would be permanently or temporarily impacted by the Project include Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3.

The proposed Project also includes increasing the spillway height two feet above the current maximum water level (with flashboards installed) to 797.9 feet. This would lead to infrequent inundation of the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as "additional inundation area") for an approximate maximum up to 45 days, but typically would be inundated for less time, and in some years not at all. In the last 20 years, Irvine Lake has been four times at the maximum capacity with the flashboards installed of 795.9-foot elevation. Approximately the same frequency would be expected following implementation of the proposed Project, depending on the frequency of future large storms and depending on the operations of the lake. With this frequency and duration of inundation, the vegetation within the "additional inundation area" is not expected to type convert. While the OHWM may change following the implementation of the proposed Project, creating some additional jurisdiction, riparian vegetation and hydric soils are not expected to be created where they do not currently occur based on the infrequent additional inundation. Portions of some mapped drainages fall within the additional inundation area (i.e., Irvine Lake, Santiago Creek, Drainage 4–7, Drainage 9, Drainage 12, and Drainage 15).

Based on the preliminary Project design, a total of 203.570 acres of WOTUS under the regulatory authority of the USACE would be impacted by the proposed Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) (Tables 5 and 8; Exhibit 10). This represents impacts to WOTUS in Irvine Lake, Santiago Creek, and Drainage 1. The proposed Project would inundate an additional 0.673 acre of wetland WOTUS within the additional inundation area (Table 5; Exhibit 10). As mentioned above, the inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM; additional inundation of areas under the jurisdiction of USACE would not be considered a substantial change.

Based on the preliminary Project design, a total of 203.641 acres of waters of the State under the regulatory authority of the RWQCB would be impacted by the proposed Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland 1.861 acres permanent, 137.865 acres temporary) (Table 6 and 8; Exhibit 11). This represents impacts to waters of the State in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. The proposed Project would impact an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area (Table 6; Exhibit 11).





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

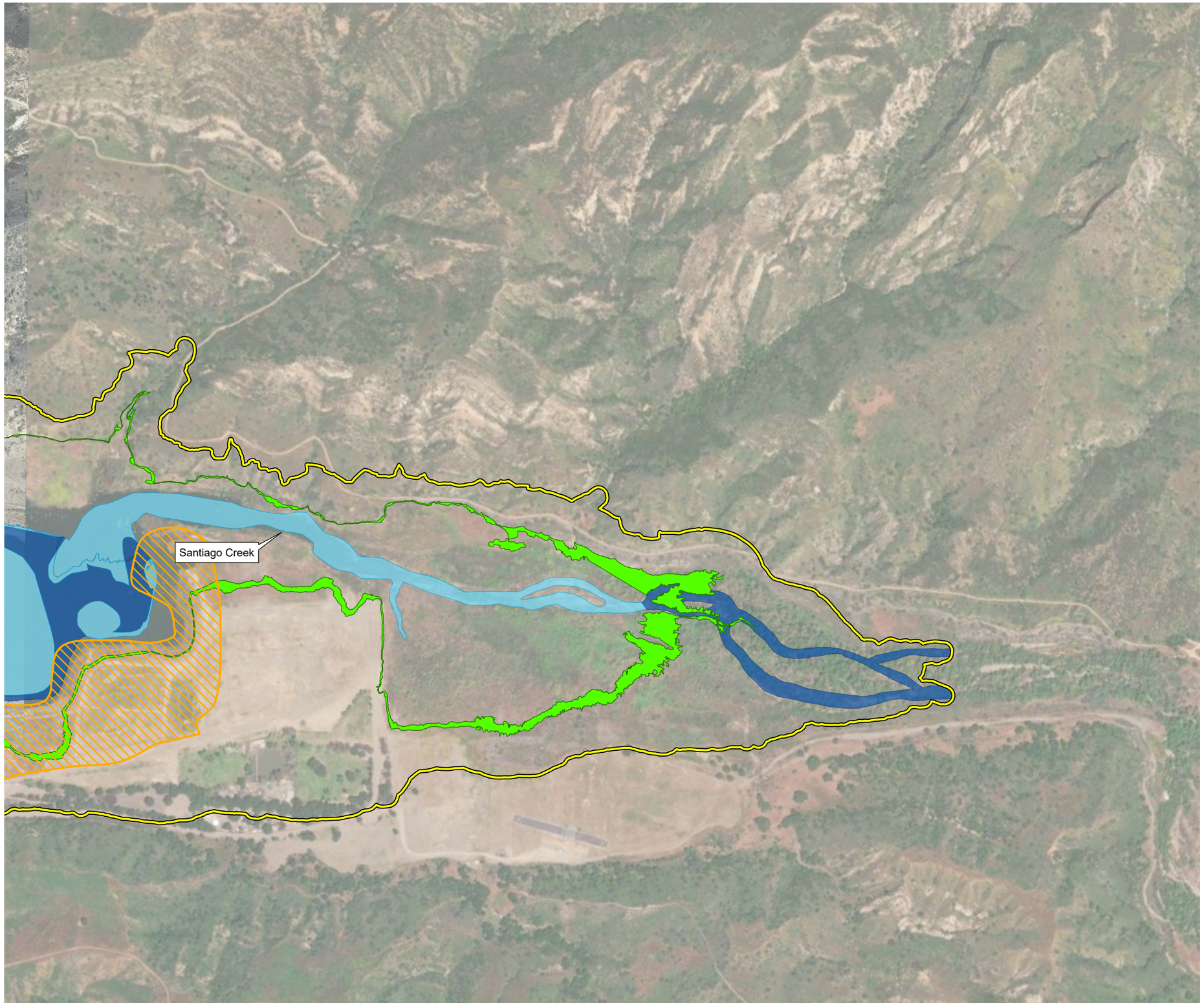
Exhibit 10a

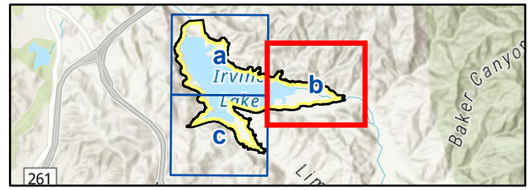
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

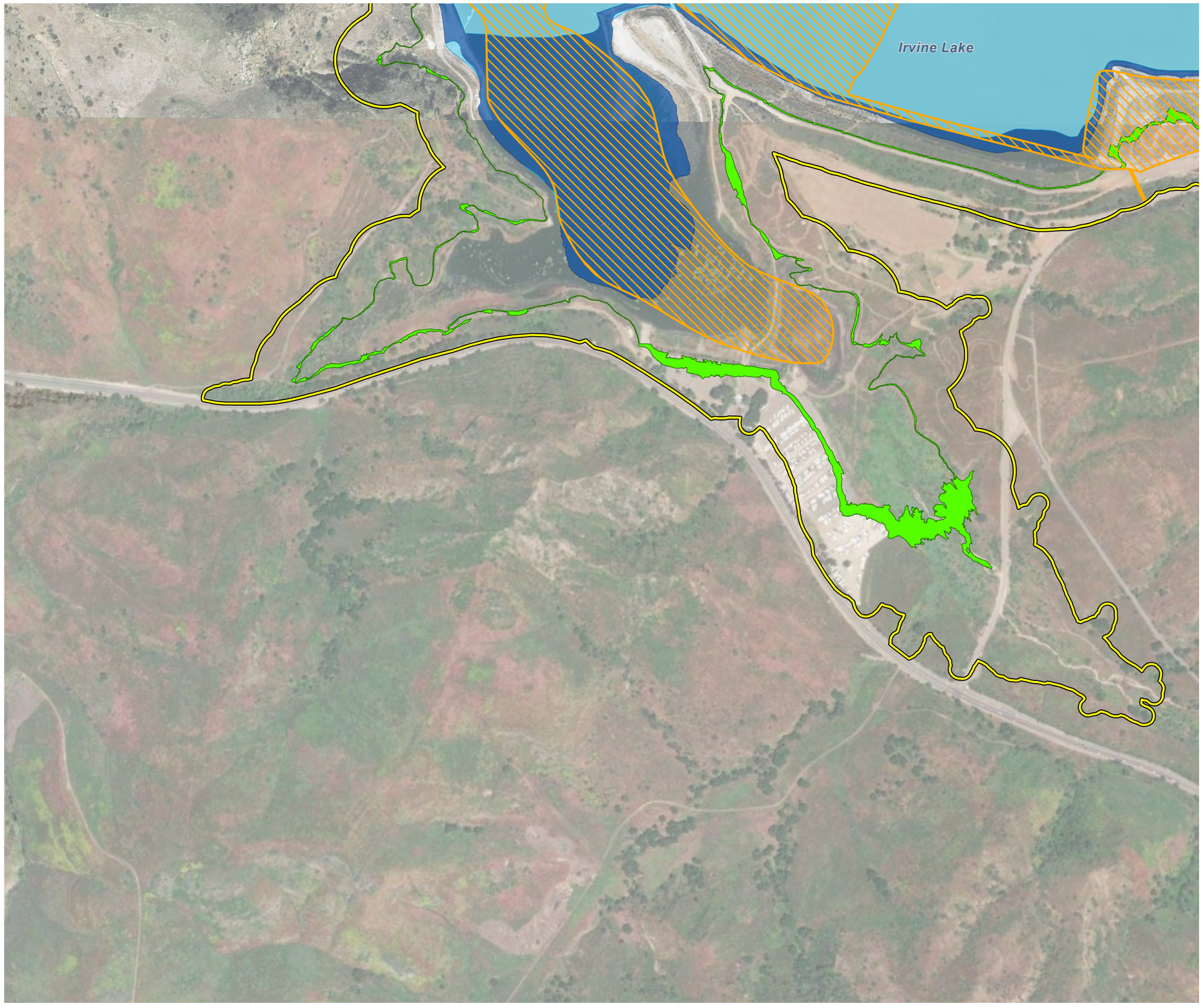
Exhibit 10b

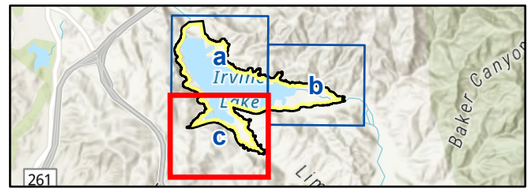
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Project Impacts

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the United States

Wetland

Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
USACE Waters of the United States

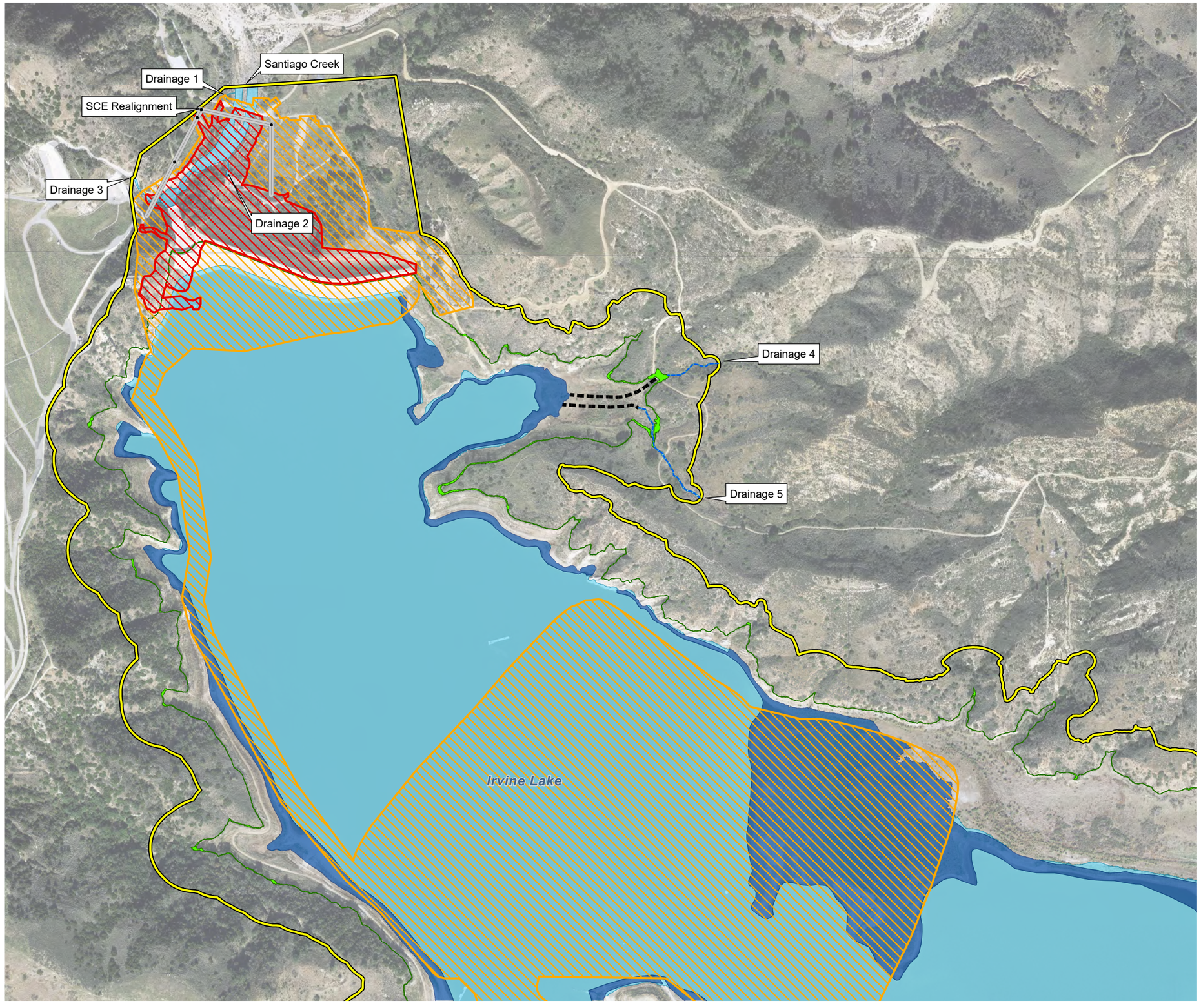
Exhibit 10c

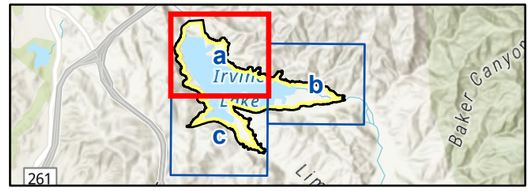
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_JD_USACE_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

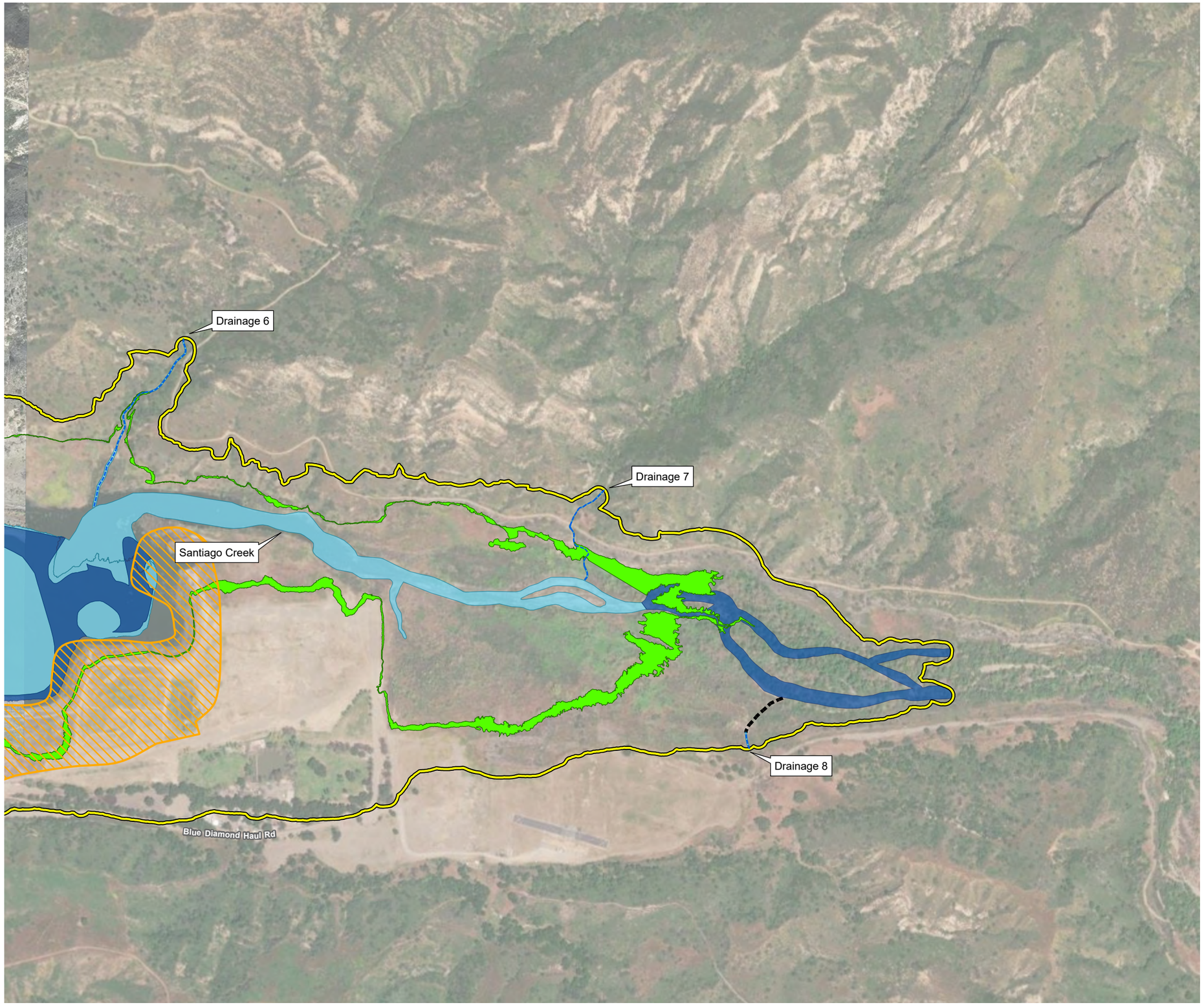
Exhibit 11a

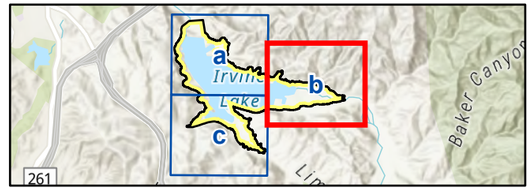
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

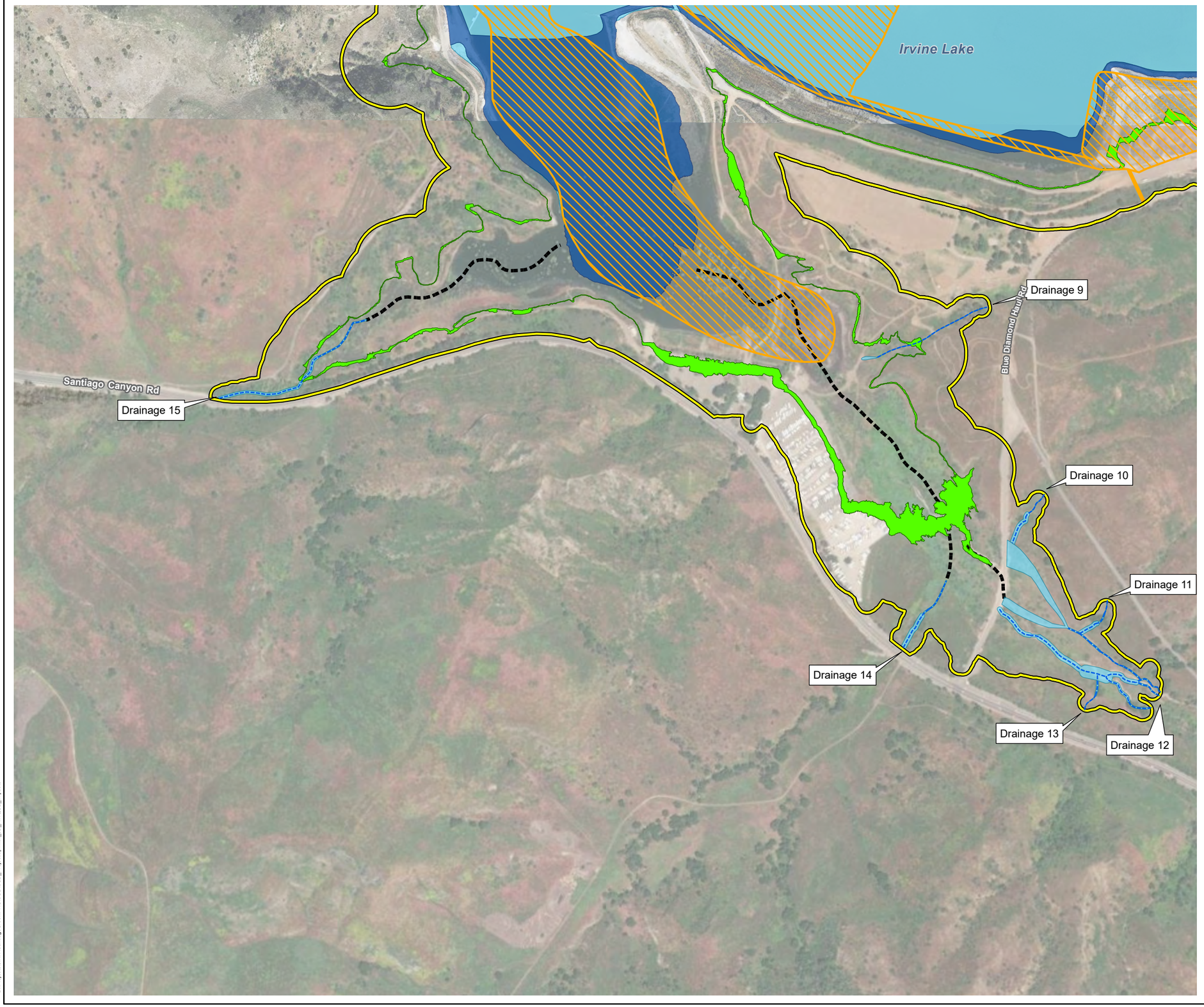
Exhibit 11b

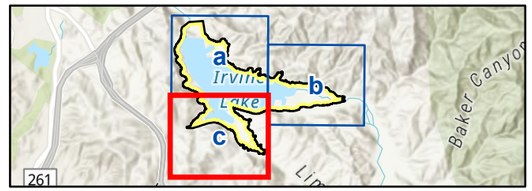
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_RWQCB_Impacts





Survey Area

Sheet Flow (non-jurisdictional)

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Waters of the State

Wetland

Non-Wetland

Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

Exhibit 11c

Santiago Creek Dam Improvement Project

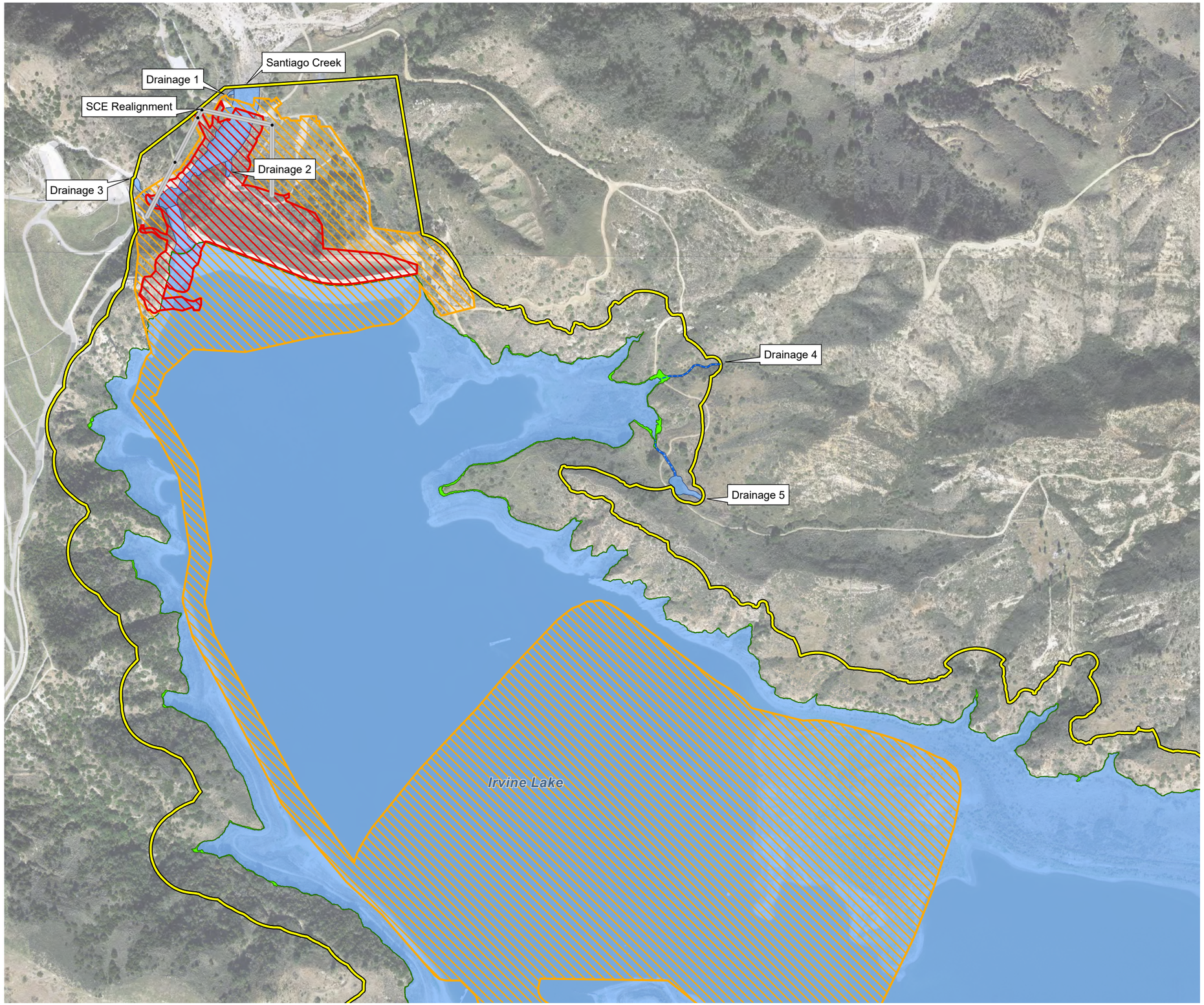
PSOMAS

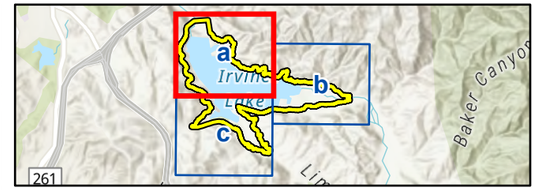
(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010209\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROS\SCD\SCD_Project aprvlex_JD_RWQCB_Impacts

As mentioned above, the inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of RWQCB would not be considered a substantial change.

Based on the preliminary Project design, a total of 233.774 acres of waters under the regulatory authority of the CDFW would be impacted by the proposed Project (3.924 acres permanent; 229.850 acres temporary (Tables 7 and 8; Exhibit 12). This represents impacts to waters under the authority of the CDFW in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. The proposed Project would impact an additional 8.980 acres of waters under the authority of the CDFW with the additional inundation area (Table 7; Exhibit 12). As mentioned above, the inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the existing bed and bank, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of CDFW would not be considered a substantial change.





Biological Study Area

Impact Type

Permanent Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

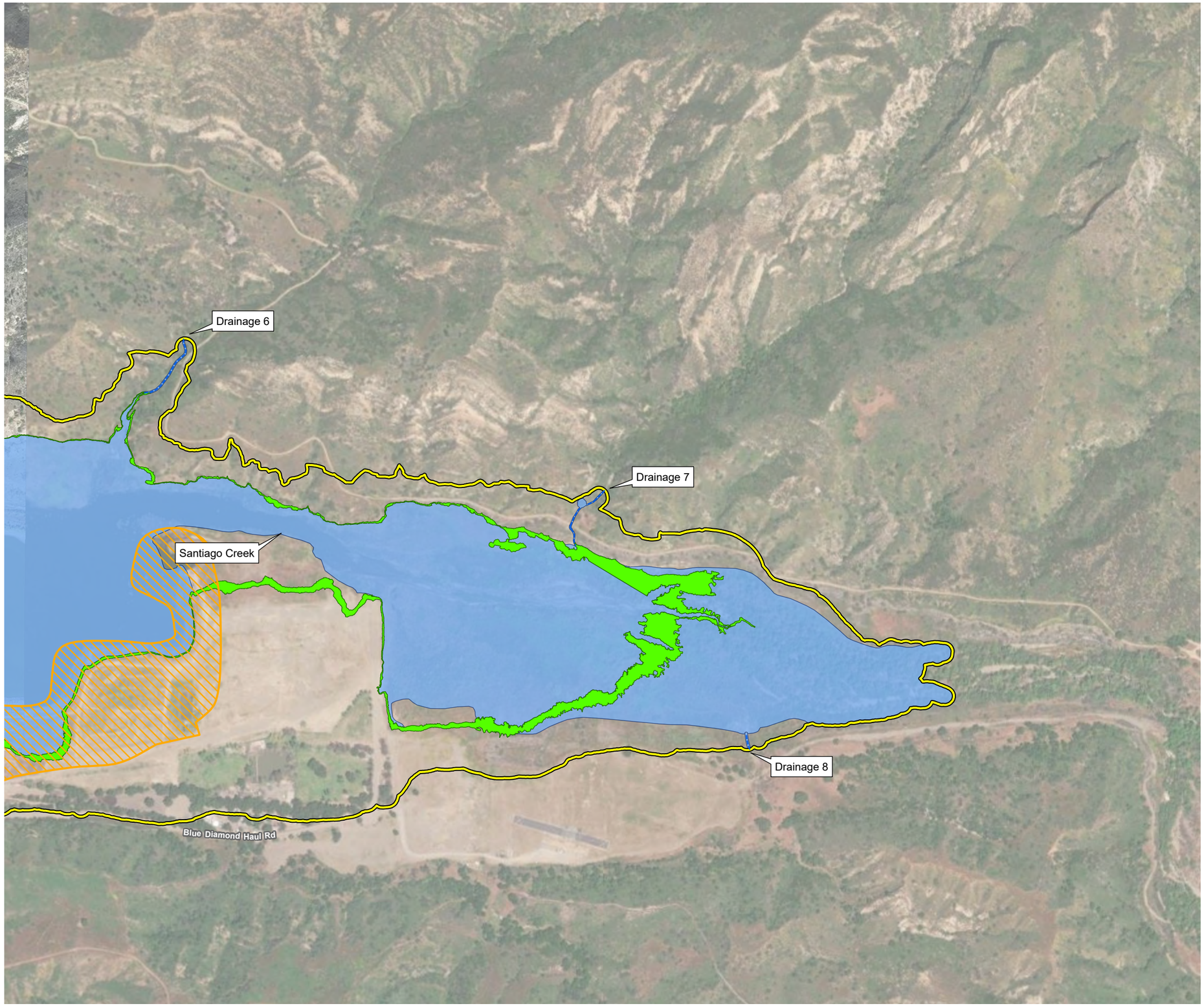
Exhibit 12a

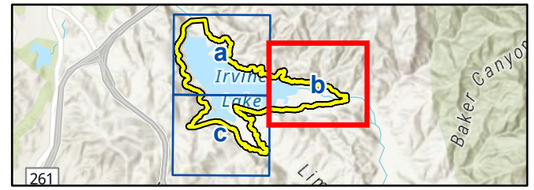
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

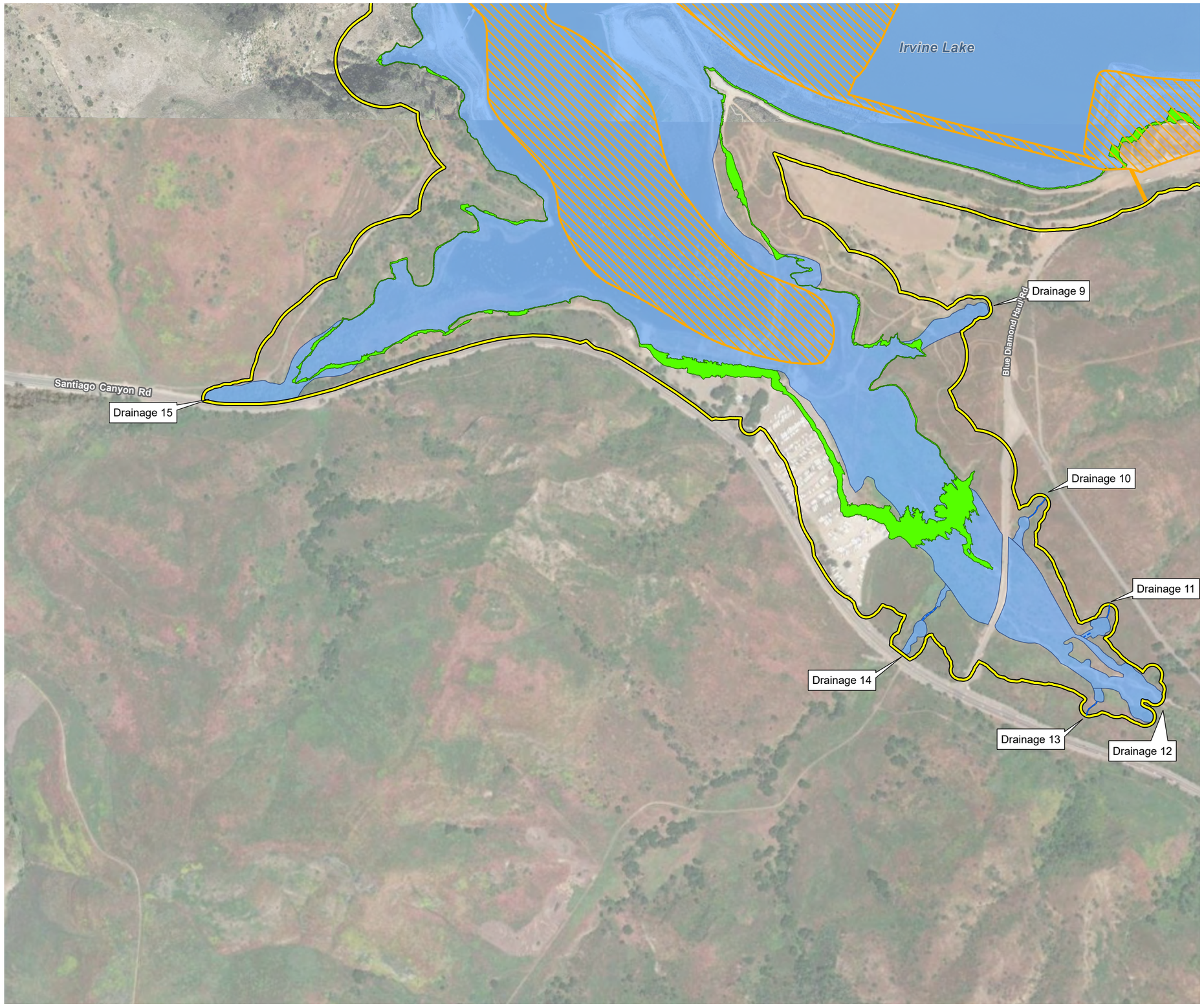
Exhibit 12b

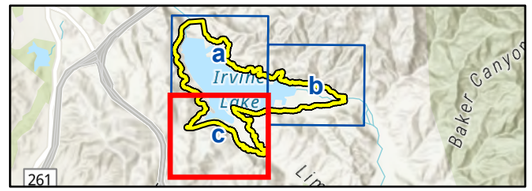
Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts





Biological Study Area

Impact Type

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

CDFW Jurisdictional Waters

CDFW

Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

N
W E
S

0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

Exhibit 12c

Santiago Creek Dam Improvement Project

PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\ex_JD_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PROJSCD\SCD_Project.aprx\ex_JD_CDFW_Impacts

TABLE 5
PROJECT IMPACTS ON USACE JURISDICTIONAL RESOURCES IN THE SURVEY AREA*

Feature	Existing (acres)			Permanent Impact (acres)			Temporary Impact (acres)			Total Permanent/Temporary Impact (acres)			Additional Inundation Area** (acres)		
	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total
Irvine Lake	94.582	312.959	407.541	—	0.450	0.450	63.708	137.639	201.347	63.708	138.089	201.797	—	—	—
Santiago Creek	7.124	13.803	20.927	—	1.348	1.348	0.207	0.216	0.423	0.207	1.564	1.771	0.673	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	0.002	0.002	—	0.002	0.002	—	—	—
Drainage 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	**101.706**	**326.770**	**428.476**	**0.000**	**1.798**	**1.798**	**63.915**	**137.857**	**201.772**	**63.915**	**139.655**	**203.570**	**0.673**	**0.000**	**0.673**

* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.
** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE 6
PROJECT IMPACTS ON RWQCB JURISDICTIONAL RESOURCES IN THE SURVEY AREA*

Feature	Existing (acres)			Permanent Impact (acres)			Temporary Impact (acres)			Total Permanent/Temporary Impact (acres)			Additional Inundation Area** (acres)		
	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total
Irvine Lake	94.582	312.959	407.541	—	0.450	0.450	63.708	137.639	201.347	63.708	138.089	201.797	—	—	—
Santiago Creek	7.124	13.803	20.927	—	1.348	1.348	0.207	0.216	0.423	0.207	1.564	1.771	0.673	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	0.002	0.002	—	0.002	0.002	—	—	—
Drainage 2	—	0.025	0.025	—	0.025	0.025	—	—	—	—	0.025	0.025	—	—	—
Drainage 3	—	0.071	0.071	—	0.038	0.038	—	0.008	0.008	—	0.046	0.046	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	0.006	0.006
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	0.010	0.010
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	0.014	0.014
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	0.004	0.004
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	0.004	0.004
Total	**101.706**	**333.499**	**435.205**	**0.000**	**1.861**	**1.861**	**63.915**	**137.865**	**201.780**	**63.915**	**139.726**	**203.641**	**0.673**	**0.038**	**0.711**

* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.
** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE 7
PROJECT IMPACTS ON CDFW JURISDICTIONAL RESOURCES
IN THE SURVEY AREA*

Feature	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area** (acres)
Irvine Lake	614.135	1.843	229.517	231.360	0.775
Santiago Creek	36.024	1.924	0.305	2.229	5.433
Drainage 1	0.027	—	0.005	0.005	—
Drainage 2	0.074	0.074	—	0.074	—
Drainage 3	0.168	0.083	0.023	0.106	—
Drainage 4	0.094	—	—	—	0.014
Drainage 5	0.359	—	—	—	0.011
Drainage 6	0.149	—	—	—	0.008
Drainage 7	0.148	—	—	—	0.003
Drainage 8	0.042	—	—	—	—
Drainage 9	1.237	—	—	—	0.088
Drainage 10	0.245	—	—	—	—
Drainage 11	0.318	—	—	—	—
Drainage 12	13.517	—	—	—	2.370
Drainage 13	0.114	—	—	—	—
Drainage 14	0.416	—	—	—	—
Drainage 15	2.563	—	—	—	0.278
Total	**669.630**	**3.924**	**229.850**	**233.774**	**8.980**

* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.

** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE 8
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES IN THE SURVEY AREA*

Jurisdiction	Amount of Jurisdictional Water Resource (acres)				
	Existing	Permanent	Temporary	Total Permanent/ Temporary Impact	Additional Inundation Area**
USACE WOTUS	428.476	1.798	201.772	203.570	0.673
RWCQB Waters of the State	435.205	1.861	201.780	203.641	0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; "–": not present

* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.

** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

5.0 REGULATORY APPROVAL PROCESS

5.1 REGULATORY PERMIT REQUIREMENTS

This section summarizes the various permits, agreements, and certifications that may be required prior to initiation of project activities that involve impacts to jurisdictional waters.

- USACE Section 404 Individual Permit
- RWQCB Waste Discharge Requirements
- CDFW Section 1602 Lake or Streambed Alteration Agreement

It should be noted that all regulatory permit applications can be processed concurrently. The USACE permit would be issued subject to the receipt of the RWQCB's Waste Discharge Requirements (WDRs).

5.1.1 U.S. Army Corps of Engineers

Prior to construction in WOTUS, a Section 404 permit from the USACE is required for impacts to WOTUS (i.e., Irvine Lake and Santiago Creek). Regulatory authorization in the form of a Nationwide Permit (NWP) or regional permit is provided for certain categories of activities. If the NWP conditions cannot be met, an Individual Permit (IP) will be required. It is expected that the Project would require an IP. It should be noted that the definition of WOTUS is currently in flux, and the USACE will make the final determination of jurisdictional boundaries during the permit consultation process.

Issuance of the USACE Section 404 permit would be contingent upon the approval of a permit from the Santa Ana RWQCB. The RWQCB requires certification of the project's California Environmental Quality Act (CEQA) documentation before it will approve the WDRs. The RWQCB, as a responsible agency, will use the project's CEQA document to satisfy its own CEQA compliance requirements.

On August 11, 2023, staff from IRWD, SWD, Psomas, USACE, USEPA, and U.S. Fish and Wildlife Service (USFWS) attended an online pre-application filing meeting. IRWD described the proposed Project and Psomas discussed biological surveys conducted and resources that are present in the BSA. The meeting discussed that the Project would need an Individual Permit from the USACE and a formal Section 7 Consultation with the USFWS. The purpose of this meeting was to provide the attending agencies with a briefing on the project's scope and potential resource issues in advance of filing the 404 permit application.

5.1.2 Regional Water Quality Control Board

When a project involves impacts to both federal WOTUS and non-federal waters of the State, the RWQCB would authorize all impacts under Waste Discharge Requirements (WDRs). The application for discharges of dredged or fill material would include both WOTUS and ephemeral waters of the State.

The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. The WDRs must also address compliance with the Basin Plan. The application would also require the payment of an application fee, which would be based on project impacts.

Staff from IRWD, Psomas, CDFW, RWQCB, and U.S. Fish and Wildlife (USFWS) attended a pre-application field meeting for the Project on July 12, 2023. During the field meeting, IRWD described the proposed Project and Psomas discussed biological surveys conducted and resources that are present in the BSA. The meeting attendees visited the dam crest, spillway and also the staging area at the upstream end of Irvine Lake.

On August 16, 2023, the RWQCB hosted the required pre-filing meeting. This meeting is required to be conducted at least 30 days prior to the filing of a 401 water quality certification request with the RWQCB and the USACE.

5.1.3 California Department of Fish and Wildlife

Prior to construction, a Notification of Lake or Streambed Alteration (LSA) must be submitted to the CDFW that describes any proposed streambed alteration contemplated by a project. If an LSA Agreement is required, the CDFW may want to conduct an on-site inspection.

In addition to the formal application materials and the fee, a copy of the appropriate environmental document should be included in the submittal, consistent with CEQA requirements. The CDFW will not deem the application to be complete until the application fees have been paid and the agency is provided with a certified CEQA document and a signed copy of the receipt of County Clerk filing fees for the Notice of Determination.

Staff from IRWD, Psomas, CDFW, RWQCB, and USFWS attended a pre-application field meeting for the Project on July 12, 2023. During the field meeting, IRWD described the proposed Project and Psomas discussed biological surveys conducted and resources that are present in the BSA. The meeting attendees visited the dam crest, spillway and also the staging area at the upstream end of Irvine Lake.

6.0 RECOMMENDATIONS

Based on the conclusions of this Jurisdictional Delineation Report, the following recommendations have been identified:

1. The appropriate permits, agreements, and certifications, as discussed in Section 5, should be prepared and submitted for projects impacting jurisdictional waters. Avoidance, minimization, and/or mitigation measures may be required by the regulatory agencies.

7.0 DISCLAIMER STATEMENT

This report represents Psomas' summary of the jurisdictional resources delineated in the survey area. The descriptions and maps provided are Psomas' jurisdictional recommendation based on the field evidence, regulations, and environmental information available. Only the regulatory agencies can make the final determination on whether the features present are subject to USACE, RWQCB, and/or CDFW regulatory authority.

8.0 REFERENCES

Curtis, K.E. and R.W. Lichvar. 2010 (July). *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1). Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

Federal Geographic Data Committee (FGDC). 2013. *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC-STD-004-2013, 2nd Ed.). Washington, D.C.: FGDC and U.S. Fish and Wildlife Service. https://www.fgdc.gov/standards/projects/wetlands/index_html.

Irvine Ranch Water District (IRWD). 2020a (April 16, date accessed). About Irvine Lake. Irvine, CA: IRWD. https://www.irwd.com/construction/irvine-lake.

———.2020b (April 16). Personal communication regarding water release in Drainage 2. Email conversation between IRWD and Psomas.

———.2020c (October 5). Personal communication regarding the use of the spillway. Email conversation between IRWD and Psomas.

———.2020d (November 16). Personal communication regarding the permanent/temporary impacts and construction timing. Email conversation between IRWD and Psomas.

———.2020e (November 18). Personal communication regarding the reservoir levels from 2002 to 2020. Email conversation between IRWD and Psomas.

———.2020f (November 19). Personal communication regarding length of time water would be held at the maximum following implementation of raising the spillway. Phone conversation between IRWD and Psomas.

Lichvar, R.W. and S.M. McColley. 2008 (August). *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Santa Ana Regional Water Quality Control Board (Santa Ana RWQCB). 1995 (updated 2008). *Water Quality Control Plan: Santa Ana River Basin (8)*. Riverside, CA: Santa Ana RWQCB.

State Water Resources Control Board (SWRCB). 2019 (April 2). *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*.

https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf.

URS Corporation (URS). 2015 (July). *Santiago Creek Dam Outlet Tower Seismic Evaluation Structural Engineering Services*. Oakland, CA: URS.

U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0). (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

———. 2007 (January 31). Memorandum: Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) Implementing Regulations. Washington, D.C.: USACE.

———. 2005 (December 7). Regulatory Guidance Letter. Ordinary High Water Mark Identification. Washington, D.C.: USACE.

———. 2001. *Memorandum No. 2 regarding SWANCC decision*.

U.S. Army Corps of Engineers and Environmental Protection Agency (USACE and USEPA). 2023a (January 18). Revised Definition of "Waters of the United States". *Federal Register* 88(11):3004–3144. Washington, D.C.: USACE and USEPA.

———. 2023b (September 8). Revised Definition of "Waters of the United States"; Conforming. *Federal Register* 88(173):61964–61969. Washington, D.C.: USACE and USEPA.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2020 (April 16, date accessed). State Soil Data Access Hydric Soils List. Washington, D.C.: USDA, NRCS. http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

U.S. Fish and Wildlife Service (USFWS). 2020 (April 16, date accessed). Wetlands Mapper [Information for the Survey Area]. Washington D.C.: USFWS, National Wetlands Inventory. http://www.fws.gov/wetlands/ Data/Mapper.html.

U.S. Geological Survey (USGS). 2020a (April 16, date accessed). National Water Information System Mapper. Stream Site Data for USGS 11075800 Santiago C A Modjeska CA. https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=11075800.

———. 2020b (April 16, date accessed). StreamStats (v4.3.11). Drainage Area Data for Santiago Creek at 33.78817°, -117.72679°. Reston, VA: USGS. https://streamstats.usgs.gov/ss/.

ATTACHMENT A

SUMMARY OF REGULATORY AUTHORITY

REGULATORY AUTHORITY

This attachment summarizes the regulatory authority of the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) over activities that have potential to impact jurisdictional resources.

U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into waters of the United States (WOTUS) under Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. This permitting authority applies to all WOTUS where the material (1) replaces any portion of WOTUS with dry land or (2) changes the bottom elevation of any portion of any WOTUS. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in these waters.

Waters of the United States

The definition of WOTUS has been subject to shifting regulations over the years, with the U.S. Supreme Court issuing multiple decisions that provide context and guidance in determining the appropriate scope of WOTUS. The following provides a brief summary of the historical interpretations of WOTUS.

In *United States v. Riverside Bayview Homes*,[1] the Court upheld the inclusion of adjacent wetlands in the regulatory definition of WOTUS. In *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (SWANCC),[2] the Court held that the use of "isolated" non-navigable intrastate ponds by migratory birds was not, by itself, sufficient basis for the exercise of federal regulatory authority under the CWA. In *Rapanos v. United States* (Rapanos),[3] a majority of the U.S. Supreme Court overturned two Sixth Circuit Court of Appeals decisions, finding that certain wetlands constituted WOTUS under the CWA. In his plurality opinion, Justice Scalia argued that WOTUS should not include channels through which water flows intermittently or ephemerally or channels that periodically provide drainage for rainfall. He also stated that a wetland may not be considered "adjacent to" remote WOTUS based on a mere hydrologic connection. Justice Kennedy authored a separate concurring opinion concluding that wetlands are WOTUS if they, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as "navigable". Lacking a majority opinion, regulatory jurisdiction under the CWA exists over a water body if either the plurality's or Justice Kennedy's "significant nexus" standard is satisfied.

1 *United States v. Riverside Bayview Homes, Inc*., 474 U.S. 121 (1985)
2 *Solid Waste Agency of Northern Cook Cty. v. Army Corps of Engineers,* 531 U.S. 159 (2001)
3 Consolidated cases: *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208 2006) refer to the U.S. Supreme Court's decision concerning USACE jurisdiction over waters of the United States under the CWA.

In 2015, the USACE and the U.S. Environmental Protection Agency (USEPA) published a final rule (2015 Rule) clarifying the scope of WOTUS protected under the CWA. One of the major changes was to make all tributaries and adjacent waters jurisdictional, by rule.

In December 2018, the USEPA and the Department of the Army (DOA) proposed a new definition of WOTUS that clarified federal authority under the federal CWA consistent with the February 2017 Presidential Executive Order entitled "Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the 'Waters of the United States' Rule". On September 12, 2019, the USEPA and DOA signed a final "Step One Rule" to repeal the 2015 Rule and re-codify the regulatory text defining WOTUS that existed prior to the 2015 Rule. The new regulations went into effect on December 23, 2019.[4] With this new final rule, the regulations defining the scope of federal CWA jurisdiction are those portions of the Code of Federal Regulations (CFR) as they existed before the amendments promulgated in the 2015 rule.

The Step One Rule was replaced by the Navigable Waters Protection Rule (NWPR, Step Two Rule). On January 23, 2020, the USEPA and DOA finalized the Step Two Rule defining WOTUS. This rule was published in the *Federal Register* on April 21, 2020, and went into effect 60 days following publication (i.e., on June 22, 2020). The NWPR changed the definition of WOTUS. Major changes implemented by this rule were that ephemeral features would not be considered jurisdictional, the "significant nexus" process was eliminated, and wetlands must either abut jurisdictional waters of have a direct hydrological surface connection to jurisdictional waters.

On June 9, 2021, the USEPA and DOA announced their intent to revise the definition of WOTUS to better protect our nation's vital water resources that support public health, environmental protection, agricultural activity, and economic growth. On August 30, 2021, the U.S. District Court for the District of Arizona vacated and remanded the NWPR for reconsideration to the USEPA and the USACE.[5] In light of this order, the agencies halted implementation of the NWPR and interpreted WOTUS consistent with the pre-2015 regulatory regime.

On January 18, 2023, the USEPA and the USACE published in the *Federal Register* a new Water Rule (2023 Rule) which provided an updated definition of WOTUS (USACE 2023a). This 2023 Rule became effective on March 20, 2023. The 2023 Rule used the pre-2015 regulations as the basis for the definition of WOTUS, while incorporating the Supreme Court's ruling from the case of *Rapanos v. United States* ("Rapanos" 2006)[6]. The 2023 Water Rule defined WOTUS per the following categories:

1. Waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; the territorial seas; or interstate waters, including interstate wetlands ("paragraph (a)(1) waters");

[4] 40 CFR 230.3(s).

[5] *Pasqua Yaqui Tribe, et al. v. U.S. Environmental Protection Agency, et al*.

[6] Consolidated cases: *Rapanos v. United States* and *Carabell v. United States* refer to the U.S. Supreme Court's decision concerning USACE jurisdiction over "waters of the U.S." under the CWA.

2. Impoundments of waters otherwise defined as WOTUS under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section ("paragraph (a)(2) waters");
3. Tributaries of waters identified in paragraph (a)(1) or (2) of this section: that are relatively permanent, standing, or continuously flowing bodies of water; or that either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section ("paragraph (a)(3) waters");
4. Wetlands adjacent to the following waters: waters identified in paragraph (a)(1) of this section; or relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3)(i) of this section and with a continuous surface connection to those waters; or waters identified in paragraph (a)(2) or (3) of this section when the wetlands either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section ("paragraph (a)(4) waters");
5. Intrastate lakes and ponds, streams, or wetlands not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3)(i) of this section; or that either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section ("paragraph (a)(5) waters").

The 2023 Rule also excluded certain waters from being WOTUS:

1. Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the CWA;
2. Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal Agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the USEPA;
3. Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;
4. Artificially irrigated areas that would revert to dry land if the irrigation ceased;
5. Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
6. Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;
7. Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and

until the construction or excavation operation is abandoned and the resulting body of water meets the definition of WOTUS; and

8. Swales and erosional features (e.g., gullies, small washes) characterized by low volume, infrequent, or short duration flow.

In response to the May 25, 2023, Supreme Court decision in the case of *Sackett v. USEPA*, the USEPA issued a pre-published rule regarding the definition of WOTUS on August 29, 2023 (USACE 2023b). On September 8, 2023, the USEPA and the DOA amended the CFR to conform the definition of WOTUS to the Supreme Court decision. This conforming rule amends the provisions of the agencies' definition of WOTUS that are invalid under the Supreme Court's interpretation of the CWA; the final rule went into effect on September 8, 2023. The sole purpose of this rule is to amend specific provisions of the 2023 rule that are considered invalid under *Sackett*. The Amended 2023 Rule made the following changes:

1. "Interstate wetlands" were removed from paragraph (a)(1) waters;
2. The significant nexus standard for tributaries (paragraph (a)(3) waters), adjacent wetlands (paragraph (a)(4) waters), and intrastate lakes and ponds (paragraph (a)(5) waters was removed;
3. "Streams" and "wetlands" were removed from paragraph (a)(5) waters;
4. "Adjacent" was revised to mean "having a continuous surface connection" instead of "bordering, contiguous, or neighboring". Wetlands separated from other WOTUS by man-made dikes or barriers, natural river berms, beach dunes, and the like are no longer considered "adjacent wetlands".

No changes have been made to waters excluded by the 2023 Rule.

Ordinary High Water Mark

The landward limit of tidal WOTUS is the high-tide line. In non-tidal waters where adjacent wetlands are absent, the lateral limits of USACE jurisdiction extend to the ordinary high water mark (OHWM).[7] The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas".[8] When wetlands are present, the lateral limits of USACE jurisdiction extend beyond the OHWM to the limits of the adjacent wetlands.[9]

Wetlands

A wetland is a subset of jurisdictional waters and is defined by the USACE and the USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and

[7] U.S. Army Corps of Engineers (USACE). 2005 (December 7). Regulatory Guidance Letter. Ordinary High Water Mark Identification. Washington, D.C.: USACE.
[8] *Code of Federal Regulations* (CFR), Title 33, §328.3(e)
[9] USACE 2005

duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions".[10] Wetlands generally include swamps, marshes, bogs, and areas containing similar features.

The definition and methods for identifying wetland resources can be found in the USACE's *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*,[11] a supplement to the 1987 *Corps of Engineers Wetlands Delineation Manual*.[12] Both the 1987 Wetlands Manual and the 2008 Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Pursuant to these manuals, a three-parameter approach is used to identify wetlands and requires evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. In order to be considered a wetland, an area must figure one or more indicators of all three of these parameters. However, problem areas may periodically or permanently lack certain indicators for reasons such as seasonal or annual variability of rainfall, vegetation, and other factors. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*.

Section 404 Permit

Except as specified in Section 323.4 of the CFR, impacts to WOTUS require a Section 404 Permit. Permit authorization which may be in the form of (1) a "general permit" authorizing a category of activities in a specific geographical region or nationwide or (2) an "individual permit" (IP) following a review of an individual application form (to be obtained from the district office having jurisdiction over the waters in which the activity is proposed to be located).

Regulatory authorization in the form of a Nationwide Permit (NWP) is provided for certain categories of activities such as repair, rehabilitation, or replacement of a structure or fill which was previously authorized; utility line placement; or bank stabilization. NWPs authorize only those activities with minimal adverse effects on the aquatic environment and are valid only if the conditions applicable to the permits are met or waivers to these conditions are provided in writing from the USACE. Waivers may require consultation with affected federal and State agencies, which can be a lengthy process with no mandated processing time frames. Certain activities do not require submission of an application form, but may require a separate notification. If the NWP conditions cannot be met, an IP will be required. WOTUS temporarily filled, flooded, excavated, or drained but restored to pre-construction contours and elevations after construction are not included in the measurement of loss of WOTUS. The appropriate permit authorization will be based on the

[10] 33 CFR §328.3(b)

[11] USACE. 2008a. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*. (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[12] Environmental Laboratory. 1987. Cor*ps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)*. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

amount of impacts to WOTUS, as determined by the USACE. There is no filing fee for the Section 404 Permit.

Approximately three or four months are typically required to process a routine permit application; large or complex activities may take longer to process. When a permit application is received, it will be assigned an identification number and reviewed for completeness by the District Engineer. If an application is incomplete, additional information will be requested within 15 days of receipt of the application. If an application is complete, the District Engineer will issue a public notice within 15 days unless specifically exempted by provisions of the CFR. Public comments will be accepted no more than 30 days but not less than 15 days from the date of public notice; these will become part of the administrative record of the application. Generally, the District Engineer will decide on the application no later than 60 days after receipt of the completed application. Additional permit situations may increase the permit processing time (e.g., projects involving a Section 401 Water Quality Certification, a coastal zone management consistency analysis, historic properties, a federal agency, and/or Endangered species). The Project Applicant will be given time, not to exceed 30 days, to respond to requests of the District Engineer.

On January 31, 2007, the USACE published a memorandum clarifying the Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) implementing regulations.[13] The Interim Guidance applies to all Department of the Army requests for authorization/verification, including Individual Permits (IPs, i.e., standard permits and letters of permission) and all Regional General Permits (RGPs) and Nationwide Permits (NWPs). The State or Tribal Historic Preservation Officer (SHPO/THPO) has 30 days to respond to a determination that a proposed activity, which otherwise qualifies for an NWP or an RGP, has no effect or no adverse effect on a historic property. If the SHPO/THPO does not respond within 30 days of notification, the Los Angeles District may proceed with verification. If the SHPO/THPO disagrees with the District's determination, the District may work with the SHPO/THPO to resolve the disagreement or request an opinion from the ACHP. The USACE will submit the Draft Jurisdictional Delineation Report to the SHPO/THPO for review prior to initiating the actual regulatory process.

If the USACE determines that the drainages/waterbodies are jurisdictional and would be impacted by project implementation, the Applicant will be required to obtain a CWA Section 401 Water Quality Certification from the RWQCB before the USACE will issue the Section 404 Permit. If the USACE determines that the impacted drainage/waterbody is not jurisdictional, the Applicant will be required to obtain RWQCB authorization under the provisions of a Report of Waste Discharge (ROWD).

Jurisdictional Determinations

Pursuant to USACE Regulatory Guidance Letter (RGL) 16-01 (dated October 2016), the USACE can issue two types of jurisdictional determinations to implement Section 404 of the CWA: Approved Jurisdictional Determinations (AJD) and Preliminary Jurisdictional Determinations (PJD).[14] An AJD is an official USACE determination that jurisdictional aquatic

[13] USACE. 2007 (January 31). Memorandum: Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) Implementing Regulations. Washington, D.C.: USACE.

[14] USACE. 2008b (June 26). Regulatory Guidance Letter. Jurisdictional Determinations. Washington, D.C.: USACE.

resources (e.g., WOTUS) are either present or absent on a site. An AJD also identifies the precise limits of jurisdictional waters on a Project site.

AJDs may be either "stand-alone" AJDs or AJDs associated with permit actions. Some "stand-alone" AJDs may later be associated with permit actions, but at time of issuance are not related to a permit application. A "stand-alone" AJD may be requested so that impacts to jurisdictional aquatic resources may be avoided or minimized during the planning stages of a project, or it may be requested in order to fulfill a local/state authorization requirement.

The USACE will provide an AJD when (1) an Applicant requests an official jurisdictional determination; (2) an Applicant contests jurisdiction over a particular water body or wetland; or (3) when the USACE determines that jurisdiction does not exist over a particular water body or wetland. The AJD then becomes the USACE's official determination that can then be relied upon over a five-year period to request regulatory authorization as part of the permit application. In addition, an Applicant may decline to request an AJD and instead obtain a USACE IP or General Permit Authorization based on a Preliminary Jurisdictional Determination (PJD) or, in certain circumstances (e.g., authorizations by nonreporting nationwide general permits), with no Jurisdictional Determination.

PJDs are nonbinding, advisory in nature, and may not be appealed. They indicate that WOTUS may occur on a Project site. An Applicant may elect to use a PJD to voluntarily waive or set aside questions regarding CWA jurisdiction over a site, usually in the interest of expediting the permitting process. The USACE will determine what form of Jurisdictional Determination is appropriate for a particular Project site.

The USACE will coordinate with the USEPA per applicable memoranda. The USACE will continue to post final AJDs until they expire (generally five years). PJDs will not be coordinated with the USEPA or posted on USACE websites.

Regional Water Quality Control Board

The RWQCB is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The RWQCB's jurisdiction extends to all waters of the State and to all WOTUS, including wetlands (isolated and non-isolated).

Section 401 of the CWA provides the RWQCB with the authority to regulate, through a Water Quality Certification, any proposed, federally permitted activity that may affect water quality. Among such activities are discharges of dredged or fill material permitted by the USACE pursuant to Section 404 of the CWA. Section 401 requires the RWQCB to provide certification that there is reasonable assurance that an activity which may result in discharge to navigable waters will not violate water quality standards. Water Quality Certification must be based on a finding that the proposed discharge will comply with water quality standards, which contain numeric and narrative objectives that can be found in each of the nine RWQCBs' Basin Plans.

The Porter-Cologne Act provides the State with very broad authority to regulate waters of the State (which are defined as any surface water or groundwater, including saline waters). The Porter-Cologne Act has become an important tool in the post-SWANCC (*Solid Waste Agency of Northern Cook Counties vs. United States Army Corps of Engineers*) and Rapanos era with respect to the State's authority over isolated waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file an ROWD when there is no federal nexus, such as under Section 404(b)(1) of the CWA. Although "waste" is partially defined as any waste substance associated with human habitation, the RWQCB interprets this to include fill discharge into water bodies.

On April 2, 2019, the State Water Resources Control Board (SWRCB) adopted the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The procedures went into effect on May 28, 2020. Under these regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS and all waters that would have been considered WOTUS under the 2015 Rule. Thus, the WOTUS that are no longer under USACE jurisdiction would be under SWRCB jurisdiction.

Wetlands

In 2019, the SWRCB adopted rules to provide a common, statewide definition of what constitutes a wetland and to provide consistency in the way they and the RWQCBs regulate activities to protect wetlands and other waterways. The SWRCB defines an area as wetlands "if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation".[15] The following wetlands are waters of the State:

1. Natural wetlands,
2. Wetlands created by modification of a surface water of the State, and
3. Artificial wetlands that meet any of the following criteria:
    a. Approved by an agency as compensatory mitigation for impacts to other waters of the State, except where the approving agency explicitly identifies the mitigation as being of limited duration;
    b. Specifically identified in a water quality control plan as a wetland or other water of the State;
    c. Resulted from historic human activity, is not subject to ongoing operation and maintenance, and has become a relatively permanent part of the natural landscape; or
    d. Greater than or equal to one acre in size, unless the artificial wetland was constructed, and is currently used and maintained, primarily for one or more

[15] State Water Resources Control Board (SWRCB). 2019 (March 22). State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State.

of the following purposes (e.g., the following artificial wetlands are not waters of the State unless they also satisfy the criteria set forth in 2, 3a, or 3b):

i. Industrial or municipal wastewater treatment or disposal,

ii. Settling of sediment,

iii. Detention, retention, infiltration, or treatment of stormwater runoff and other pollutants or runoff subject to regulation under a municipal, construction, or industrial stormwater permitting program,

iv. Treatment of surface waters,

v. Agricultural crop irrigation or stock watering,

vi. Fire suppression,

vii. Industrial processing or cooling,

viii. Active surface mining – even if the site is managed for interim wetlands functions and values,

ix. Log storage,

x. Treatment, storage, or distribution of recycled water, or

xi. Maximizing groundwater recharge (this does not include wetlands that have incidental groundwater recharge benefits); or

xii. Fields flooded for rice growing.

All artificial wetlands that are less than an acre in size and do not satisfy the criteria set forth in 2, 3.a, 3.b, or 3.c are not waters of the State.

Section 401 Water Quality Certification

Issuance of the USACE Section 404 Permit would be contingent upon the approval of a Section 401 Water Quality Certification from the RWQCB. Also, the RWQCB requires certification of the project's California Environmental Quality Act (CEQA) documentation before it will approve the Section 401 Water Quality Certification or ROWD. The RWQCB, as a responsible agency, will use the project's CEQA document to satisfy its own CEQA-compliance requirements.

On June 1, 2020, the USEPA finalized the "Clean Water Act Section 401 Certification Rule" to implement the water quality certification process consistent with the text and structure of the CWA. The final rule establishes procedures that promote consistent implementation of CWA section 401 and regulatory certainty in the federal licensing and permitting process. The new regulation includes reviews and approvals by the USACE prior to the RWQCB issuing a 401 Certification and reviews and approvals by the USEPA prior to the USACE issuing a 404. The new 401 rule went into effect on September 11, 2020.

The new certification rule defines a discharge subject to 401 Certification as a discharge from a point source into a WOTUS. The new rule also states that States with additional water quality regulations cannot use these to expand the certification request.

The new rule requires all project proponents to request a pre-filing meeting with the RWQCB at least 30 days prior to filing a 401 "Certification Request". The filing procedure has been simplified to require the filing of a "Certification Request", rather than the acceptance of a "complete application". The certification request has nine mandatory components:

1. identify the project proponent(s) and a point of contact;
2. identify the proposed project;
3. identify the applicable federal license or permit;
4. identify the location and nature of any potential discharge that may result from the proposed project and the location of receiving waters;
5. include a description of any methods and means proposed to monitor the discharge and the equipment or measures planned to treat, control, or manage the discharge;
6. include a list of all other federal, interstate, tribal, state, territorial, or local agency authorizations required for the proposed project, including all approvals or denials already received;
7. include documentation that a pre-filing meeting request was submitted to the certifying authority at least 30 days prior to submitting the certification request;
8. contain the following statement: 'The project proponent hereby certifies that all information contained herein is true, accurate, and complete, to the best of my knowledge and belief; and
9. contain the following statement: 'The project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.'

There is a mandatory 30 day wait period between a pre-filing meeting request and the filing of a Certification Request. A Certification Request must be filed with the RWQCB and the USACE concurrently. USACE reviews the Certification Request for the nine required components. The USACE has 15 days to review the Certification Request. The USACE then notifies the RWQCB that request is complete. And concurrently notifies the RWQCB of the reasonable time period to act on the Certification Request. The reasonable time period is not to exceed 1 year. Within 15 days of receipt of the Certification Request, the RWQCB must provide the applicant with the following: 1) date of receipt; 2) applicable reasonable period of time to act on the Certification Request; and 3) date upon which waiver will occur if the certifying authority fails or refuses to act on the Certification Request.

Once the RWQCB issues the 401 Certification, the USACE has 5 days to notify the USEPA that the 401 Certification has been issued. The USEPA then has 30 days to notify neighboring jurisdictions of the 401 Certification. Neighboring jurisdictions have 60 days to respond. If there are no objections to the 401 Certification, then the USACE would issue the 404 permit.

On June 2, 2021, the USEPA published a notice of intention to reconsider and revise the Clean Water Act Section 401 Certification Rule. On September 14, 2023, the USEPA announced the final 2023 Clean Water Act Section 401 Water Quality Certification Improvement Rule. This rule restores the fundamental authority granted by Congress to states, territories, and tribes

to protect water resources from adverse impacts that could result from federally licensed or permitted projects. The 2020 rule is currently in effect. This new, 2023 rule becomes effective 60 days after it is published in the federal register (i.e., November 14, 2023). Key components of the new rule include the following:

1. Pre-filing meeting request: The project proponent must request a pre-filing meeting at least 30 days prior to requesting certification (unless waived by the certifying authority).
2. Request for certification: The project proponent submits a request for certification to the certifying authority.
3. Setting reasonable period of time (RPT): The certifying authority and federal agency collaboratively determine how much time the certifying authority will have to review the request (up to one year), otherwise the review period defaults to six months unless an automatic extension applies.
4. Analysis: The certifying authority analyzes whether the activity will comply with their water quality requirements.
5. Certification Decision: The certifying authority determines whether to (1) grant certification, (2) grant certification with conditions, (3) deny certification, or (4) expressively waive certification.

The RWQCB is required under the *California Code of Regulations* (CCR) to have a "minimum 21-day public comment period" before any action can be taken on the Section 401 application.[16] This period closes when the RWQCB acts on the application. Since projects often change or are revised during the Section 401 permit process, the comment period can remain open. The public comment period starts as soon as an application has been received. Generally, the RWQCB Section 401, USACE Section 404, and CDFW Section 1602 permit applications are submitted at the same time.

The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. The notification/application for a CWA Section 401 Water Quality Certification must also address compliance with the Basin Plan. Please note that filing an application would also require the payment of an application fee which would be based on project impacts. The fee schedule calculator is available at https://www.waterboards.ca.gov/resources/fees/water_quality/docs/dredgefillcalculator.xlsm.

Waste Discharge Requirements

If no USACE Section 404 Permit is required, then the RWQCB issues Waste Discharge Requirements (WDRs) instead of a Section 401 Water Quality Certification. The RWQCB requires certification of the project's CEQA documentation before it will issue WDRs.

[16] 23 CCR §3858(a)

If operation or discharges from a Project affects California's surface, coastal, or groundwater, an application may need to obtain a permit to discharge waste from the appropriate RWQCB. For discharging, or proposing to discharge, pollutants into surface waters, an applicant must file completed federal National Pollutant Discharge Elimination System (NPDES) permit application forms with the appropriate RWQCB. For other types of discharges, such as those affecting groundwater or in a diffused manner (e.g., erosion from soil disturbance or waste discharge to land), an applicant must file a Report of Waste Discharge with the appropriate RWQCB to obtain WDRs. For specific situations, the RWQCB may waive the requirement to obtain a WDR for discharges to land or may determine that a proposed discharge can be permitted more effectively through enrollment in a general NPDES permit or general WDR.

To obtain WDRs, file the ROWD Form 200 with the necessary supplemental information with the RWQCB at least 120 days before beginning to discharge waste. The RWQCB reviews the application for completeness and may request additional information. Once the application is complete, the RWQCB determines whether they should adopt WDRs, prohibit the discharge, or waive the WDRs. If WDRs should be issued, the RWQCB prepares proposed WDRs and distributes them to persons and public agencies with known interest in the project for a minimum 30-day comment period. RWQCB staff members may modify the proposed WDRs based on comments received from the discharger and interested parties. The RWQCB holds a public hearing with at least a 30-day public notification. The RWQCB may adopt the proposed WDRs or modify and adopt them at the public hearing by majority vote. The entire process for developing and adopting the requirements normally takes about three months. WDRs are in effect until such time as the discharge is terminated or until revoked by the RWQCB. NPDES permits expire after five years and must be reissued.

There is no application fee for Form 200 (except for dairies). Instead, there is an annual fee that will be paid to the RWQCB.

California Department of Fish and Wildlife

The CDFW has jurisdictional authority over wetland resources associated with rivers, streams, and lakes pursuant to the *California Fish and Game Code*.[17] Activities of any person, State or local governmental agency, or public utility that are project proponents are regulated by the CDFW under Section 1602 of the *California Fish and Game Code.* This section regulates any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State.

The CDFW jurisdictional limits are not as clearly defined by regulation as those of the USACE. While they closely resemble the limits described by USACE regulations, they include riparian habitat supported by a river, stream, or lake regardless of the presence or absence of hydric and saturated soils conditions. In general, the CDFW takes jurisdiction from the top of a stream bank or to the outer limits of the adjacent riparian vegetation (outer drip line),

[17] See §§1600–1616.

whichever is greater. Notification is generally required for any project that will take place within or in the vicinity of a river, stream, lake or within or in the vicinity of tributaries to a river, stream, or lake. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish and other aquatic plant and/or wildlife species. It also includes watercourses that have a surface or subsurface flow that support or have supported riparian vegetation.

Section 1602 Lake or Streambed Alteration Agreement

The CDFW enters into a Lake or Streambed Alteration (LSA) Agreement with a project proponent in order to ensure protection of wildlife and habitat values and acreages.

Prior to construction, a Notification of an LSA must be submitted to the CDFW that describes any proposed lake or streambed alteration that would occur with implementation of a project. The Notification of an LSA must address the initial construction and long-term operation and maintenance of any structures (such as a culvert or a desilting basin) included in the project design that are located within any river, stream, or lake and that may require periodic maintenance. In addition to the formal application materials and the fee, a copy of the appropriate environmental document (e.g., a Mitigated Negative Declaration) should be included in the submittal, consistent with CEQA requirements. The complete notification package must be submitted to the CDFW regional office that services the county where the activity will take place. This notification will serve as the basis for the CDFW's issuance of a Section 1602 LSA Agreement. Note that notification is not required before beginning emergency work, but the CDFW must be notified in writing within 14 days after beginning the work.

After receiving Notification of an LSA Agreement, the CDFW will determine whether an LSA Agreement will be required for the proposed activity. An LSA Agreement will be required if the activity could substantially adversely affect an existing fish and wildlife resource. If an LSA Agreement is required, the CDFW may want to conduct an on-site inspection.

If the CDFW does not respond in writing concerning the completeness of the Notification within 30 days of its submittal, the Notification automatically becomes complete. If the CDFW does not submit a draft LSA Agreement to the Applicant within 60 days of the determination of a completed Notification package, the CDFW will issue a letter that either (1) identifies the final date to transmit a draft LSA Agreement or (2) indicates that an LSA Agreement was not required. The CDFW will also indicate that it was unable to meet this mandated compliance date and that, by law, the Applicant is authorized to complete the project without an LSA Agreement as long as the Applicant constructs the project as proposed and complies with all avoidance, minimization, and mitigation measures described in the submitted Notification package. If the project requires revisions to the design or project construction, the CDFW may require submittal of a new Notification/application with an additional 90-day permit process.

If determined to be necessary, the CDFW will prepare a draft LSA Agreement, which will include standard measures to protect fish and wildlife resources during project construction and during ongoing operation and maintenance of any project element that occurs within a CDFW jurisdictional area. The draft Agreement must be transmitted to the Applicant within

60 calendar days of the CDFW's determination that the notification is complete. It should be noted that the 60-day timeframe might not apply to long-range agreements.

Following receipt of a draft LSA Agreement from the CDFW, the Applicant has 30 calendar days to notify the CDFW concerning the acceptability of the proposed terms, conditions, and measures. If the Applicant agrees with these terms, conditions and measures, the Agreement must be signed and returned to the CDFW. The Agreement becomes final once the CDFW executes it and an LSA Agreement is issued. All application fees must be paid and the final certified CEQA documentation must be provided prior to the CDFW's execution of the Agreement.

ATTACHMENT B

NATIONAL WETLAND INVENTORY DEFINITIONS

NATIONAL WETLANDS INVENTORY

The descriptions for resources mapped by the National Wetlands Inventory in the survey area (see Exhibit 6) are provided below.

Lacustrine Features: L1UBHh, L2ABFh, L2EM2Fh, L2UBFh, L2USAh, L2USCh

- **L: System LACUSTRINE.** The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, and emergent mosses or lichens with 30 percent or greater areal coverage; and (3) total area of at least 8 hectares (ha) (20 acres). Similar wetlands and deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin equals or exceeds 2.5 meters (8.2 feet) at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5 part per trillion (ppt).
    - **1: Subsystem LIMNETIC.** This Subsystem includes all deepwater habitats (i.e., areas > 2.5 meters [8.2 feet] deep below low water) in the Lacustrine System. Many small Lacustrine Systems have no Limnetic Subsystem.
    - **2: Subsystem LITTORAL.** This Subsystem includes all wetland habitats in the Lacustrine System. It extends from the shoreward boundary of the System to a depth of 2.5 meters (8.2 feet) below low water, or to the maximum extent of nonpersistent emergents if these grow at depths greater than 2.5 meters.
        - **AB: Class AQUATIC BED.** Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most f the growing season in most years.
        - **EM: Class EMERGENT.** Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
        - **UB: Class UNCONSOLIDATED BOTTOM.** Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 centimeters), and a vegetative cover less than 30%.
        - **US: Class UNCONSOLIDATED SHORE.** Includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover or stones, boulders, or bedrock and (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.
            - **2: Subclass NON-PERSISTENT.** Wetlands in this subclass are dominated by plants which fall to the surface of the substrate or below the surface of the water at the end of the growing season so that, at certain seasons of the year, there is no obvious sign of emergent vegetation.

- **A: Water Regime TEMPORARY FLOODED.** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
- **C: Water Regime SEASONALLY FLOODED.** Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
- **F: Water Regime SEMIPERMANENTLY FLOODED.** Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
- **H: Water Regime PERMANENTLY FLOODED.** Water covers the substrate throughout the year in all years.
    - **h: Special Modifier DIKED/IMPOUNDED.** These wetlands have been created or modified by a man-made barrier or dam that obstructs the inflow or outflow of water.

Riverine Features: R2UBF, R2USC, R4SBA, R4SBAr, R4SBC, and R4SBCr

- **R: System RIVERINE.** The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.
    - **2: Subsystem: LOWER PERENNIAL.** This Subsystem is characterized by a low gradient. There is no tidal influence and some water flows all year, except during years of extreme drought. This substrate consists mainly of sand and mud. Oxygen deficits may sometimes occur. The fauna is composed mostly of species that reach their maximum abundance in still water and true planktonic organisms are common. The gradient is lower than that of the Upper Perennial Subsystem and the floodplain is well developed.
    - **4: Subsystem INTERMITTENT.** This Subsystem includes channels that contain flowing water only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.
        - **SB: Class STREAMBED.** Includes all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the

Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide.

- **UB: Class UNCONSOLIDATED BOTTOM.** Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 centimeters), and a vegetative cover less than 30%.
- **US: Class UNCONSOLIDATED SHORE.** Includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover or stones, boulders, or bedrock and (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.
  - **A: Water Regime TEMPORARY FLOODED.** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
  - **C: Water Regime SEASONALLY FLOODED.** Surface water is present for extended periods, especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
  - **F: Water Regime SEMIPERMANENTLY FLOODED.** Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
    - **r: Special Modifier ARTIFICIAL SUBSTRATE.** This Modifier describes concrete-lined drainage ways, as well as Rock Bottom, Unconsolidated Bottom, Rocky Shore, and Unconsolidated Shore where the substrate material has been emplaced by humans. Jetties and breakwaters are examples of Artificial Rocky Shores.

Palustrine Features: PEM1C, PFOC, PFOCh, PFO/EM1Ch, PFO/SSA PSSA, PSSC, PSS/EM1C

- **P: System PALUSTRINE.** The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses, or lichens and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 part per trillion (ppt). It also includes wetlands lacking such vegetation but with all of the following four characteristics: (1) area less than 8 ha (20 acres), (2) active wave-formed or bedrock shoreline features lacking, (3) water depth in the deepest part of the basin less than 2.5 meters (8.2 feet) at low water, and (4) salinity due to ocean-derived salts less than 0.5 ppt.

- **EM: Class EMERGENT.** Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
- **FO: Class FORESTED.** Characterized by woody vegetation that is 6 meters tall or taller.
- **SS: Class SCRUB-SHRUB.** Includes areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions.
    - **1: Subclass PERSISTENT.** This subclass is dominated by species that normally remain standing at least until the beginning of the next growing season. This subclass is found only in the Estuarine and Palustrine systems.
        - **A: Water Regime TEMPORARY FLOODED.** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
        - **C: Water Regime SEASONALLY FLOODED.** Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
            - **h: Special Modifier DIKED/IMPOUNDED.** These wetlands have been created or modified by a man-made barrier or dam that obstructs the inflow or outflow of water.

ATTACHMENT C

REPRESENTATIVE PHOTOGRAPHS

Photo 1: Santiago Creek Dam and Irvine Lake. October 14, 2020.

Photo 2: Overview of Irvine Lake from Santiago Dam. October 21, 2020.

Photo 3: Top of existing spillway channel. February 25, 2020.

Photo 4: Existing dam embankment and Irvine Lake. February 25, 2020.

Photo 5: Santiago Creek channel upstream of Irvine Lake. October 20, 2020.

Photo 6: Santiago Creek discharging into Irvine Lake. October 21, 2020.

D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP1.ai

Representative Photographs

Attachment C-1

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_SP.pdf

Photo 7: Santiago Creek below spillway channel. February 25, 2020.

Photo 8: Santiago Creek at existing Irvine Lake Pipeline. February 25, 2020.

Photo 9: Downstream end of Santiago Creek. March 24, 2020.

Photo 10: Pipe culvert leading into Drainage 1. March 24, 2020.

Photo 11: Drainage 3, a concrete- and riprap-lined tributary to Santiago Creek. February 25, 2020.

Photo 12: Drainage 4 at access road. October 21, 2020.

D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP2.ai

Representative Photographs

Attachment C-2

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_SP.pdf

Photo 13: Drainage 5. October 21, 2020.

Photo 14: Drainage 6. October 21, 2020.

Photo 15: Drainage 7. October 21, 2020.

Photo 16: Drainage 8. October 20, 2020.

Photo 17: Drainage 9. October 14, 2020.

Photo 18: Drainage 10. October 14, 2020.

D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP3.ai

Representative Photographs

Attachment C-3

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2024 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_SP.pdf

Photo 19: Drainage 11. October 14, 2020.

Photo 20: Drainage 12. October 14, 2020.

Photo 21: Drainage 13. October 14, 2020.

Photo 22: Drainage 14. October 14, 2020.

Photo 23: Downstream end of Drainage 15. October 14, 2020.

Photo 24: Ordinary High Water Mark is indicated by staining on the existing dam embankment. October 21, 2020.

D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP4.ai

Representative Photographs

Attachment C-4

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_SP.pdf

Photo 25: Ordinary High Water Mark is indicated by drift deposits around Irvine Lake. October 14, 2020.

Photo 26: Sampling Point 1 in Santiago Creek downstream of the dam. March 24, 2020.

Photo 27: Sampling Point 2 at the downstream end of Drainage 9. October 14, 2020.

Photo 28: Sampling Point 3 on the western edge of Irvine Lake. October 14, 2020.

Photo 29: Sampling Point 4 on the western edge of Irvine Lake. October 14, 2020.

Photo 30: Sampling Point 5 on the western edge of Irvine Lake just above the Ordinary High Water Mark. October 14, 2020.

D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP5.ai

Representative Photographs

Attachment C-5

Santiago Creek Dam Improvement Project

PSOMAS

(02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_SP.pdf

ATTACHMENT D

RWQCB AND CDFW JURISDICTIONAL RESOURCES DETAIL

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainages 4, 5

Attachment D-2a

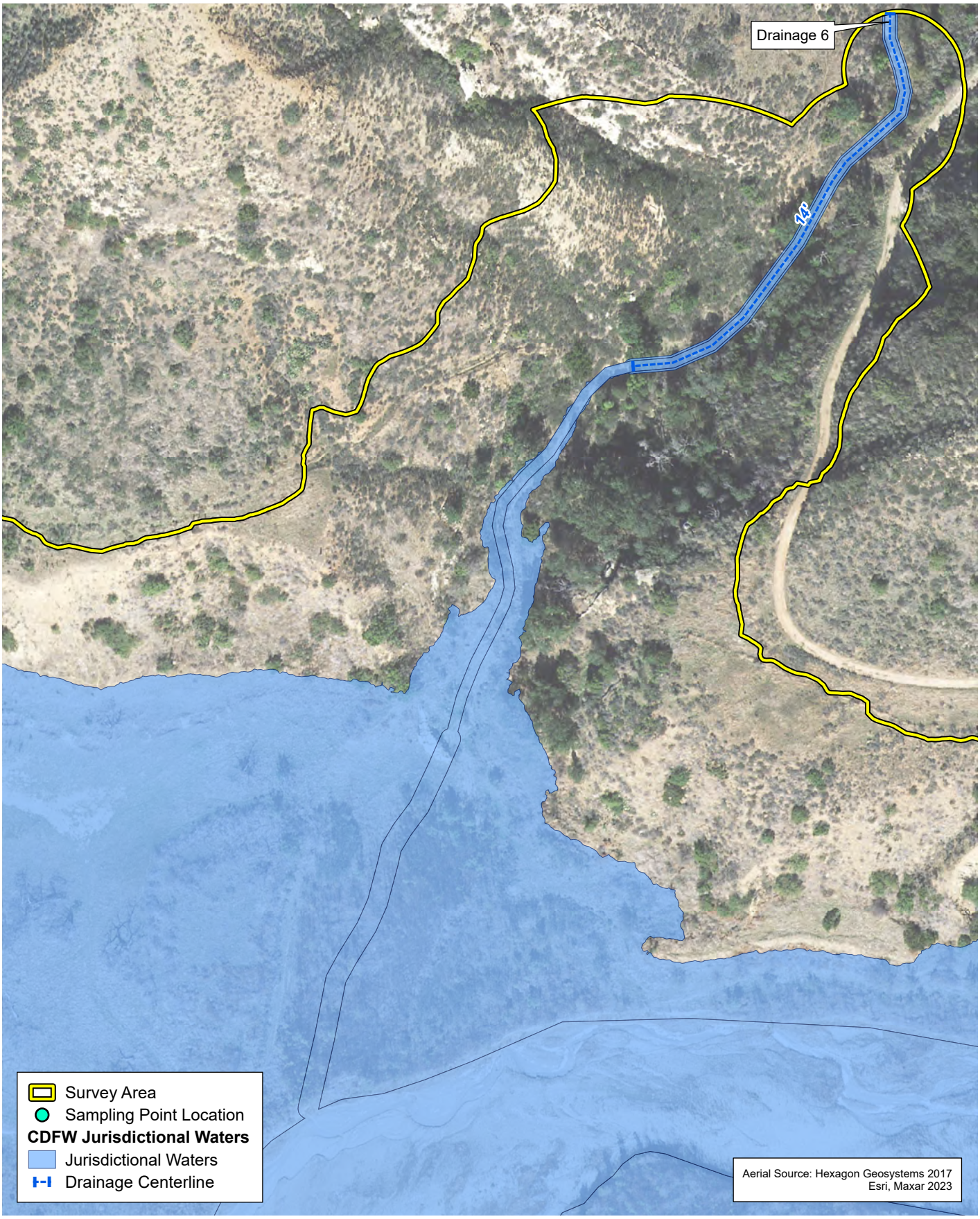
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 6

Attachment D-2b

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 7

Attachment D-2c

Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 8

Attachment D-2d

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 9

Attachment D-2e

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail - Drainage 10

Attachment D-2f

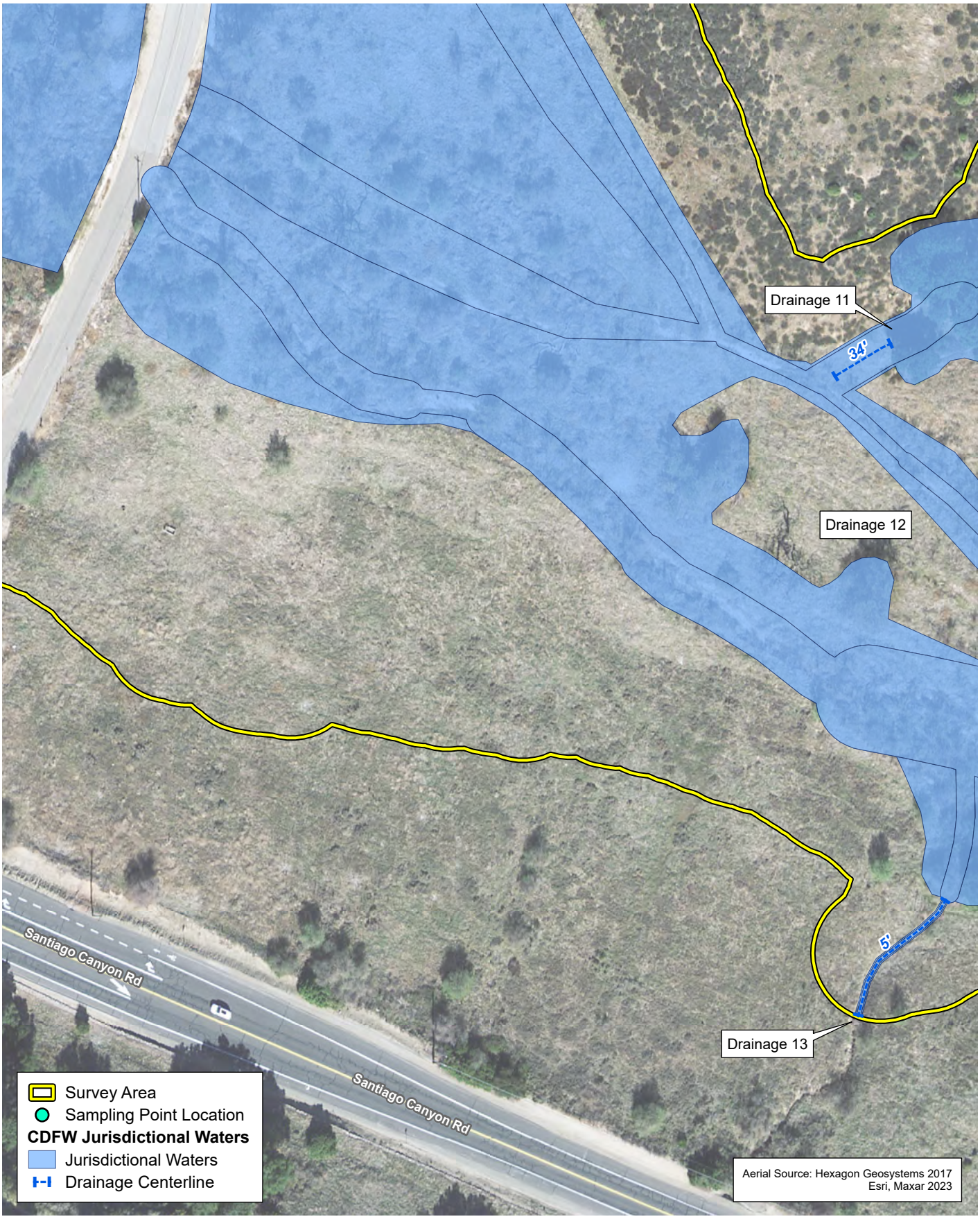
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainages 11, 12, 13

Attachment D-2g

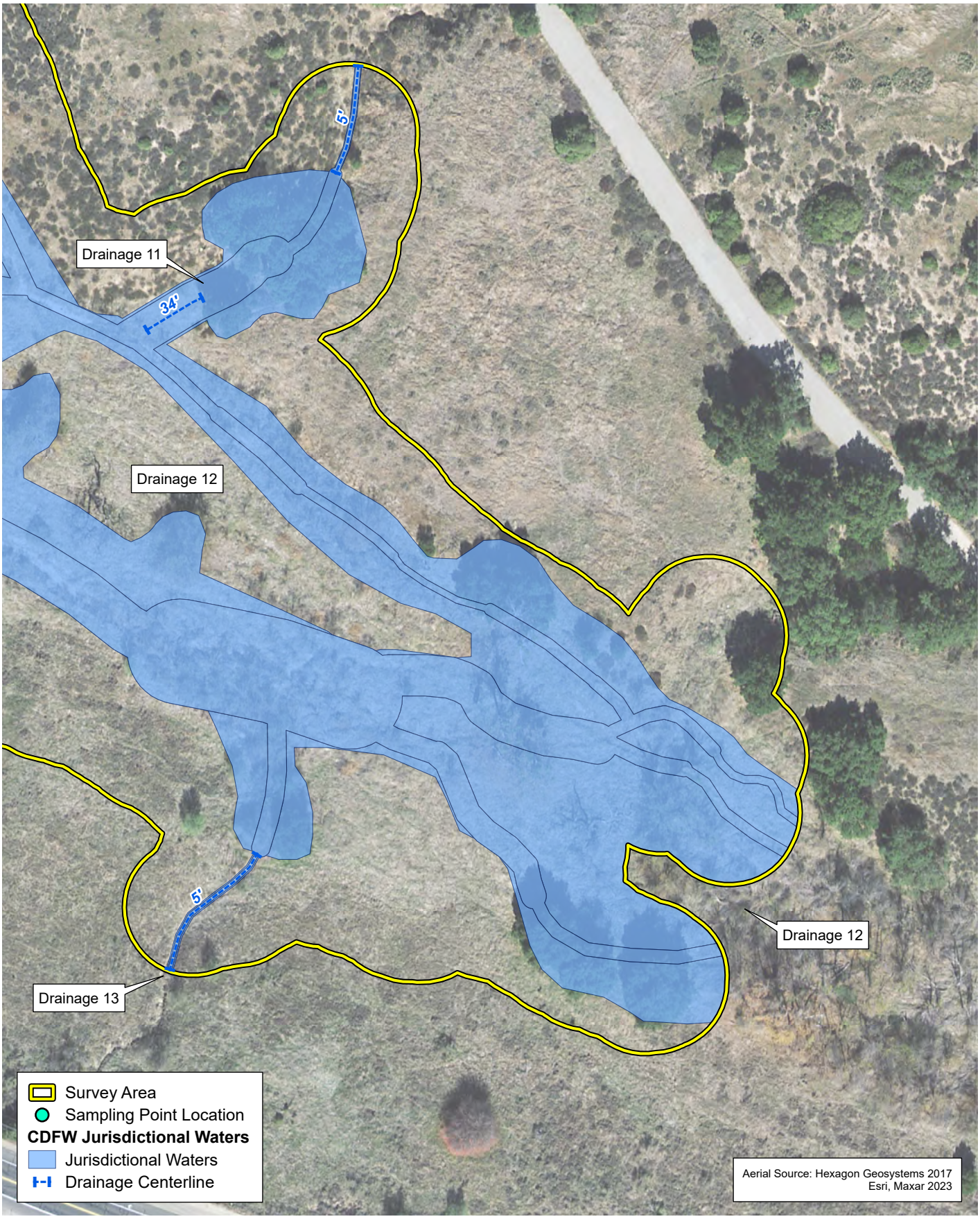
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainages 11, 12, 13

Attachment D-2h

Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 14

Attachment D-2i

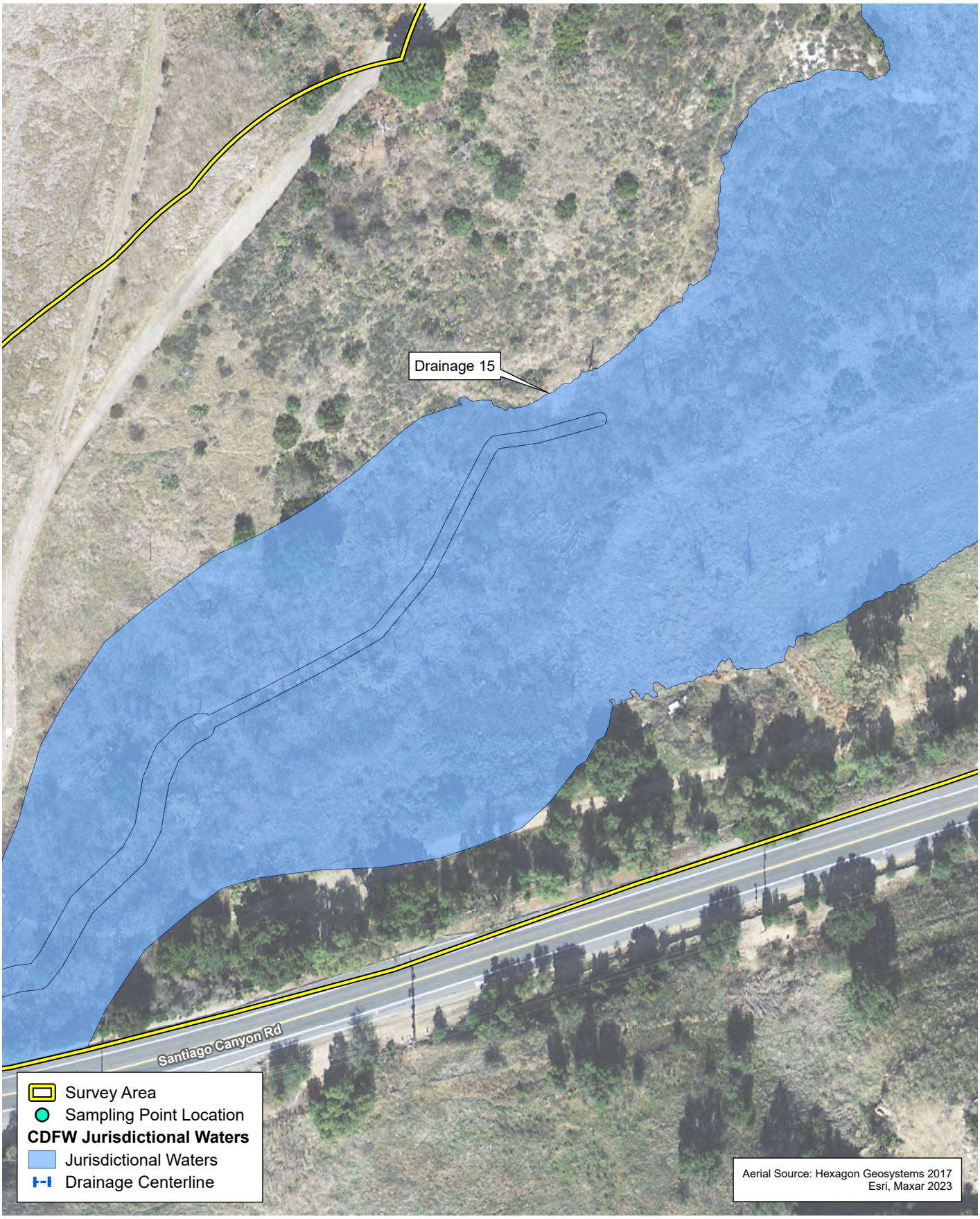
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW

CDFW Jurisdictional Waters Detail – Drainage 15

Attachment D-2j

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

CDFW Jurisdictional Waters Detail – Drainage 15

Attachment D-2k

Santiago Creek Dam Improvement Project

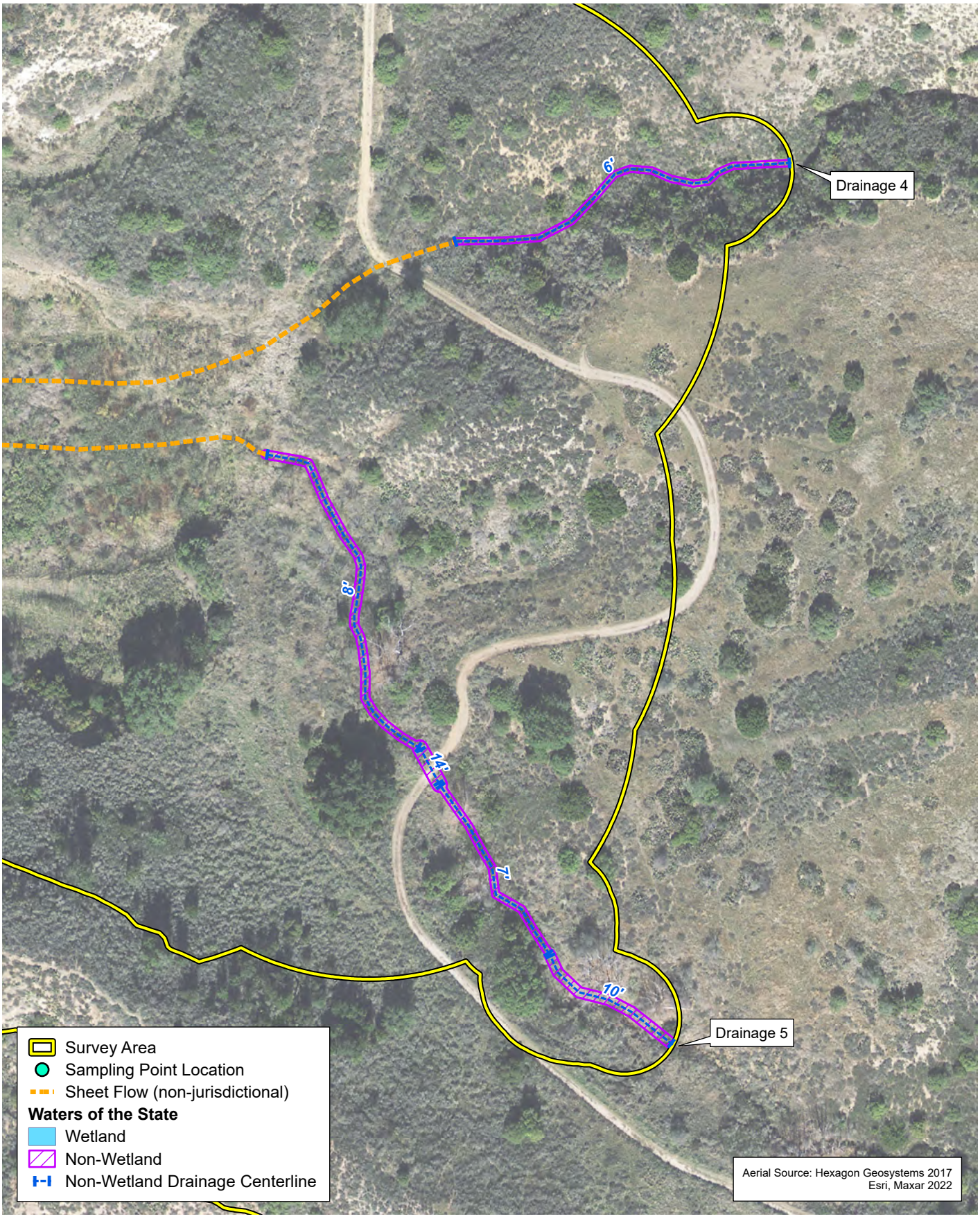
N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail – Drainages 4, 5

Attachment D-1a

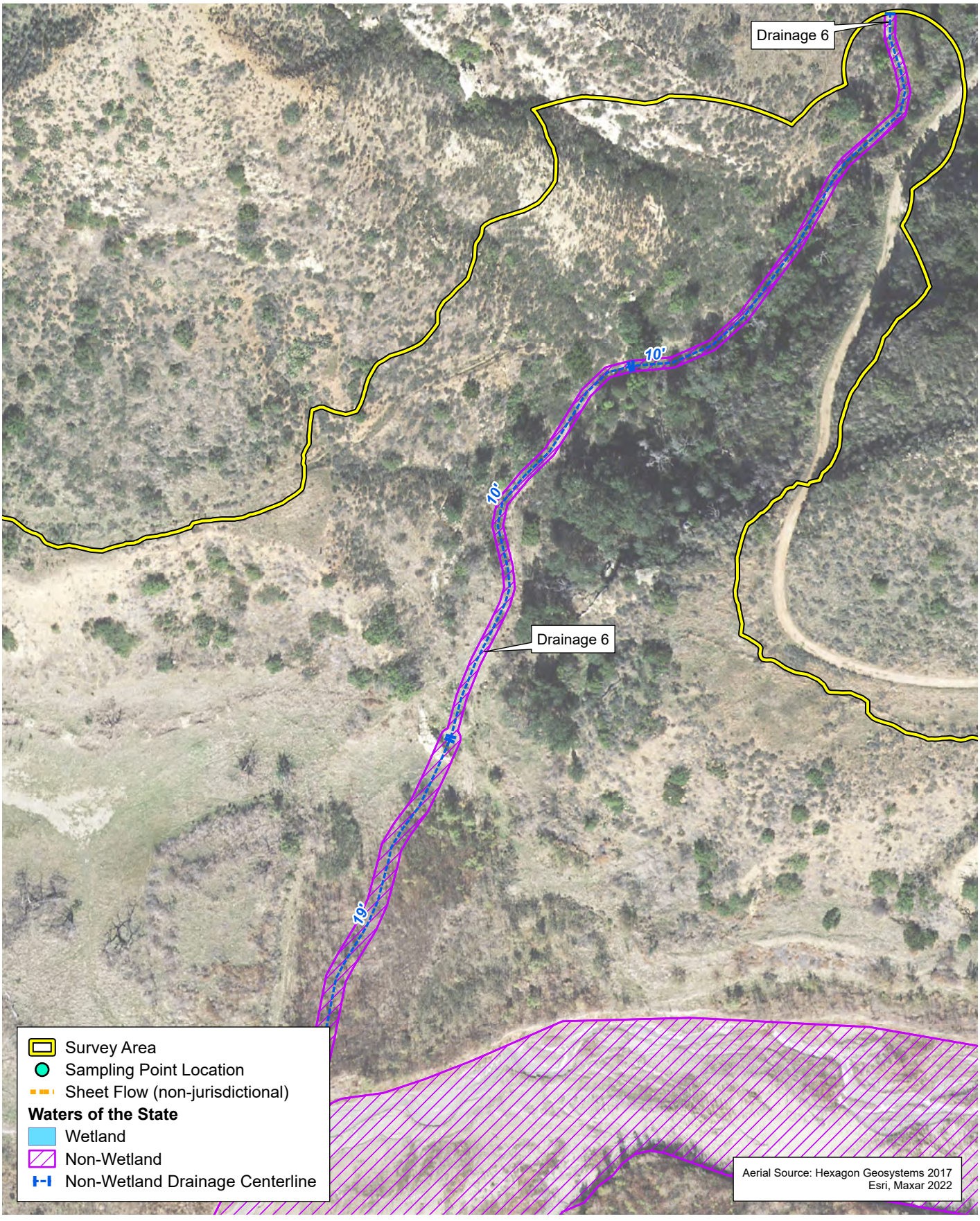
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 6

Attachment D-1b

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 7

Attachment D-1c

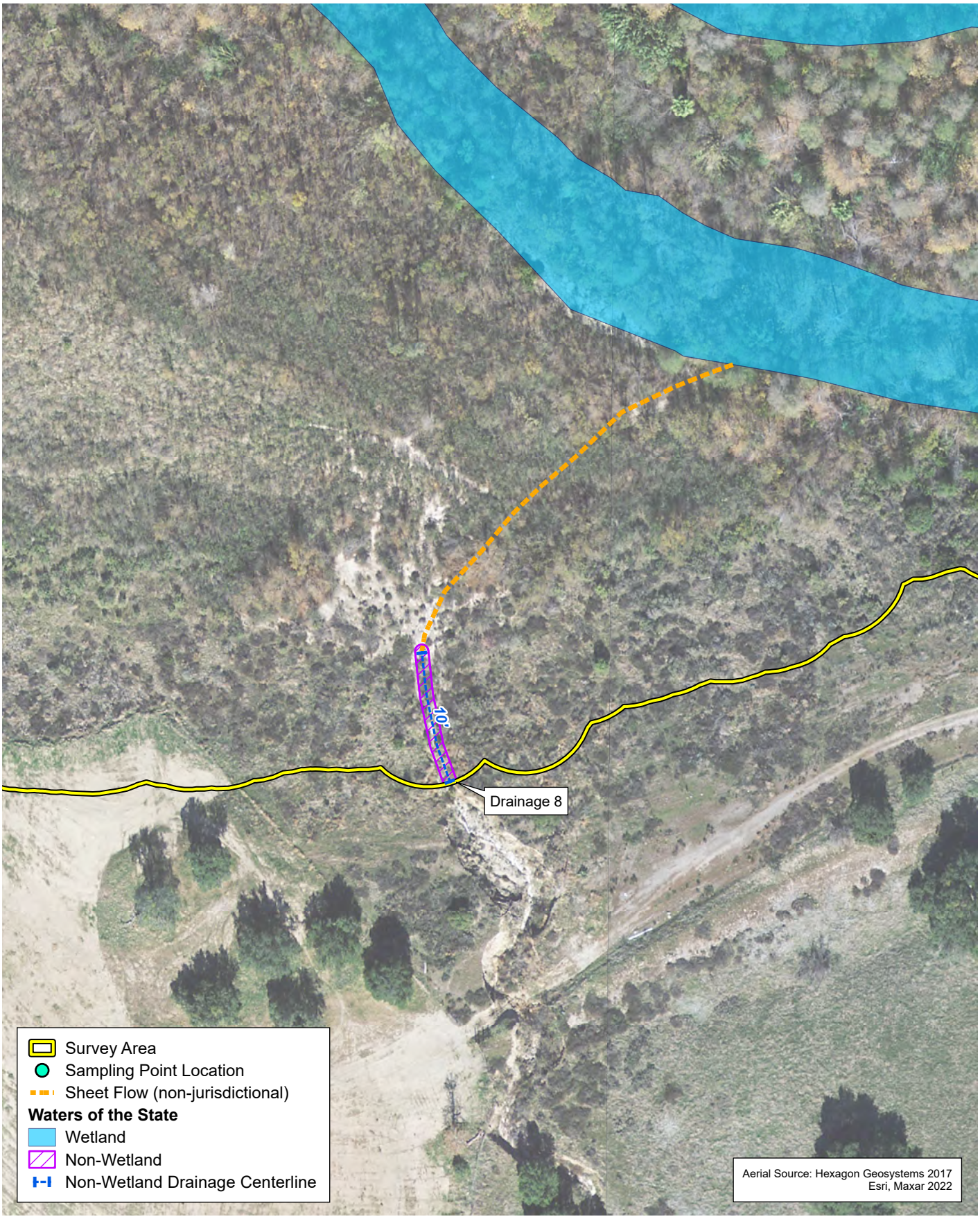
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 8

Attachment D-1d

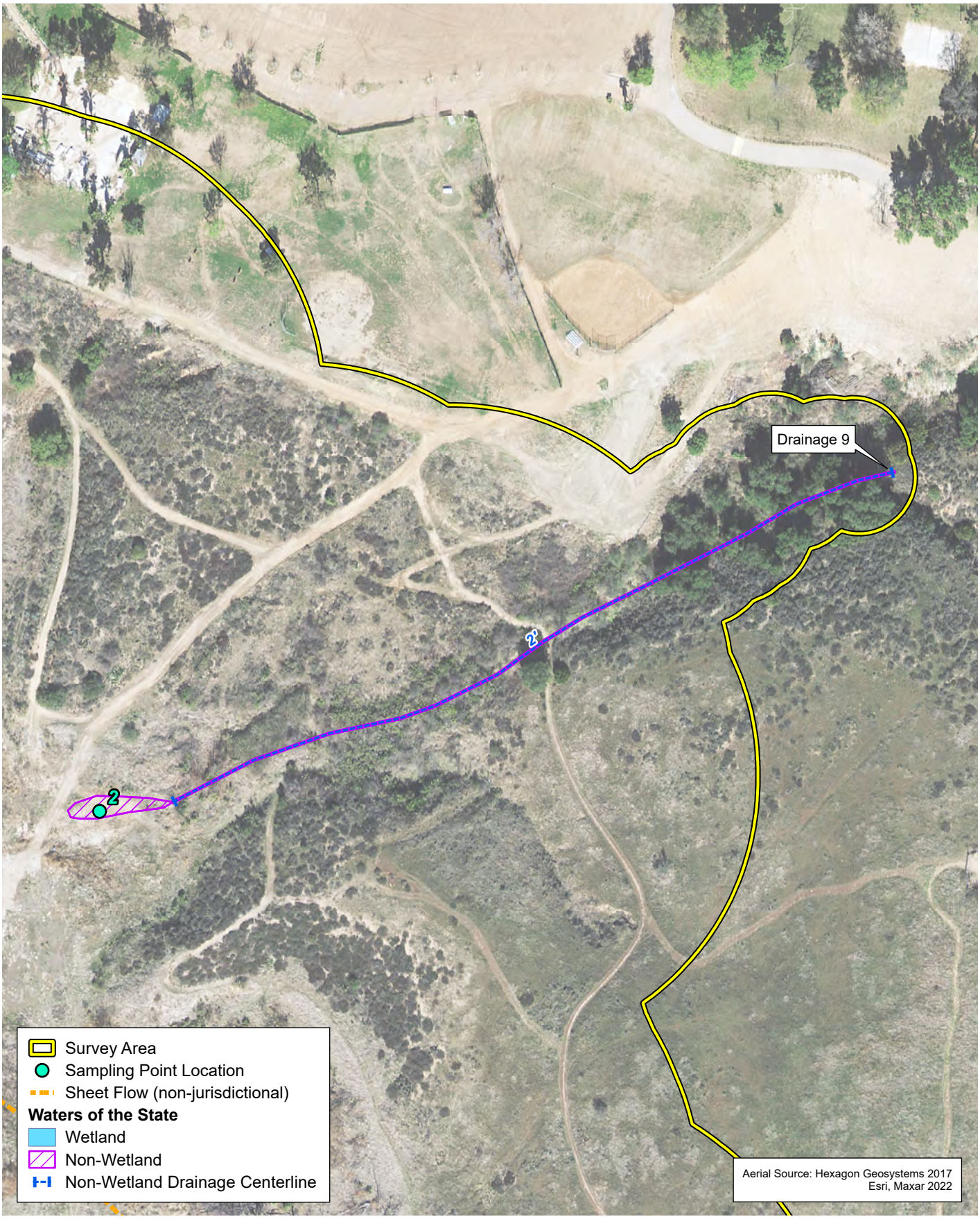
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 9

Attachment D-1e

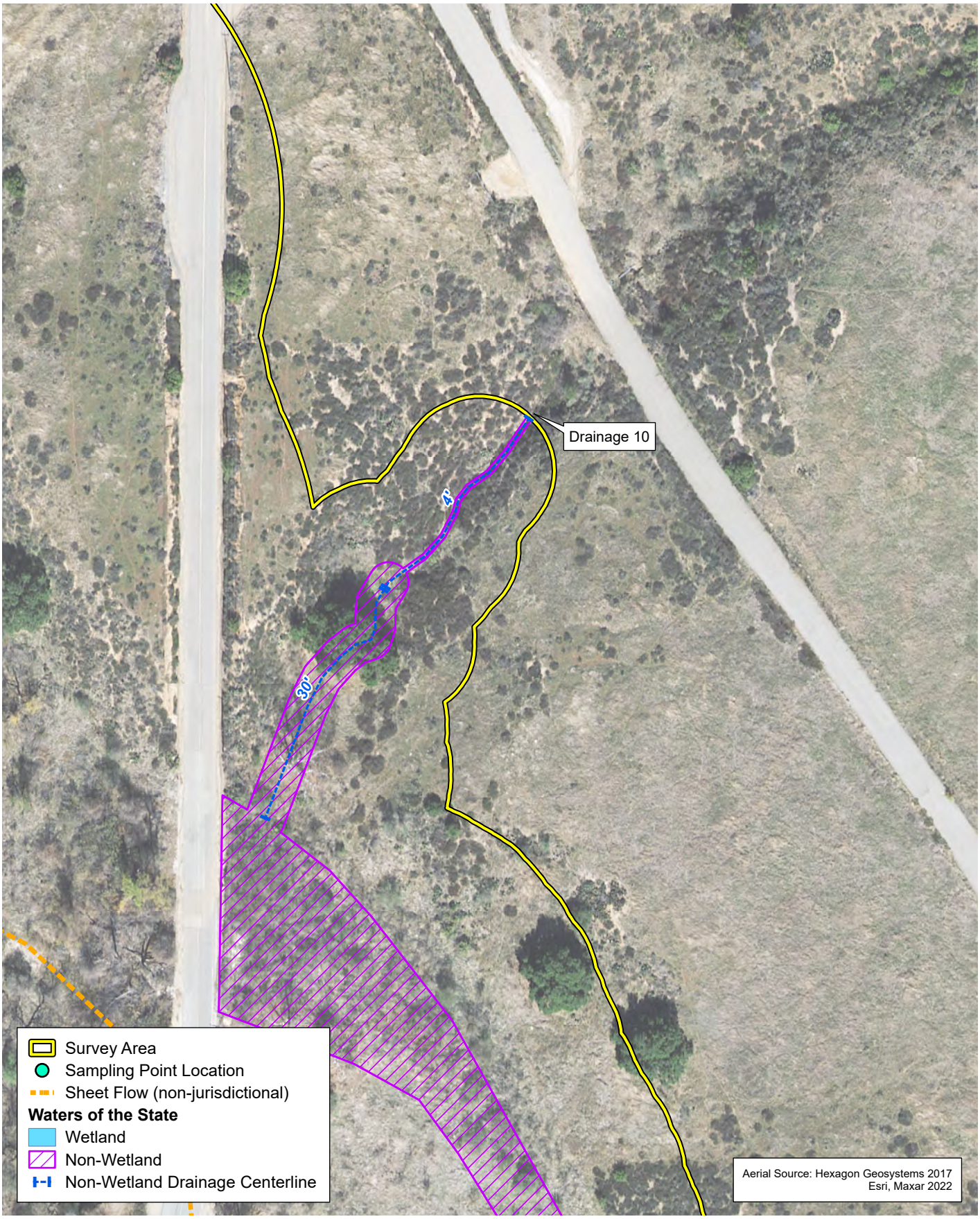
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 10

Attachment D-1f

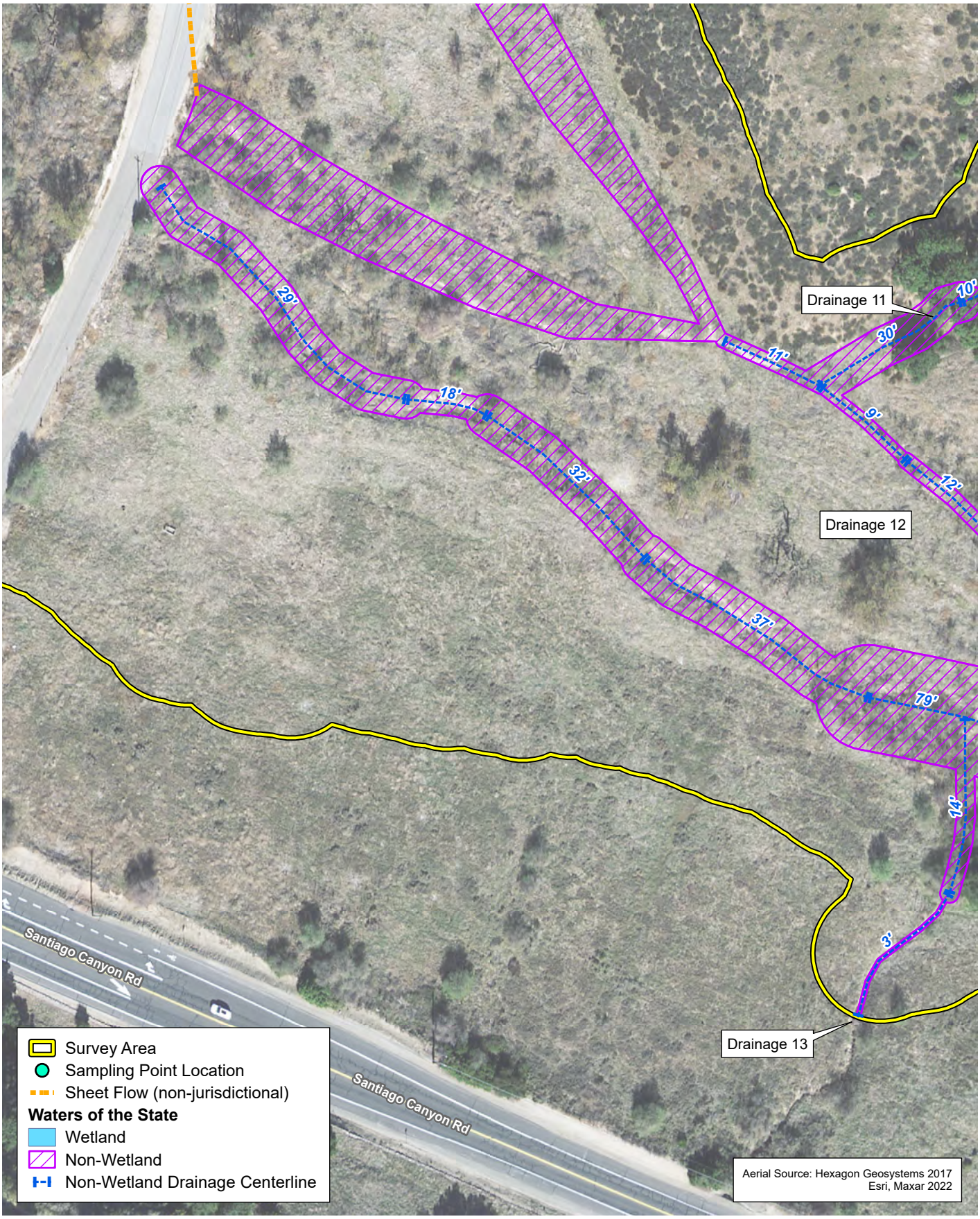
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail – Drainages 11, 12, 13

Attachment D-1g

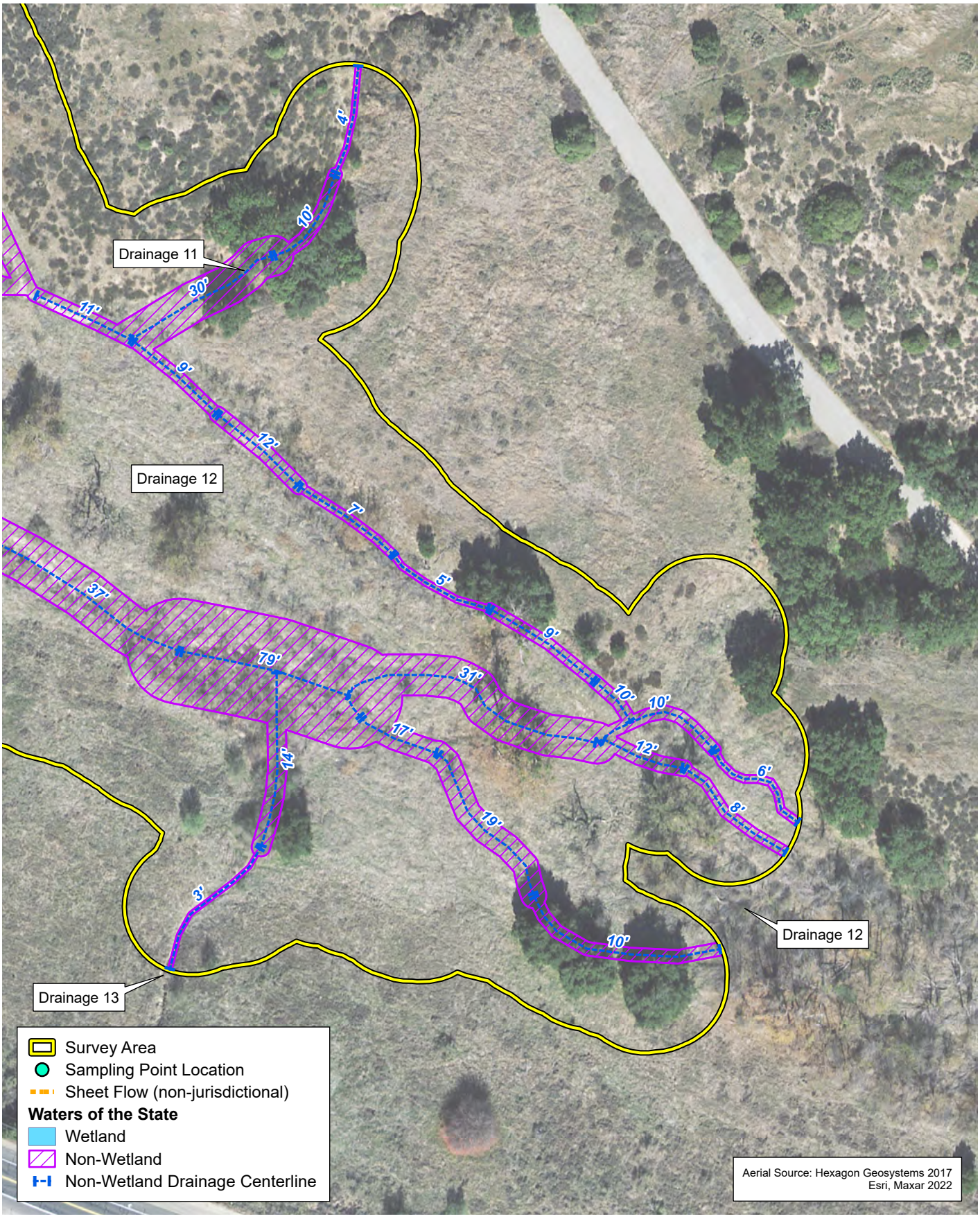
Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainages 11, 12, 13

Attachment D-1h

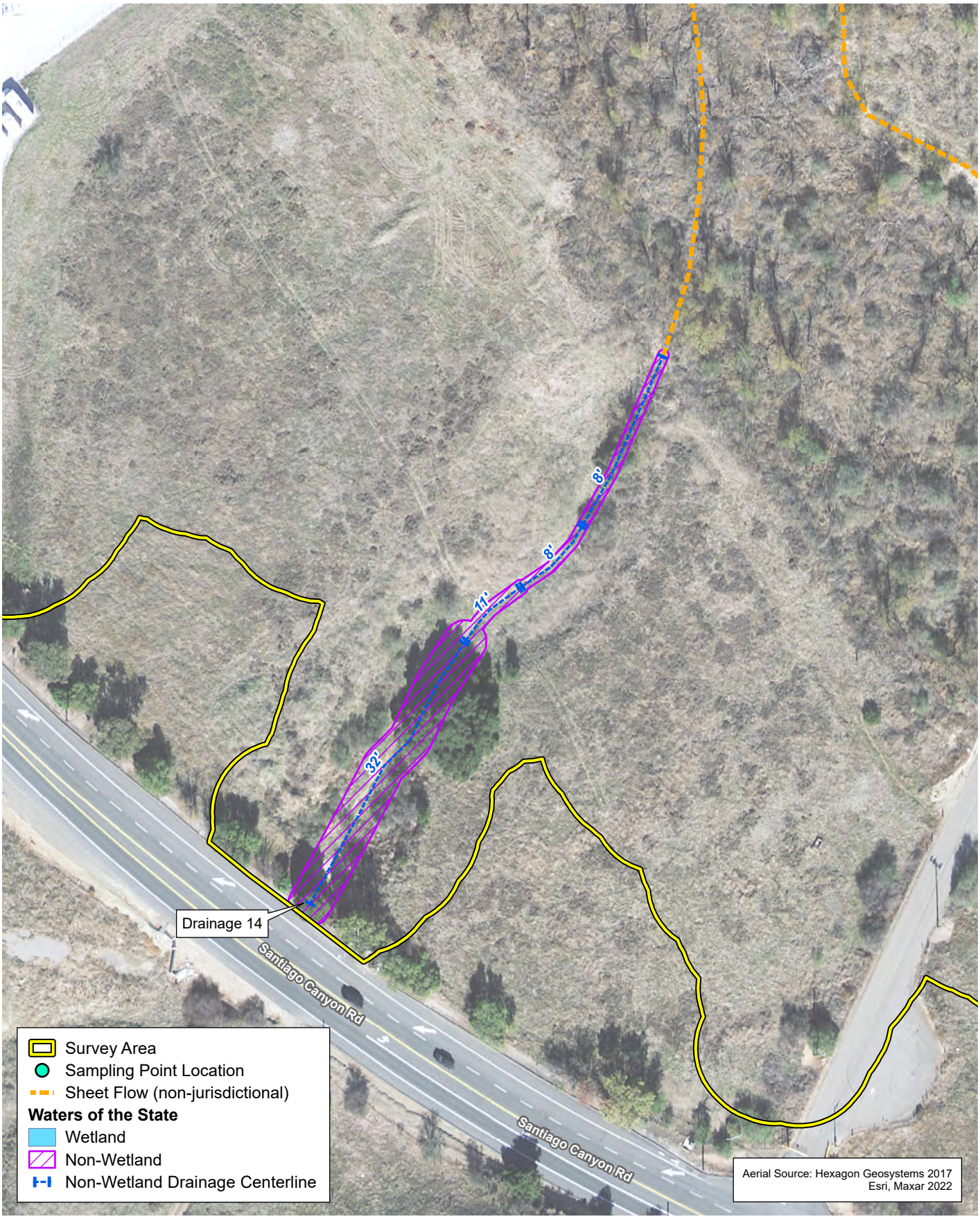
Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail – Drainage 14

Attachment D-1i

Santiago Creek Dam Improvement Project

N
W E
S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 15

Attachment D-1j

Santiago Creek Dam Improvement Project

N
W E
S

0 50 100
Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB

RWQCB Waters of the State Detail - Drainage 15

Attachment D-1k

Santiago Creek Dam Improvement Project

N W E S

0 50 100 Feet

PSOMAS

(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

ATTACHMENT E

DATASHEETS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co. Sampling Date: 3/24/2020

Applicant/Owner: IRWD State: CA Sampling Point: 1

Investigator(s): ARudalevige Section, Township, Range: 28, T04S, R08W

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): California Lat: 33.78804° Long: -117.72701° Datum: NAD 83

Soil Map Unit Name: Anaheim clay loam, 50-75% slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes Y No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y No ____	**Is the Sampled Area within a Wetland?** Yes ____ No Y
Hydric Soil Present?	Yes ____ No Y	
Wetland Hydrology Present?	Yes Y No ____	

Remarks: Sampling point is in a steep canyon below the Santiago Dam Spillway

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1. Salix gooddingii	40	Y	FACW
2. Populus fremontii	5	N	UPL
3.			
4.			
	45	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5')			
1. Baccharis salicifolia ssp. S.	1	N	FAC
2.			
3.			
4.			
5.			
	1	= Total Cover	
Herb Stratum (Plot size: 5')			
1. Typha sp. *	5	N	OBL
2. Bromus rubens	10	Y	UPL
3. Pulicaria paludosa	20	Y	FAC
4. Melilotus albus	1	N	UPL
5.			
6.			
7.			
8.			
	36	= Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 64 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.6% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

Y Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No ____

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	100					loamy clay	
2-12	10YR 4/4	100					loamy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock & roots

Depth (inches): 12

Hydric Soil Present? Yes ___ No Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Y Surface Water (A1)
- Y High Water Table (A2)
- Y Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- Y Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes Y No ___ Depth (inches): 6"

Water Table Present? Yes Y No ___ Depth (inches): 4"

Saturation Present? (includes capillary fringe) Yes Y No ___ Depth (inches): 1"

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Sampled following a rain event.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co Sampling Date: 10/14/2020

Applicant/Owner: IRWD State: CA Sampling Point: 2

Investigator(s): ARudalevige, JAguayo Section, Township, Range: S04, T05S, R08W

Landform (hillslope, terrace, etc.): toe of slope Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR): California Lat: 33.768437° Long: -117.713390° Datum: NAD 83

Soil Map Unit Name: Riverwash NWI classification: L2UBFh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y No _____	**Is the Sampled Area within a Wetland?** Yes _____ No Y
Hydric Soil Present?	Yes _____ No Y	
Wetland Hydrology Present?	Yes X No _____	

Remarks:
Sampling point is at downstream end of drainage south of Irvine Lake.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5')			
1. Cyperus cf. eragrostis	40	Y	FACW
2. Rumex crispus	2	N	FAC
3. Heliotropium curassaricum	2	N	FACU
4. var. oculatum			
5. Epilobium ciliatum	1	N	FACW
6.			
7.			
8.			
	45 = Total Cover		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 55 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-19	5YR 4/3	95%	10BG 2.5/1	5%		M	clay	red parent material but no redox depletions or concentrations.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Y Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): <1

Water Table Present? Yes X No ____ Depth (inches): 13

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 0

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co Sampling Date: 10/14/2020
Applicant/Owner: IRWD State: CA Sampling Point: 3
Investigator(s): ARudalevige, JAguaigo Section, Township, Range: S 33 T04S R08W
Landform (hillslope, terrace, etc.): lakebed Local relief (concave, convex, none): concave Slope (%): 0
Subregion (LRR): California Lat: 33.773677 Long: -117.721168 Datum: NAD83
Soil Map Unit Name: Water NWI classification: L1UBHh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation X, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____
Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Sampling point is below OHWM in Irvine Lake above water line.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5')			
1. Cryptsis schoenoides	60	y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ____

Remarks:
Vegetation in lakebed varies based on water level, which is affected by inflow, precipitation, + releases from the dam, leading to temporal shifts in vegetation.

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-17	7.5YR 3/1	90	7.5YR 3/4	10	C	PL,M	silty clay	distinct mottles

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- Y Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes Y No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- Y Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- Y Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- Y FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No Y Depth (inches): _____

Water Table Present? Yes ___ No Y Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No Y Depth (inches): _____

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

B13 - freshwater bivalves present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: Unincorporated Orange Co Sampling Date: 10/14/2020
Applicant/Owner: IRWD State: CA Sampling Point: 4
Investigator(s): ARudalevige, JAguayo Section, Township, Range: S33, T04S, R08W
Landform (hillslope, terrace, etc.): lakebed Local relief (concave, convex, none): concave Slope (%): <1%
Subregion (LRR): California Lat: 33.773601 Long: -117.721428 Datum: NAD83
Soil Map Unit Name: Water NWI classification: L1UBHh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation Y, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes Y No ____
Hydric Soil Present? Yes Y No ____
Wetland Hydrology Present? Yes Y No ____
Is the Sampled Area within a Wetland? Yes X No ____

Remarks: Sampling point in on lower bank of Irvine Lake below OHWM and above waterline.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5')			
1. Crypsis schoenoides	40	Y	FACW
2. Xanthium strumarium	10	n	FAC
3. Melilotus albus	10	n	UPL
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ____

Remarks: Vegetation in lakebed varies based on water level, which is affected by inflow, precipitation, and releases from the dam, leading to temporal shifts in vegetation.

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	7.5YR 4/2	92	2.5YR 3/6	8	C	PL, M	clay loam	prominent mottles
15-16	10YR 3/2	97	2.5YR 3/6	3	C	PL, M	sandy clay loam	prominent mottles

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- Y Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- Y Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes Y No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- Y Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ✓ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No Y Depth (inches): _____

Water Table Present? Yes ___ No Y Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

B13 - freshwater bivalves present

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co Sampling Date: 10/14/2020
Applicant/Owner: IRWD State: CA Sampling Point: 5
Investigator(s): ARudalevige, JAguayo Section, Township, Range: S 33 T04S R08W
Landform (hillslope, terrace, etc.): lake edge Local relief (concave, convex, none): concave Slope (%): 1%
Subregion (LRR): California Lat: 33.7734606 Long: -117.721826 Datum: NAD83
Soil Map Unit Name: water NWI classification: L2UBFH
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No N
Hydric Soil Present? Yes ____ No Y
Wetland Hydrology Present? Yes ____ No Y
Is the Sampled Area within a Wetland? Yes ____ No N

Remarks: Sampling point is above OHWM in Irvine Lake

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5')			
1. cf. Cardionema ramosissimum	5	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 95 % Cover of Biotic Crust 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species	5	x 5 =	25
Column Totals:	5 (A)		25 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No N

Remarks:

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	7.5YR 4/2	100	—	—	—	—	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Above OHWM

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Santiago Creek Dam Outlet Tower + Spillway Improvement **Date:** 3/24/2020 **Time:** 1000
Project Number: 31RW000904 **Town:** unInc. Orange Co **State:** CA
Stream: Santiago Creek **Photo begin file#:** **Photo end file#:**
Investigator(s): A Rudalevige

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details: Below Irvine Lake spillway at canyon mouth

Projection: **Datum:**

Coordinates: 33° 47.953', -117° 43.565'

Potential anthropogenic influences on the channel system:
Santiago Dam (impoundment) and controlled releases of flow. Access road with Arizona Crossing.

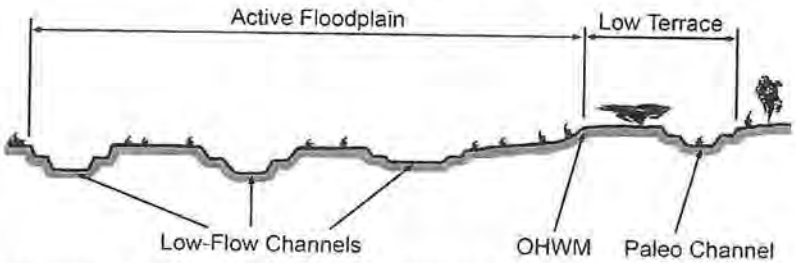
Brief site description: Floodplain of Santiago Creek downstream of Irvine Lake.

Checklist of resources (if available):

- ☑ Aerial photography
  Dates: 2018
- ☒ Topographic maps
- ☐ Geologic maps
- ☑ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☑ Stream gage data
  Gage number: 11075800 (upstream of dam)
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

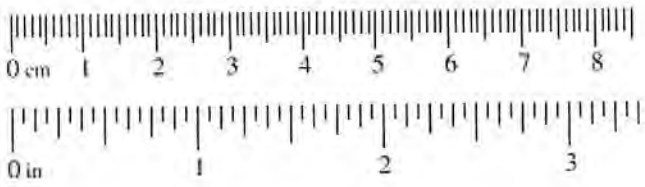


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☑ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

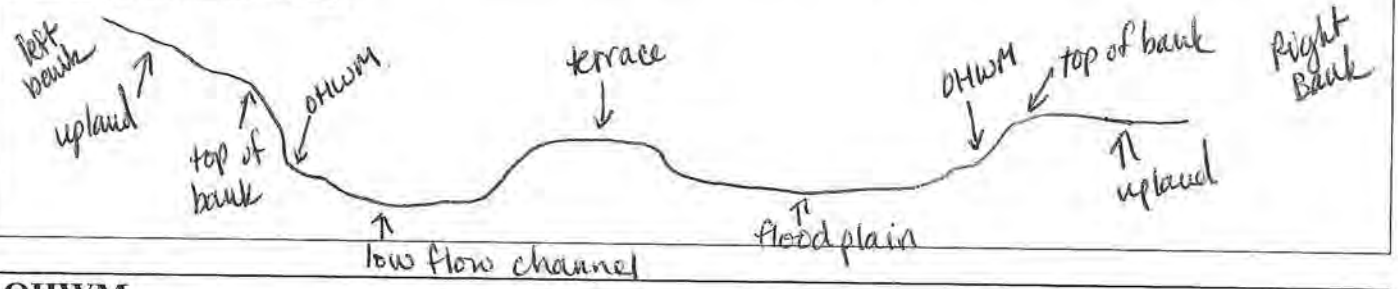
Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	Gravel
0.157	4	Pebble	Gravel
		Granule	Gravel
0.079	2.00		
0.039	1.00	Very coarse sand	Sand
0.020	0.50	Coarse sand	Sand
1/2 0.0098	0.25	Medium sand	Sand
1/4 0.005	0.125	Fine sand	Sand
1/8 0.0025	0.0625	Very fine sand	Sand
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	Silt
1/128 0.00015	0.0039	Very fine silt	Silt
		Clay	Mud



Project ID: 31RW000904 **Cross section ID:** 1 **Date:** 3/24/2020 **Time:** 1000

Cross section drawing:



OHWM

GPS point: 33°47.353', -117°43.565'

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [x] Other: sediment deposits on cobbles
- [x] Other: drift deposits

Comments:

Floodplain unit:

- [x] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: 33°47.353', -117°43.565'

Characteristics of the floodplain unit:

Average sediment texture: cobbles

Total veg cover: 25 % Tree: 0 % Shrub: 5 % Herb: 20 %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [x] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [x] Drift and/or debris
- [x] Presence of bed and bank
- [x] Benches
- [ ] Soil development
- [ ] Surface relief
- [x] Other: sediment deposits
- [ ] Other: _____
- [ ] Other: _____

Comments:

Vegetation consists of mule fat (Baccharis salicifolia ssp. salicifolia) and fennel (Foeniculum vulgare) with annual herbs and grasses.

Project ID: 3IRW000904 **Cross section ID:** 1 **Date:** 3/24/20 **Time:** 1000

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 33° 47'353", -117° 43.565"

Characteristics of the floodplain unit:

Average sediment texture: cobbles & boulders

Total veg cover: 30 % Tree: 0 % Shrub: 10 % Herb: 20 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: sediment covering cobbles
- ☐ Other: _____
- ☐ Other: _____

Comments:

Vegetation composition similar to low flow channel.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 33° 47'353", -117° 43.565"

Characteristics of the floodplain unit:

Average sediment texture: cobbles & boulders

Total veg cover: 30 % Tree: 0 % Shrub: 10 % Herb: 20 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Upland vegetation. i.e. California buckwheat [Eriogonum fasciculatum]) scattered in area.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Santiago Creek Dam Outlet Tower & Spillway Improvement **Date:** 10/20/2020 **Time:** 0815
Project Number: 31RW000904 **Town:** unincorporated OC **State:** CA
Stream: Santiago Creek **Photo begin file#:** **Photo end file#:**
Investigator(s): ARudalevige, JAguayo

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: Near downstream end of Santiago Creek where enters Irvine Lake

Projection: **Datum:** NAD 83

Coordinates: 33.776649, -117.702460

Potential anthropogenic influences on the channel system:
Santiago Dam (impoundment) and controlled releases of flow

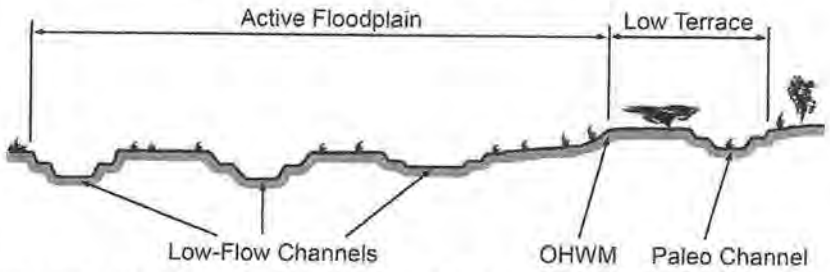
Brief site description:
Floodplain of Santiago Creek upstream of Irvine Lake

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: 2018
- ☒ Topographic maps
- ☐ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☒ Stream gage data
  Gage number: 11075800 (upstream)
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

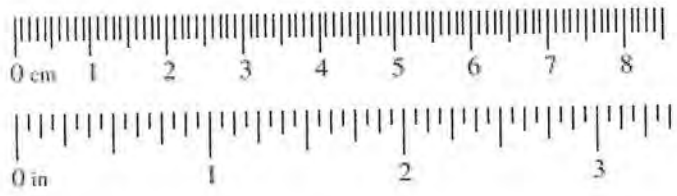


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☒ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

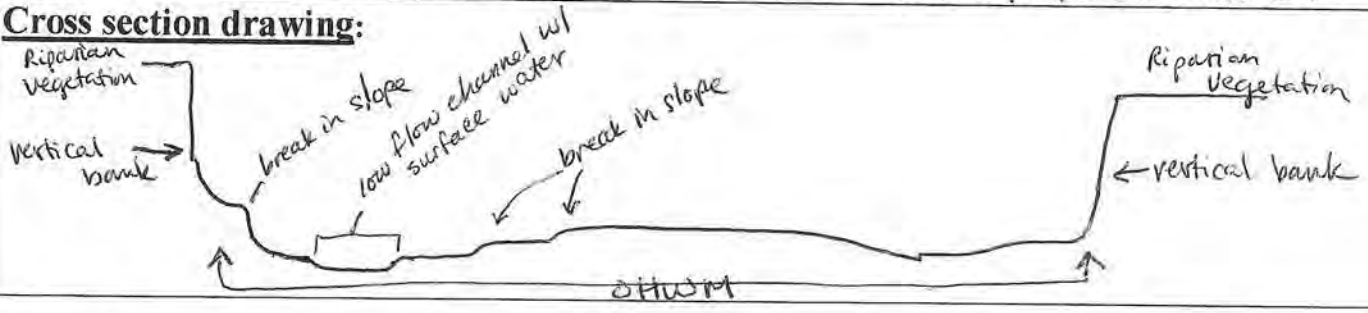
Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	Gravel
0.157	4	Pebble	Gravel
		Granule	Gravel
0.079	2.00		
0.039	1.00	Very coarse sand	Sand
0.020	0.50	Coarse sand	Sand
1/2 0.0098	0.25	Medium sand	Sand
1/4 0.005	0.125	Fine sand	Sand
1/8 0.0025	0.0625	Very fine sand	Sand
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	Silt
1/128 0.00015	0.0039	Very fine silt	Silt
		Clay	Mud



Project ID: 3RW000904 **Cross section ID:** 2 **Date:** 10/20/2020 **Time:** 0815

Cross section drawing:



OHWM

GPS point: 33.776649, -117.702460 C.

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [x] Other: Sediment deposits
- [ ] Other: _____

Comments:

Floodplain unit:

- [x] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Cobble with silt

Total veg cover: 10 % Tree: 0 % Shrub: 0 % Herb: 10 %

Community successional stage:

- [ ] NA
- [x] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [x] Ripples
- [ ] Drift and/or debris
- [x] Presence of bed and bank
- [x] Benches
- [ ] Soil development
- [ ] Surface relief
- [x] Other: Sediment deposits on rock
- [ ] Other: _____
- [ ] Other: _____

Comments:

Project ID: 3IRW000904 **Cross section ID:** 2 **Date:** 10/20/2020 **Time:** 0815

Floodplain unit: ☐ Low-Flow Channel ☑ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: cobbles, pebbles, sand, + silt

Total veg cover: 25 % Tree: 0 % Shrub: 5 % Herb: 20 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☑ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☑ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☑ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☑ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

No low terrace; active floodplain extends to vertical banks.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Santiago Creek Dam Outlet Tower + Spillway Improvement **Date:** 10/14/2020 **Time:** 11:20 AM
Project Number: 3iRW000904 **Town:** unincorporated OC **State:** CA
Stream: unnamed (Drainage 12) **Photo begin file#:** **Photo end file#:**
Investigator(s): ARudalevige, JAguayo

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details: representative section of Drainage 12

Projection: **Datum:** NAD 83
Coordinates: 33.763575, -117.708999

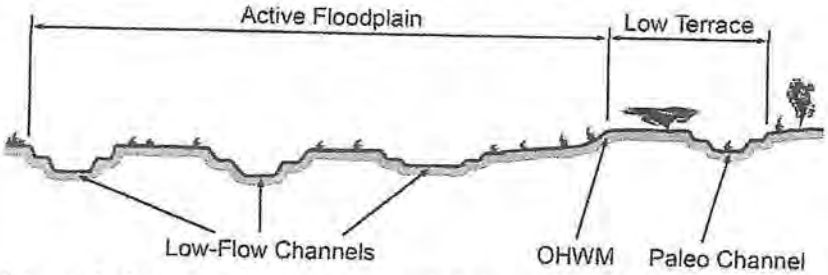
Potential anthropogenic influences on the channel system:
Above grade road crosses drainage downstream of sampling point.

Brief site description:
Braided drainage that discharges into Irvine Lake

Checklist of resources (if available):

- ☑ Aerial photography
  Dates: 2018
- ☑ Topographic maps
- ☐ Geologic maps
- ☑ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

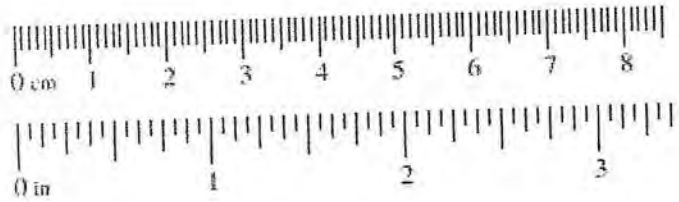


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

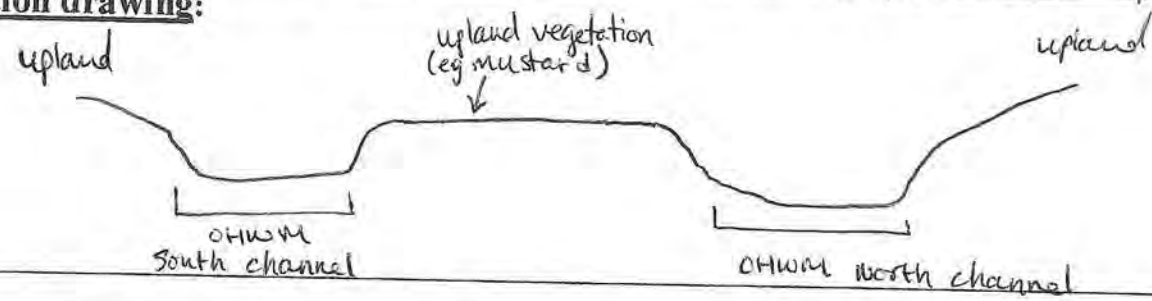
Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	
2.56	64	Cobble	Gravel
0.157	4	Pebble	
0.079	2.00	Granule	
0.039	1.00	Very coarse sand	
0.020	0.50	Coarse sand	
1/2 0.0098	0.25	Medium sand	Sand
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Project ID: 31RW000904 **Cross section ID:** 3 **Date:** 10/14/2020 **Time:** 11:20 AM

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments: Channel is braided with terrace between areas of OHWM.

Floodplain unit:

- [x] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Coarse Sand

Total veg cover: ____ % Tree: 0 % Shrub: 2 % Herb: ____ %

Community successional stage:

- [ ] NA
- [x] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [x] Drift and/or debris
- [x] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Project ID: 31RW000904 **Cross section ID:** 3 **Date:** 10/14/2020 **Time:** 11:20 AM

Floodplain unit: ☐ Low-Flow Channel ☑ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Most portions of the channel lack active floodplain.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 33.763575, -117.708999

Characteristics of the floodplain unit:

Average sediment texture: Sandy loam

Total veg cover: 90 % Tree: 5 % Shrub: 10 % Herb: 80 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☑ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments: herbaceous vegetation dominated by upland species (e.g. mustard) with scattered coast live oaks and other trees/shrubs.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Santiago Creek Dam Outlet Tower & Spillway Improvement
Project Number: 31RW000904
Stream: unnamed (Drainage 7)
Investigator(s): ARudalevige, CMessett
Date: 10/21/2020 **Time:** 12:05 PM
Town: unincorporated OC **State:** CA
Photo begin file#: **Photo end file#:**

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: Drainage 7

Projection: **Datum:** NAD 83
Coordinates: 33.776931, -117.695032

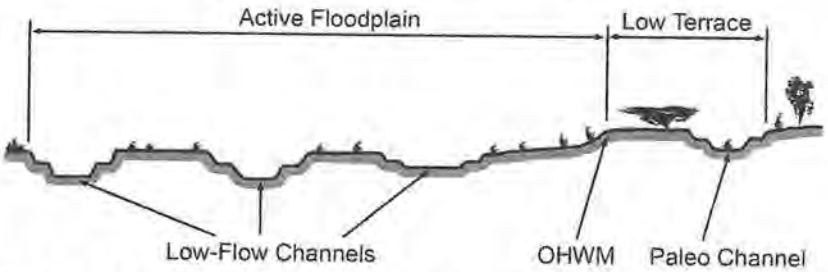
Potential anthropogenic influences on the channel system:
Access road crosses drainage downstream of assessed location; this is true of multiple small drainages in the survey area.

Brief site description:
Representative cross section of smaller drainages in the survey area that discharge into Santiago Creek or Irvine Lake.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: 2018
- ☒ Topographic maps
- ☐ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

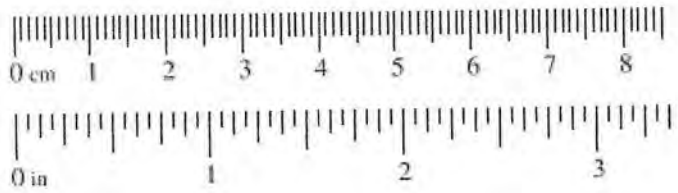


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☒ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

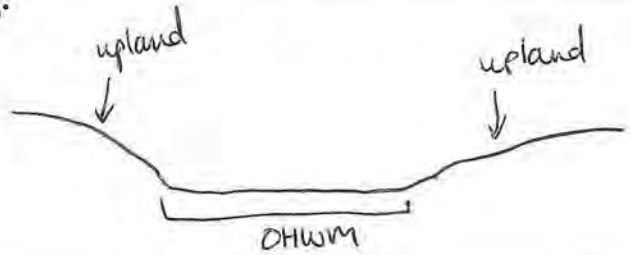
Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	Gravel
0.157	4	Pebble	Gravel
0.079	2.00	Granule	Gravel
0.039	1.00	Very coarse sand	Sand
0.020	0.50	Coarse sand	Sand
1/2 0.0098	0.25	Medium sand	Sand
1/4 0.005	0.125	Fine sand	Sand
1/8 0.0025	0.0625	Very fine sand	Sand
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	Silt
1/128 0.00015	0.0039	Very fine silt	Silt
		Clay	Mud



Project ID: 3IRW0000904 **Cross section ID:** 4 **Date:** 10/21/2020 **Time:** 12:05 PM

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:

Floodplain unit: [x] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sand (some boulders & cobbles)

Total veg cover: 5 % Tree: 0 % Shrub: 0 % Herb: 5 %

Community successional stage:

- [ ] NA
- [x] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [x] Drift and/or debris
- [x] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [x] Other: sediment deposits on rock
- [ ] Other: _____
- [ ] Other: _____

Comments:

Upland surrounding low flow channel has clayey / loamy clay soil with total vegetation cover ~80% consisting of herbs & shrubs.

Project ID: 3IRW000904 **Cross section ID:** 4 **Date:** 10/21/2020 **Time:** 12:05PM

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments: No active floodplain present

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments: No low terrace present.

ATTACHMENT F

LITERATURE REVIEW DETAILS – SOILS

This attachment provides detailed results of the literature review regarding soils mapped in the survey area.

SOIL SERIES

The below text is the detailed soil information obtained from the Map Unit Description found in the legend of the USDA NRCS website.[24]

104—Alo variant clay, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* hclc
- *Elevation:* 200 to 1,590 feet
- *Mean annual precipitation:* 14 to 15 inches
- *Mean annual air temperature:* 64 to 66 degrees Fahrenheit (F)
- *Frost-free period:* 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Alo variant and similar soils:* 70 percent
- *Alo variant, calcareous, and similar soils:* 20 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Alo Variant

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sedimentary rock

Typical profile

- *H1 - 0 to 25 inches:* clay
- *H2 - 25 to 38 inches:* clay
- *H3 - 38 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock
- *Drainage class:* Well drained

[24] U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2019. Web Soil Survey. Records for the Survey Area, as Area of Interest. Further information about Soil Map Units. Lincoln, NE: USDA NRCS https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Moderate (about 6.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Description of Alo Variant, Calcareous

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

Properties and qualities

- *Depth to restrictive feature:* More than 80 inches
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None

Minor Components

Bosanko, clay

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Myford, sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Anaheim, clay loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

105—Alo variant clay, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hcld
- *Elevation:* 210 to 1,740 feet
- *Mean annual precipitation:* 14 to 15 inches
- *Mean annual air temperature:* 64 to 66 degrees F
- *Frost-free period:* 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Alo variant and similar soils:* 70 percent
- *Alo variant, calcareous, and similar soils:* 20 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Alo Variant

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sedimentary rock

Typical profile

- *H1 - 0 to 25 inches:* clay
- *H2 - 25 to 38 inches:* clay
- *H3 - 38 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Moderate (about 6.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e

- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Description of Alo Variant, Calcareous

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

Properties and qualities

- *Depth to restrictive feature:* More than 80 inches
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None

Minor Components

Bosanko, clay

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

106—Anaheim loam, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* hclf
- *Elevation:* 100 to 1,930 feet
- *Mean annual precipitation:* 12 to 20 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *A1 - 0 to 9 inches:* loam
- *A2 - 9 to 17 inches:* loam
- *A3 - 17 to 26 inches:* loam
- *Cr - 26 to 54 inches:* bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 20 to 39 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Anaheim, clay loam

- *Percent of map unit:* 7 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Nacimiento, clay loam

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 3 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

107—Anaheim loam, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hclg
- *Elevation:* 40 to 2,060 feet
- *Mean annual precipitation:* 11 to 19 inches
- *Mean annual air temperature:* 62 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *A1 - 0 to 9 inches:* loam
- *A2 - 9 to 17 inches:* loam
- *A3 - 17 to 26 inches:* loam
- *Cr - 26 to 54 inches:* bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 39 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Anaheim, clay loam

- *Percent of map unit:* 7 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 4 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Nacimiento, clay loam

- *Percent of map unit:* 4 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

109—Anaheim clay loam, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hclj
- *Elevation:* 20 to 2,710 feet
- *Mean annual precipitation:* 11 to 19 inches
- *Mean annual air temperature:* 62 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *A1 - 0 to 9 inches:* clay loam
- *A2 - 9 to 17 inches:* clay loam
- *A3 - 17 to 26 inches:* clay loam
- *Cr - 26 to 59 inches:* bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 39 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)

- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.4 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Nacimiento, clay loam

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Alo

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Calleguas

- *Percent of map unit:* 3 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD071CA - SHALLOW CLAYEY (1975)
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 2 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit, shoulder
- *Landform position (three-dimensional):* Crest

- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

110—Anaheim clay loam, 50 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hclk
- *Elevation:* 100 to 2,500 feet
- *Mean annual precipitation:* 12 to 20 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 300 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 90 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *H1 - 0 to 21 inches:* clay loam
- *H2 - 21 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 50 to 75 percent
- *Depth to restrictive feature:* 20 to 36 inches to paralithic bedrock
- *Natural drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Low (about 3.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* C
- *Ecological site:* CLAYEY (1975) (R019XD001CA)
- *Hydric soil rating:* No

Minor Components

Cieneba, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

114—Balcom-Rock outcrop complex, 15 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hclp
- *Elevation:* 130 to 4,000 feet
- *Mean annual precipitation:* 8 to 15 inches
- *Mean annual air temperature:* 45 to 63 degrees F
- *Frost-free period:* 110 to 320 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Balcom and similar soils:* 75 percent
- *Minor components:* 25 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Balcom

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Calcareous residuum weathered from sandstone and shale

Typical profile

- *H1 - 0 to 27 inches:* clay loam
- *H2 - 27 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 15 to 50 percent
- *Depth to restrictive feature:* 24 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Low (about 4.3 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Rock outcrop

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

115—Beaches

Map Unit Setting

- *National map unit symbol:* hclq
- *Elevation:* 0 to 10 feet
- *Mean annual precipitation:* 42 to 48 inches
- *Mean annual air temperature:* 52 to 57 degrees F
- *Frost-free period:* 190 to 210 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Beaches:* 100 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Beaches

Setting

- *Landform:* Beaches

Typical profile

- *H1 - 0 to 6 inches:* sand
- *H2 - 6 to 60 inches:* coarse sand, sand, fine sand
- *H2 - 6 to 60 inches:*
- *H2 - 6 to 60 inches:*

Properties and qualities

- *Slope:* 0 to 5 percent
- *Drainage class:* Poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
- *Depth to water table:* About 0 to 72 inches
- *Frequency of flooding:* Frequent
- *Maximum salinity:* Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
- *Available water capacity:* Moderate (about 6.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8w
- *Hydric soil rating:* Yes

126—Bosanko clay, 9 to 15 percent slopes

Map Unit Setting

- *National map unit symbol:* 2xm61
- *Elevation:* 100 to 2,040 feet
- *Mean annual precipitation:* 9 to 16 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 321 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Bosanko and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Bosanko

Setting

- *Landform:* Hills, hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope

- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *Ap - 0 to 5 inches:* clay
- *Bss - 5 to 25 inches:* clay
- *Bk - 25 to 37 inches:* clay
- *Cr - 37 to 79 inches:* bedrock

Properties and qualities

- *Slope:* 9 to 15 percent
- *Depth to restrictive feature:* 26 to 38 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Available water capacity:* Low (about 5.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* 3e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Balcom

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Alo

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

- *Hydric soil rating:* No

Fallbrook

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Bonsall

- *Percent of map unit:* 3 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Vista

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

127—Bosanko clay, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* 2xm5y
- *Elevation:* 120 to 1,080 feet
- *Mean annual precipitation:* 12 to 15 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 353 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Bosanko and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Bosanko

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Acid residuum weathered from igneous rock

Typical profile

- *Ap - 0 to 5 inches:* clay
- *Bss - 5 to 25 inches:* clay
- *Bk - 25 to 35 inches:* clay
- *Cr - 35 to 79 inches:* bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 26 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Low (about 5.5 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Balcom

- *Percent of map unit:* 6 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Alo

- *Percent of map unit:* 6 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Vista

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Bonsall

- *Percent of map unit:* 1 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Fallbrook

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

131—Botella loam, 2 to 9 percent slopes, warm MAAT, lower MAP, MLRA 19

Map Unit Setting

- *National map unit symbol:* 2tyzb
- *Elevation:* 20 to 2,180 feet
- *Mean annual precipitation:* 14 to 17 inches
- *Mean annual air temperature:* 64 to 65 degrees F
- *Frost-free period:* 271 to 365 days
- *Farmland classification:* Farmland of statewide importance

Map Unit Composition

- *Botella and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Botella

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Alluvium derived from sedimentary rock

Typical profile

- *H1 - 0 to 8 inches:* loam
- *H2 - 8 to 35 inches:* silty clay loam
- *H3 - 35 to 66 inches:* clay loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* High (about 9.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* 2e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Capistrano

- *Percent of map unit:* 5 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex

- *Hydric soil rating:* No

Sorrento

- *Percent of map unit:* 5 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Botella, clay loam

- *Percent of map unit:* 5 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

132—Botella clay loam, 2 to 9 percent slopes, warm MAAT, MLRA 19

Map Unit Setting

- *National map unit symbol:* 2tyz8
- *Elevation:* 80 to 1,450 feet
- *Mean annual precipitation:* 14 to 16 inches
- *Mean annual air temperature:* 64 to 65 degrees F
- *Frost-free period:* 330 to 360 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Botella and similar soils:* 90 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Botella

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Alluvium derived from sedimentary rock

Typical profile

- *A - 0 to 8 inches:* clay loam

- *2Bt - 8 to 35 inches:* silty clay loam
- *2C - 35 to 66 inches:* clay loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* High (about 10.0 inches)

Interpretive groups

- *Land capability classification (irrigated):* 2e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Sorrento

- *Percent of map unit:* 6 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Footslope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Mocho

- *Percent of map unit:* 4 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Footslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

134—Calleguas clay loam, 50 to 75 percent slopes, eroded

Map Unit Setting

- *National map unit symbol:* 2xm62
- *Elevation:* 220 to 2,110 feet
- *Mean annual precipitation:* 13 to 18 inches
- *Mean annual air temperature:* 64 to 65 degrees F
- *Frost-free period:* 353 to 365 days

- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Calleguas and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Calleguas

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from calcareous shale

Typical profile

- *A1 - 0 to 7 inches:* clay loam
- *A2 - 7 to 11 inches:* clay loam
- *A3 - 11 to 15 inches:* very channery clay loam
- *Cr - 15 to 59 inches:* bedrock

Properties and qualities

- *Slope:* 50 to 75 percent
- *Depth to restrictive feature:* 10 to 20 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 2.2 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD071CA - SHALLOW CLAYEY (1975)
- *Hydric soil rating:* No

Minor Components

Cieneba

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Anaheim

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Balcom

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

135—Capistrano sandy loam, 2 to 9 percent slopes

Map Unit Setting

- *National map unit symbol:* hcmc
- *Elevation:* 0 to 2,500 feet
- *Mean annual precipitation:* 14 to 25 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 240 to 365 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Capistrano and similar soils:* 80 percent
- *Minor components:* 20 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Capistrano

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Concave
- *Across-slope shape:* Convex
- *Parent material:* Alluvium derived from granite

Typical profile

- *H1 - 0 to 27 inches:* sandy loam
- *H2 - 27 to 65 inches:* fine sandy loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Runoff class:* Low
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Moderate (about 6.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* 2e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* A
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Corralitos, loamy sand

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Capistrano, gravelly

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Hanford

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Myford, sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Ramona, fine sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

136—Capistrano sandy loam, 9 to 15 percent slopes

Map Unit Setting

- *National map unit symbol:* hcmd
- *Elevation:* 0 to 2,500 feet
- *Mean annual precipitation:* 14 to 25 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 240 to 365 days
- *Farmland classification:* Farmland of statewide importance

Map Unit Composition

- *Capistrano and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Capistrano

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Alluvium derived from igneous and sedimentary rock

Typical profile

- *H1 - 0 to 27 inches:* sandy loam
- *H2 - 27 to 65 inches:* fine sandy loam

Properties and qualities

- *Slope:* 9 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Moderate (about 6.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* 3e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* A
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

San andreas, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Unnamed

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Myford, sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Unnamed

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

141—Cieneba sandy loam, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* hcmk
- *Elevation:* 500 to 4,000 feet
- *Mean annual precipitation:* 12 to 35 inches
- *Mean annual air temperature:* 57 to 64 degrees F
- *Frost-free period:* 200 to 300 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Cieneba and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Cieneba

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope

- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 17 inches:* sandy loam
- *H2 - 17 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 4 to 20 inches to paralithic bedrock
- *Drainage class:* Somewhat excessively drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 2.5 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Minor Components

San andreas, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soper, gravelly loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

142—Cieneba sandy loam, 30 to 75 percent slopes, eroded

Map Unit Setting

- *National map unit symbol:* hcml
- *Elevation:* 500 to 4,000 feet
- *Mean annual precipitation:* 12 to 35 inches

- *Mean annual air temperature:* 57 to 64 degrees F
- *Frost-free period:* 200 to 300 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Cieneba and similar soils:* 65 percent
- *Minor components:* 35 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Cieneba

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Concave, convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 7 inches:* sandy loam
- *H2 - 7 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 4 to 20 inches to paralithic bedrock
- *Drainage class:* Somewhat excessively drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 1.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Minor Components

Cieneba, uneroded

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Vista, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soper, cobbly loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

San andreas, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Rock outcrop

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Tollhouse

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Blasingame, loam

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

145—Cieneba–rock outcrop complex, 30 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hcmp
- *Elevation:* 500 to 4,000 feet
- *Mean annual precipitation:* 8 to 35 inches
- *Mean annual air temperature:* 45 to 64 degrees F
- *Frost-free period:* 110 to 300 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Cieneba and similar soils:* 60 percent
- *Rock outcrop:* 30 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Cieneba

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Concave, convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 7 inches:* sandy loam
- *H2 - 7 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 7 to 20 inches to paralithic bedrock
- *Natural drainage class:* Somewhat excessively drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 1.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* SHALLOW LOAMY - ROCK OUTCROP COMPLEX (R019XD073CA)
- *Hydric soil rating:* No

Description of Rock Outcrop

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 4 inches:* unweathered bedrock

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8s
- *Hydric soil rating:* No

Minor Components

Anaheim, loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

San Andreas, sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Tollhouse, soils

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Vista, coarse sandy loam

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

146—Corralitos loamy sand

Map Unit Setting

- *National map unit symbol:* hcmq
- *Elevation:* 30 to 1,000 feet
- *Mean annual precipitation:* 12 to 30 inches
- *Mean annual air temperature:* 57 to 61 degrees F
- *Frost-free period:* 230 to 300 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Corralitos and similar soils:* 65 percent
- *Minor components:* 35 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Corralitos

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat

- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from mixed

Typical profile

- *H1 - 0 to 9 inches:* loamy sand
- *H2 - 9 to 60 inches:* stratified sand to loamy sand

Properties and qualities

- *Slope:* 0 to 5 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Somewhat excessively drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* 3s
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* A
- *Ecological site:* R019XD035CA
- *Hydric soil rating:* No

Minor Components

Unnamed

- *Percent of map unit:* 20 percent
- *Hydric soil rating:* No

Riverwash

- *Percent of map unit:* 5 percent
- *Landform:* Fans
- *Hydric soil rating:* Yes

Metz, loamy sand

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soboba, gravelly loamy sand

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Capistrano, sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

173—Myford sandy loam, 2 to 9 percent slopes

Map Unit Setting

- *National map unit symbol:* hcnl
- *Elevation:* 0 to 1,560 feet
- *Mean annual precipitation:* 11 to 18 inches
- *Mean annual air temperature:* 62 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Myford and similar soils:* 75 percent
- *Minor components:* 25 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Myford

Setting

- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from sandstone

Typical profile

- *A1 - 0 to 1 inches:* sandy loam
- *A2 - 1 to 4 inches:* sandy loam
- *A3 - 4 to 12 inches:* sandy loam
- *Bt1 - 12 to 18 inches:* sandy clay
- *Bt2 - 18 to 28 inches:* sandy clay loam
- *Btk1 - 28 to 35 inches:* sandy clay loam
- *Btk2 - 35 to 41 inches:* sandy clay loam
- *B't1 - 41 to 49 inches:* sandy clay loam
- *B't2 - 49 to 61 inches:* sandy clay loam
- *Bt3 - 61 to 71 inches:* sandy clay loam
- *C - 71 to 79 inches:* sandy loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* 8 to 20 inches to abrupt textural change
- *Drainage class:* Moderately well drained
- *Runoff class:* High

- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 1.5 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Minor Components

Myford, thick surface

- *Percent of map unit:* 10 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Yorba, gravelly sandy loam

- *Percent of map unit:* 5 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Capistrano

- *Percent of map unit:* 5 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Chesterton, loamy sand

- *Percent of map unit:* 3 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Water

- *Percent of map unit:* 2 percent
- *Landform:* Depressions

175—Myford sandy loam, 9 to 15 percent slopes

Map Unit Setting

- *National map unit symbol:* hcnn
- *Elevation:* 1,500 feet
- *Mean annual precipitation:* 12 to 20 inches
- *Mean annual air temperature:* 63 degrees F
- *Frost-free period:* 270 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Myford and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Myford

Setting

- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Concave
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from mixed

Typical profile

- *H1 - 0 to 12 inches:* sandy loam
- *H2 - 12 to 18 inches:* sandy clay
- *H3 - 18 to 28 inches:* sandy clay loam
- *H4 - 28 to 71 inches:* sandy clay loam
- *H5 - 71 to 79 inches:* sandy loam

Properties and qualities

- *Slope:* 9 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Moderately well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 1.4 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Minor Components

Myford, sandy loam, eroded

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Capistrano, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Yorba, gravelly sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

San andreas, sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

177—Myford sandy loam, 9 to 30 percent slopes, eroded

Map Unit Setting

- *National map unit symbol:* hcnq
- *Elevation:* 0 to 2,100 feet
- *Mean annual precipitation:* 11 to 18 inches
- *Mean annual air temperature:* 62 to 65 degrees F

- *Frost-free period:* 290 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Myford and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Myford

Setting

- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from sandstone

Typical profile

- *A - 0 to 7 inches:* sandy loam
- *Bt - 7 to 11 inches:* sandy clay
- *Btk - 11 to 21 inches:* sandy clay loam
- *B't - 21 to 64 inches:* sandy clay loam
- *C - 64 to 79 inches:* sandy loam

Properties and qualities

- *Slope:* 9 to 30 percent
- *Depth to restrictive feature:* 4 to 10 inches to abrupt textural change
- *Drainage class:* Moderately well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 0.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Minor Components

Myford, sandy loam

- *Percent of map unit:* 10 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 3 percent
- *Landform:* Ridges
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Yorba, cobbly sandy loam

- *Percent of map unit:* 2 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

185—Pits

Map Unit Composition

- *Pits:* 95 percent
- *Minor components:* 5 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Pits

Setting

- *Down-slope shape:* Concave
- *Across-slope shape:* Concave
- *Parent material:* Igneous, metamorphic, and sedimentary rock

Typical profile

- *H1 - 0 to 6 inches:* extremely gravelly coarse sand
- *H2 - 6 to 60 inches:* extremely gravelly sand, extremely gravelly coarse sand, very gravelly coarse sand
- *H2 - 6 to 60 inches*
- *H2 - 6 to 60 inches*

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8s
- *Hydric soil rating:* No

Minor Components

Unnamed

- *Percent of map unit:* 5 percent
- *Landform:* Depressions
- *Hydric soil rating:* Yes

Riverwash

Map Unit Composition

- *Riverwash:* 100 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Riverwash

Setting

- *Landform:* Fans
- *Parent material:* Sandy and gravelly alluvium

Typical profile

- *C1 - 0 to 6 inches:* gravelly sand
- *C2 - 6 to 60 inches:* stratified gravelly coarse sand to sandy loam

Properties and qualities

- *Slope:* 0 to 5 percent
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
- *Depth to water table:* About 0 to 24 inches
- *Frequency of flooding:* Frequent
- *Available water storage in profile:* Very low (about 2.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8w
- *Hydric soil rating:* Yes

192—Rock outcrop–Cieneba complex, 30 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hcp6
- *Elevation:* 500 to 4,000 feet
- *Mean annual precipitation:* 8 to 35 inches
- *Mean annual air temperature:* 45 to 64 degrees F
- *Frost-free period:* 110 to 300 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Rock outcrop:* 50 percent
- *Cieneba and similar soils:* 40 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Rock Outcrop

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Concave
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8s

- *Hydric soil rating:* No

Description of Cieneba

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 7 inches:* sandy loam
- *H2 - 7 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 4 to 20 inches to paralithic bedrock
- *Natural drainage class:* Somewhat excessively drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 1.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* SHALLOW LOAMY - ROCK OUTCROP COMPLEX (R019XD073CA)
- *Hydric soil rating:* No

Minor Components

Vista

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Soper, cobbly loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 3 percent

- *Hydric soil rating:* No

Tollhouse

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

197—Soboba gravelly loamy sand, 0 to 5 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpc
- *Elevation:* 30 to 4,200 feet
- *Mean annual precipitation:* 10 to 20 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 175 to 250 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soboba and similar soils:* 75 percent
- *Minor components:* 25 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soboba

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Sandy and gravelly alluvium derived from mixed

Typical profile

- *H1 - 0 to 10 inches:* gravelly loamy sand
- *H2 - 10 to 60 inches:* very gravelly sand

Properties and qualities

- *Slope:* 0 to 5 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Excessively drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* Very high (19.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 1.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* A
- *Ecological site:* SANDY (1975) (R019XD035CA)
- *Hydric soil rating:* No

Minor Components

Unnamed

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Soboba, gravelly loamy sand

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Corralitos, loamy sand

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Riverwash

- *Percent of map unit:* 5 percent
- *Landform:* Fans
- *Hydric soil rating:* Yes

200—Soper loam, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpg
- *Elevation:* 100 to 2,500 feet
- *Mean annual precipitation:* 12 to 25 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 250 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 65 percent
- *Minor components:* 35 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills

- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 9 inches:* loam
- *H2 - 9 to 30 inches:* gravelly clay loam
- *H3 - 30 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.2 inches)

Interpretive groups

- *Land capability classification (irrigated):* 6e
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Soper, low sloping or steeper loams

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Severely eroded areas

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Alo, clay

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

202—Soper gravelly loam, 30 to 50 percent slopes, MLRA 20

Map Unit Setting

- *National map unit symbol:* 2wv8f
- *Elevation:* 10 to 2,010 feet
- *Mean annual precipitation:* 13 to 18 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 271 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *A - 0 to 8 inches:* gravelly loam
- *Bt - 8 to 29 inches:* gravelly clay loam
- *Cr - 29 to 79 inches:* bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 22 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 3.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Cieneba

- *Percent of map unit:* 5 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Gabino

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Yorba

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Gaviota

- *Percent of map unit:* 2 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Fontana

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Rock outcrop

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

203—Soper cobbly loam, 15 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpk
- *Elevation:* 100 to 2,500 feet
- *Mean annual precipitation:* 12 to 25 inches
- *Mean annual air temperature:* 64 to 66 degrees F
- *Frost-free period:* 250 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 9 inches:* cobbly loam
- *H2 - 9 to 30 inches:* cobbly clay loam, cobbly sandy clay loam, cobbly loam
- *H2 - 9 to 30 inches:* weathered bedrock

- *H2 - 9 to 30 inches:*
- *H3 - 30 to 59 inches:*

Properties and qualities

- *Slope:* 15 to 50 percent
- *Depth to restrictive feature:* 20 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* High (about 9.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* 6e
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Yorba, cobbly sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soper, gravelly loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Gabino, gravelly clay loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

Cieneba, rock outcrop complex

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

204—Soper–rock outcrop complex, 30 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpl
- *Elevation:* 100 to 4,000 feet
- *Mean annual precipitation:* 8 to 25 inches
- *Mean annual air temperature:* 45 to 52 degrees F
- *Frost-free period:* 110 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 60 percent
- *Soper, cobbly loam, and similar soils:* 20 percent
- *Rock outcrop:* 15 percent
- *Minor components:* 5 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 4 inches:* gravelly loam
- *H2 - 4 to 20 inches:* gravelly clay loam, gravelly sandy clay loam, gravelly loam
- *H2 - 4 to 20 inches:* weathered bedrock
- *H2 - 4 to 20 inches*
- *H3 - 20 to 59 inches*

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 20 to 24 inches to paralithic bedrock
- *Natural drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Moderate (about 6.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* C
- *Ecological site:* SHALLOW LOAMY - ROCK OUTCROP COMPLEX (R019XD073CA)
- *Hydric soil rating:* No

Description of Soper, Cobbly Loam

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 4 inches:* gravelly loam

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 1.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 0.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* B
- *Hydric soil rating:* No

Description of Rock Outcrop

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 60 inches:* unweathered bedrock

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 0 inches to lithic bedrock

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8s
- *Hydric soil rating:* No

Minor Components

Cieneba, sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

207—Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19

Map Unit Setting

- *National map unit symbol:* 2tz0c
- *Elevation:* 0 to 1,340 feet
- *Mean annual precipitation:* 12 to 18 inches
- *Mean annual air temperature:* 62 to 66 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Sorrento and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Sorrento

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope

- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from sedimentary rock

Typical profile

- *A - 0 to 12 inches:* loam
- *AB - 12 to 37 inches:* silty clay loam
- *Bk - 37 to 62 inches:* silty clay loam
- *2C - 62 to 72 inches:* sandy loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 5 percent
- *Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water storage in profile:* High (about 11.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* C
- *Ecological site:* LOAMY (1975) (R019XD029CA)
- *Hydric soil rating:* No

Minor Components

Mocho

- *Percent of map unit:* 7 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Botella

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear

- *Ecological site:* LOAMY (1975) (R019XD029CA)
- *Hydric soil rating:* No

Pico

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Garretson

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Anacapa

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Botella

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site: R019XD029CA*
- *Hydric soil rating:* No

ATTACHMENT G

LITERATURE REVIEW DETAILS – BASIN PLAN BENEFICIAL USES

BASIN PLAN BENEFICIAL USES

Beneficial uses are defined in the Porter-Cologne Act as those uses of water that are necessary for tangible and intangible economic, social, and environmental benefits. The *Water Quality Control Plan: Santa Ana River Basin (8)* (Basin Plan) identifies a number of beneficial uses for Reach 1 of Santiago Creek and Irvine Lake: Municipal and Domestic Water Supply (MUN) waters, Agricultural Supply (AGR) waters, Groundwater Recharge (GRW) waters, Water Contact Recreation (REC-1) waters, Non-contact Water Recreation (REC-2) waters, Warm Fresh Water Habitat (WARM) waters, Cold Freshwater Habitat (COLD) waters, and Wildlife Habitat (WILD) waters (Santa Ana RWQCB 1995).

- MUN waters support community, military, or individual water supply systems including, but not limited to, drinking water supply.
- AGR waters are used for farming, horticulture, or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.
- GRW waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality, or halting saltwater intrusion into freshwater aquifers.
- REC-1 waters are used for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
- REC-2 waters are used for recreational activities involving proximity to water but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- WARM waters support warm water ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife (including invertebrates).
- COLD waters support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife (including invertebrates).
- WILD waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife

ATTACHMENT H

PROJECT IMPACTS BY LANDOWNERSHIP

TABLE H-1
PROJECT IMPACTS ON USACE JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area** (acres)					
	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	**101.706**	**314.770**	**428.476**	**0.000**	**0.000**	**1.157**	**0.641**	**1.157**	**0.641**	**63.915**	**0.000**	**137.686**	**0.171**	**201.601**	**0.171**	**63.915**	**0.000**	**138.843**	**0.812**	**202.758**	**0.812**	**0.000**	**0.673**	**0.000**	**0.000**	**0.000**	**0.673**

** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE H-2
PROJECT IMPACTS ON RWQCB JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area** (acres)					
Feature	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	0.025	0.025	—	—	0.025	—	0.025	—	—	—	—	—	—	—	—	—	0.025	—	0.025	—	—	—	—	—	—	—
Drainage 3	—	0.071	0.071	—	—	0.007	0.031	0.007	0.031	—	—	—	0.008	—	0.008	—	—	0.007	0.039	0.007	0.039	—	—	—	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	0.002	0.004	0.002
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.010	—	0.010
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.014	—	0.014
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Total	**101.706**	**333.499**	**435.205**	**0.000**	**0.00**	**1.189**	**0.672**	**1.189**	**0.672**	**63.915**	**0.00**	**137.686**	**0.179**	**201.601**	**0.179**	**63.915**	**0.00**	**138.875**	**0.851**	**202.790**	**0.851**	**0.00**	**0.673**	**0.012**	**0.026**	**0.012**	**0.699**

** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE H-3
PROJECT IMPACTS ON CDFW JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area** (acres)	
		IRWD	County	IRWD	County	IRWD	County	IRWD	County
Irvine Lake	614.135	1.843	—	229.517	—	231.360	—	0.097	0.678
Santiago Creek	36.024	0.859	1.065	—	0.305	0.859	1.370	—	5.433
Drainage 1	0.027	—	—	—	0.005	—	0.005	—	—
Drainage 2	0.074	0.074	—	—	—	0.074	—	—	—
Drainage 3	0.168	0.004	0.079	—	0.023	0.004	0.102	—	—
Drainage 4	0.094	—	—	—	—	—	—	0.014	—
Drainage 5	0.359	—	—	—	—	—	—	0.007	0.004
Drainage 6	0.149	—	—	—	—	—	—	—	0.008
Drainage 7	0.148	—	—	—	—	—	—	—	0.003
Drainage 8	0.042	—	—	—	—	—	—	—	—
Drainage 9	1.237	—	—	—	—	—	—	0.088	—
Drainage 10	0.245	—	—	—	—	—	—	—	—
Drainage 11	0.318	—	—	—	—	—	—	—	—
Drainage 12	13.517	—	—	—	—	—	—	2.370	—
Drainage 13	0.114	—	—	—	—	—	—	—	—
Drainage 14	0.416	—	—	—	—	—	—	—	—
Drainage 15	2.563	—	—	—	—	—	—	0.278	—
Total	**669.630**	**2.780**	**1.144**	**229.517**	**0.333**	**232.297**	**1.477**	**2.854**	**6.126**

** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE H-4
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES
IN THE SURVEY AREA BY LANDOWNER

Jurisdiction	Amount of Jurisdictional Water Resource (acres)								
	Existing	Permanent (IRWD)	Permanent (County)	Temporary (IRWD)	Temporary (County)	Total Impact (IRWD)	Total Impact (County)	Additional Inundation Area** (IRWD)	Additional Inundation Area** (County)
USACE WOTUS	428.476	1.157	0.641	201.601	0.171	202.758	0.812	0.000	0.673
RWCQB Waters of the State	435.205	1.189	0.672	201.601	0.179	202.790	0.851	0.012	0.699
CDFW Jurisdictional Resources	669.630	2.780	1.144	229.517	0.333	232.297	1.477	2.854	6.126

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; "–": not present

** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

APPENDIX N

PROJECT IMPACTS BY LANDOWNER

TABLE N-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		SCE Alignment Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area[a] (acres)	
			IRWD	County	IRWD	County	IRWD	County	IRWD	County	IRWD	County
Coastal Sage Scrub												
Sagebrush Scrub	2.3.6	115.81	1.41	0.98	0.69	2.74	—	0.07	2.10	3.79	1.48	0.76
Disturbed Sagebrush Scrub	2.3.6	20.11	0.48	0.88	0.17	0.66	—	—	0.65	1.54	0.42	0.16
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	—	—	—	0.03	—	—	—	0.03	0.04	0.02
Southern Cactus Scrub	2.4	17.48	—	—	—	—	—	—	—	—	0.19	—
Disturbed Southern Cactus Scrub	2.4	10.63	—	—	—	—	—	—	—	—	0.29	—
Disturbed Floodplain Sage Scrub	2.6	0.48	0.12	0.08	—	0.10	—	—	0.12	0.18	—	—
Subtotal Coastal Sage Scrub		*175.10*	*2.01*	*1.94*	*0.86*	*3.53*	—	*0.07*	*2.87*	*5.54*	*2.44*	*0.94*
Chaparral												
Toyon – Sumac Chaparral	3.12	30.35	1.99	0.53	0.14	2.04	—	—	2.13	2.57	0.15	0.03
Subtotal Chaparral		*30.35*	*1.99*	*0.53*	*0.14*	*2.04*	—	—	*2.13*	*2.57*	*0.15*	*0.03*
Grassland												
Annual Grassland	4.1	15.59	5.54	0.13	0.03	3.06	—	0.01	5.57	3.20	0.16	—
Ruderal	4.6	92.38	0.25	—	25.72	—	—	—	25.97	—	2.56	0.51
Subtotal Grassland		*107.97*	*5.79*	*0.13*	*25.75*	*3.06*	—	*0.01*	*31.54*	*3.20*	*2.72*	*0.51*
Riparian												
Riparian Herb	7.1	13.15	—	—	1.09	—	—	—	1.09	—	—	—
Southern Willow Scrub	7.2	0.43	0.43	—	—	—	—	—	0.43	—	—	—
Mulefat Scrub	7.3	1.50	0.24	0.78	0.15	0.18	—	—	0.39	0.96	—	—
Disturbed Mulefat Scrub	7.3	26.67	—	—	4.40	—	—	—	4.40	—	0.25	0.35
Southern Sycamore Riparian Woodland	7.4	20.48	—	—	—	—	—	—	—	—	—	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	—	—	—	—	—	—	—	—	—	—

TABLE N-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		SCE Alignment Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area[a] (acres)	
			IRWD	County	IRWD	County	IRWD	County	IRWD	County	IRWD	County
Southern Black Willow Forest	7.7	83.61	—	—	6.57	—	—	—	6.57	—	2.79	5.03
Disturbed Southern Black Willow Forest	7.7	35.34	—	—	0.73	—	—	—	0.73	—	0.28	—
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	—	—	22.16	—	—	—	22.16	—	—	—
Subtotal Riparian		*212.65*	*0.67*	*0.78*	*35.10*	*0.18*	—	—	*35.77*	*0.96*	*3.32*	*6.34*
Woodland												
Coast Live Oak Woodland	8.1	31.09	0.19	0.29	0.01	2.77	—	0.05	0.20	3.11	0.41	0.09
Western Sycamore	8.x	0.36	0.05	—	—	0.21	—	—	0.05	0.21	—	—
Subtotal Woodland		*31.45*	*0.24*	*0.29*	*0.01*	*2.98*	—	*0.05*	*0.25*	*3.32*	*0.41*	*0.09*
Cliff and Rock												
Cliff	10.0	1.63	0.26	0.04	0.09	0.12	—	0.01	0.35	0.17	0.01	—
Subtotal Cliff and Rock		*1.63*	*0.26*	*0.04*	*0.09*	*0.12*	—	*0.01*	*0.35*	*0.17*	*0.01*	—
Lakes, Reservoirs, and Basins												
Open Water	12.1	312.11	0.33	—	139.08	—	—	—	139.41	—	—	—
Fluctuating Shoreline	12.2	26.31	—	—	13.04	—	—	—	13.04	—	—	—
Vegetated Fluctuating Shoreline	12.2	45.13	—	—	31.08	—	—	—	31.08	—	—	—
Subtotal Lakes, Reservoirs, and Basins		383.55	*0.33*	—	*183.20*	—	—	—	*183.53*	—	—	—
Watercourses												
Perennial Stream	13.1	6.97	—	—	—	—	—	—	—	—	—	—
Subtotal Watercourses		6.97	—	—	—	—	—	—	—	—	—	—
Developed Areas												
Ornamental	15.5	20.77	—	0.03	1.14	0.07	—	—	1.14	0.10	0.16	0.31
Developed	15.6	20.98	2.39	0.05	1.80	0.79	—	—	4.19	0.84	1.57	0.23
Subtotal Developed Areas		*41.75*	*2.39*	*0.08*	*2.94*	*0.86*	—	—	*5.33*	*0.94*	*1.75*	*0.54*

TABLE N-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		SCE Alignment Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area[a] (acres)	
			IRWD	County	IRWD	County	IRWD	County	IRWD	County	IRWD	County
Disturbed Areas												
Disturbed	16.1	25.42	0.03	—	3.29	0.66	—	—	3.32	0.66	0.60	0.23
Subtotal Disturbed Areas		*25.42*	*0.03*	—	*3.29*	*0.66*	—	—	*3.32*	*0.66*	*0.60*	*0.23*
Total		**1,016.85**	**13.71**	**3.79**	**251.38**	**13.43**	**—**	**0.14**	**265.09**	**17.36**	**11.40**	**8.68**

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". The overlap with the permanent impact is being excluded since the vegetation would no longer be present after implementation of the Project. However, the overlap with the temporary impact is not being excluded because it is assumed these areas will be revegetated following the Project and the Additional Inundation Area represents a long-term, periodic change in maximum lake level.

TABLE N-2
PROJECT IMPACTS ON USACE JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area [a] (acres)					
	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	0.025	0.025	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 3	—	0.071	0.071	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	**101.706**	**333.499**	**435.205**	**0.000**	**0.00**	**1.157**	**0.642**	**1.157**	**0.641**	**63.915**	**0.00**	**137.686**	**0.171**	**201.601**	**0.171**	**63.915**	**0.00**	**138.843**	**0.812**	**202.758**	**0.812**	**0.00**	**0.673**	**0.000**	**0.000**	**0.000**	**0.673**

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE N-3
PROJECT IMPACTS ON RWQCB JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area [a] (acres)					
Feature	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	0.025	0.025	—	—	0.025	—	0.025	—	—	—	—	—	—	—	—	—	0.025	—	0.025	—	—	—	—	—	—	—
Drainage 3	—	0.071	0.071	—	—	0.007	0.031	0.007	0.031	—	—	—	0.008	—	0.008	—	—	0.007	0.039	0.007	0.039	—	—	—	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	0.002	0.004	0.002
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.010	—	0.010
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.014	—	0.014
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Total	**101.706**	**333.499**	**435.205**	**0.000**	**0.00**	**1.189**	**0.672**	**1.189**	**0.672**	**63.915**	**0.00**	**137.686**	**0.179**	**201.601**	**0.179**	**63.915**	**0.00**	**202.790**	**0.851**	**202.790**	**0.851**	**0.00**	**0.673**	**0.012**	**0.026**	**0.012**	**0.699**

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE N-4
PROJECT IMPACTS ON CDFW JURISDICTIONAL RESOURCES
IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		Total Permanent/Temporary Impact (acres)		Additional Inundation Area[a] (acres)	
		IRWD	County	IRWD	County	IRWD	County	IRWD	County
Irvine Lake	614.135	1.843	—	229.517	—	231.360	—	0.097	0.678
Santiago Creek	36.024	0.859	1.065	—	0.305	0.859	1.370	—	5.433
Drainage 1	0.027	—	—	—	0.005	—	0.005	—	—
Drainage 2	0.074	0.074	—	—	—	0.074	—	—	—
Drainage 3	0.168	0.004	0.079	—	0.023	0.004	0.102	—	—
Drainage 4	0.094	—	—	—	—	—	—	0.014	—
Drainage 5	0.359	—	—	—	—	—	—	0.007	0.004
Drainage 6	0.149	—	—	—	—	—	—	—	0.008
Drainage 7	0.148	—	—	—	—	—	—	—	0.003
Drainage 8	0.042	—	—	—	—	—	—	—	—
Drainage 9	1.237	—	—	—	—	—	—	0.088	—
Drainage 10	0.245	—	—	—	—	—	—	—	—
Drainage 11	0.318	—	—	—	—	—	—	—	—
Drainage 12	13.517	—	—	—	—	—	—	2.370	—
Drainage 13	0.114	—	—	—	—	—	—	—	—
Drainage 14	0.416	—	—	—	—	—	—	—	—
Drainage 15	2.563	—	—	—	—	—	—	0.278	—
Total	**669.630**	**2.780**	**1.144**	**229.517**	**0.333**	**232.297**	**1.477**	**2.854**	**6.126**

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

TABLE N-5
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Jurisdiction	Amount of Jurisdictional Water Resource (acres)								
	Existing	Permanent (IRWD)	Permanent (County)	Temporary (IRWD)	Temporary (County)	Total Impact (IRWD)	Total Impact (County)	Additional Inundation Area[a] (IRWD)	Additional Inundation Area[a] (County)
USACE WOTUS	428.476	1.157	0.641	201.601	0.171	202.758	0.812	0.000	0.673
RWCQB Waters of the State	435.205	1.189	0.672	201.601	0.179	202.790	0.851	0.012	0.699
CDFW Jurisdictional Resources	669.630	2.780	1.144	229.517	0.333	232.297	1.477	**2.854**	**6.126**

USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; "–": not present

[a] Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.

Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study

Santiago Creek Dam Outlet and Spillway Project, Irvine, Orange County, California

Prepared for

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

Prepared by

Psomas
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707

February 2024

TABLE OF CONTENTS

Section **Page**

National Archaeological Database (NADB) Information Sheet MS-1

Executive/Management Summary MS-2

1.0 Introduction 1

1.1 Project Location 1

1.2 Project Background and Project Description 1

1.2.1 Project Background 1
1.2.2 Project Description 2

1.3 Project Personnel 3

1.3.1 Charles Cisneros, M.S., RPA 3
1.3.2 Daniella Balassa, M.S. 3

2.0 Regulatory Setting 4

2.1 Cultural Resources 4

2.1.1 Federal Regulatory Setting 4
2.1.2 State Regulatory Setting 5
2.1.3 Human Remains 7
2.1.4 Paleontological Resources 7

3.0 Setting 8

3.1 Contemporary Setting 8

3.1.1 Embankment Dam 8
3.1.2 Outlet Works 8
3.1.3 Spillway 8

3.2 Basin Physiology and Environment 9

3.2.1 Basin Physiology 9
3.2.2 Environmental Setting 9

3.3 Regional Geology 9

3.4 Precontact Setting 10

3.4.1 Paleoindian Period (11,000–7000 B.C.) 11
3.4.2 Milling Stone Period (7000–3000 B.C.) 11
3.4.3 Intermediate Period (3000 B.C.–A.D. 500) 11
3.4.4 Late Precontact Period (A.D. 500–1769) 11

3.5 Post Contact History 12

3.5.1 Santiago Dam 12

4.0 Methods 14

4.1 Cultural Resources 14

4.1.1 Cultural Resource Records Search and Literature Review 14
4.1.2 Native American Sacred Lands File Review 14

4.1.3 Natural History Museum of Los Angeles County 14
4.1.4 Archaeological and Paleontological Field Survey 14

5.0 Report of Findings 16

5.1 South Central Coastal Information Center 16

5.2 Native American Sacred Lands File Review Results 20

5.2.1 Paleontological Record Search Results 20

5.3 Archaeological and Paleontological Field Survey Results 21

6.0 Discussion and Impact Analysis 22

6.1 Discussion 22

6.2 Findings of no Effect/Significant Impact 22

7.0 Recommnended Mitigation Measures 24

7.1 Mitigation Measures 24

7.2 Existing Regulatory Requirements 25

8.0 Certification 26

9.0 References Cited 27

TABLES

Table		Page
1	Cultural Chronology for Southern California	10
2	Cultural Resource Studies Within The Project Site	16
3	Prior Cultural Resources Within the 1-mile Radius of the Project APE	18
4	NAHC Tribal Representatives Contact List	20

EXHIBITS

Exhibit		Follows Page
1	Project Location	1
2	USGS 7.5-Minute Digital Quadrangle	1

FIGURES

Figure		Page
Figure 1:	Overview of Project Site	15
Figure 2:	View of Santiago Dam	19
Figure 3:	Overview of P-30-001012 (CA-ORA-1012)	21

ATTACHMENTS

Attachment	
A	SCCIC Cultural Resources Records Search Results
B	Native American Heritage Commission Search Results
C	Natural History Museum of Los Angeles County Paleontology Records Search Results
D	Confidential 523 DPR Form for Archaeological Site P-30-001012 (CA-ORA-1012)
E	South Environmental Historical Resources Evaluation Report

NATIONAL ARCHAEOLOGICAL DATABASE (NADB)

INFORMATION SHEET

Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study for the Santiago Creek Dam Outlet and Spillway Project,

Irvine, Orange County, California

BY

Charles W. Cisneros, M.S., RPA

February 2024

Submitted by:

Charles Cisneros, M.S., RPA
Psomas
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707

Submitted to:

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

Prepared for: NEPA & CEQA Documentation
USGS Geologic Map Black Star Canyon 7.5-Minute Quadrangles

Psomas Project Number: 3IRW001101
Key Words: Archaeological Survey, Lithic Scatter, Precontact Archaeology, Orange County

EXECUTIVE/MANAGEMENT SUMMARY

PURPOSE AND SCOPE

The purpose of this Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study (report) is to determine the potential for impacts to archaeological and paleontological resources within the proposed Santiago Creek Dam Outlet and Spillway Project (hereinafter referred to as "the Project"), located in Orange County, California. In addition to compliance with the California Environmental Quality Act (CEQA), the Project requires a technical study that will allow for federal funding by the State Water Board. Therefore, this report has been prepared for compliance with Section 15064.5 of the CEQA Guidelines and to satisfy Section 106 of the National Historic Preservation Act (NHPA), with respect to the identification and preservation of cultural resources (i.e., archaeological sites). According to the *Code of Federal Regulations* (CFR, Title 40, Section 1506.4, Combining documents), "Any environmental document in compliance with NEPA (National Environmental Policy Act) may be combined with any other agency documents to reduce duplication and paperwork". Therefore, the format of this report follows an amended version of the Office of Historic Preservation's *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* (Office of Historic Preservation 1990) to meet both CEQA and NEPA requirements.

DATES OF INVESTIGATION

Psomas requested the cultural resources literature and records search for the Project from the South-Central Coastal Information Center (SCCIC) at the California State University, Fullerton on September 11, 2020. On May 23, 2022, Psomas requested an additional records search, including spatial data (shapefiles) for all precontact (before arrival of Europeans) archaeological resources within a 1-mile search radius from the proposed Project Area of Potential Effects (APE).

On September11, 2020, Psomas requested that the Native American Heritage Commission (NAHC) conduct a search of its Sacred Lands File (SLF) to determine if cultural resources important to Native Americans have been recorded within the Project APE or in the immediate vicinity of the Project APE.

On October 15, 2020, Psomas requested that the Natural History Museum (NHM) of Los Angeles County conduct a search of its paleontology collection records for the locality and specimen data for the Project APE and surrounding area.

A pedestrian survey of the Project APE was conducted on October 20, 2020. This 1st draft report was completed in August 2023 and is based on the findings from the SCCIC, NAHC, Native American outreach and consultation, and the pedestrian survey of the Project APE. As a subconsultant to Psomas, South Environmental completed an architectural history and built environment study of the Santiago Dam under separate cover and is included as Attachment E. This technical report addresses only the archaeological and paleontological resources identified within the Project APE and the 1.6 km (1-mile) search radius surrounding the Project APE.

FINDINGS OF THE INVESTIGATION

Psomas conducted archaeological resources field investigations within the proposed Project APE on October 20, 2020. The main goal of the investigations was to gather and analyze information needed to determine if the Project would have a significant impact on properties eligible for the National Register of Historic Places (NRHP) and the California Register of Historic Places (CRHR) and to provide mitigation measures for those resources. The results of the 2021 SCCIC cultural resources records searches identified 18 previously recorded cultural resources within 1.6

kilometers (km) (1 mile) of the Project site. The previously recorded resources include two precontact isolates (ground stone), 12 precontact sites, three historic sites/built environments, and one multicomponent site. The precontact sites consist of rock shelters, lithic scatters (stone debris left over from making stone tools), hearths (roasting pits/remnants of campfires), cairns (rock features), bedrock milling features (ground stone technology), habitation debris (midden), and burials. The historic sites consist of roads/trails, single family residences, standing structures, wells/cisterns, water conveyance systems, and a standing engineering structure (dam). Of the 18 cultural resources, two (P-30-001012 and P-30176757) were identified within the Project APE. Cultural resource P-30-001012 is described as a precontact lithic scatter and cultural resource P-30-17657 is the Santiago Dam (see Attachment E). Furthermore, the NAHC SLF search was positive for sacred sites.

The NHM record search included a thorough search of the NHM paleontology collection records for the locality and specimen data for the Project APE and surrounding area. The records search identified fossil localities that lie directly within the proposed Project APE as well as numerous fossil localities nearby from the same sedimentary deposits that occur in the proposed Project area, either at the surface or at depth. One locality, LACM IP 26171, is located along the northwest shore of Santiago Reservoir, where unspecified invertebrates were collected from the Williams Formation during excavations for the spillway in 1969 (depth of fossils is not known). Additionally, eight localities were located nearby from the same sedimentary deposits that occurs in the Project site, either at the surface or at depth below the surface.

Fieldwork (archaeological and paleontological survey) relocated P-30-001012; however, none of the cultural resources recorded by W. H. Bryce 1982 were observed on the surface; though, MBA noted in 2004 the artifact assemblage and site boundary for P-30-001012 were not relocated due to the site being stripped for agricultural practices and scattered debris piled placed along a nearby small drainage. No new archaeological resources and/or paleontological resources were identified within the Project APE. Nevertheless, it should be noted that both the Project APE and the surrounding area should be considered highly sensitive for archaeological resources dating to both the precontact period and the historic era and paleontological resources.

DISPOSITION OF DATA

This report will be filed with the Psomas and the SCCIC. All field notes and other documentation related to the report are on file at Psomas.

1.0 INTRODUCTION

1.1 PROJECT LOCATION

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. Santiago Creek Dam impounds Irvine Lake. It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. More specifically, the Project APE is located on the Blackstar 7.5-minute United States Geological Survey (USGS) topographic quadrangle within Township 04; 05 South, Range 08 West, and Sections 33, 34, 35, 02, 03, and 04 of the San Bernardino Base and Meridian (Exhibit 1 and Exhibit 2).

1.2 PROJECT BACKGROUND AND PROJECT DESCRIPTION

1.2.1 Project Background

Irvine Ranch Water District (IRWD) and Serrano Water District (SWD), jointly referred to as the Districts, operate Irvine Lake and the Santiago Creek Dam that serves as a critical water supply reservoir for significant portions of Villa Park in Orange County, California and impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River. Santiago Creek Dam is a compacted earth-fill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000.

The Districts have been working with the DSOD to evaluate different structural elements of the existing Santiago Creek Dam, including the evaluation of the existing outlet tower and an alternative analysis for seismic retrofits or replacements of the tower. DSOD requested the Districts perform a seismic evaluation of the outlet tower; evaluation of the results shows that the tower is inadequate under some failure modes in a maximum credible earthquake. The existing outlet tower could potentially fail during the design seismic event, which could block the existing outlet conduit with pieces of the concrete tower and/or with reservoir silt. In addition, DSOD also requested a spillway condition assessment be performed for the spillway at Santiago Creek Dam. The assessment found that the aging spillway is nearing the end of its useful life and the design did not meet current standards.

In light of the findings from the seismic evaluation for the existing outlet tower and comprehensive assessment of the existing spillway, the Districts have elected to develop designs for an inclined outlet structure that would be placed near the left abutment of the existing dam and replacement of the existing spillway with a side-channel spillway on the left abutment. The spillway crest would be raised by six feet to provide more operation capacity in the reservoir for the Districts. The existing outlet tower would be abandoned, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir.

The rehabilitation and replacement of the Santiago Creek Dam outlet works, and spillway facilities is necessary to address identified seismic safety concerns; to meet current DSOD regulatory requirements; to satisfy the Districts' operational requirements; to extend the useful life of the facilities; and to improve reliability.

Irvine Lake is held at varying levels depending on the time of year. In the wet winter months, water can be stored up to the 791.9-foot elevational contour. The height of the existing spillway with the flashboards installed is at the 795.9-foot elevation contour; this is the current maximum capacity of the reservoir and is only permitted in the summer months. Historically, the inflow into the reservoir during storm events is high enough to cause the water to flow over the spillway crest, located at the 791.9-foot elevation, approximately once every four to five years (1937 to 2019).

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD.aprx\ex_Aerial_11x17

Project Location

Exhibit 1

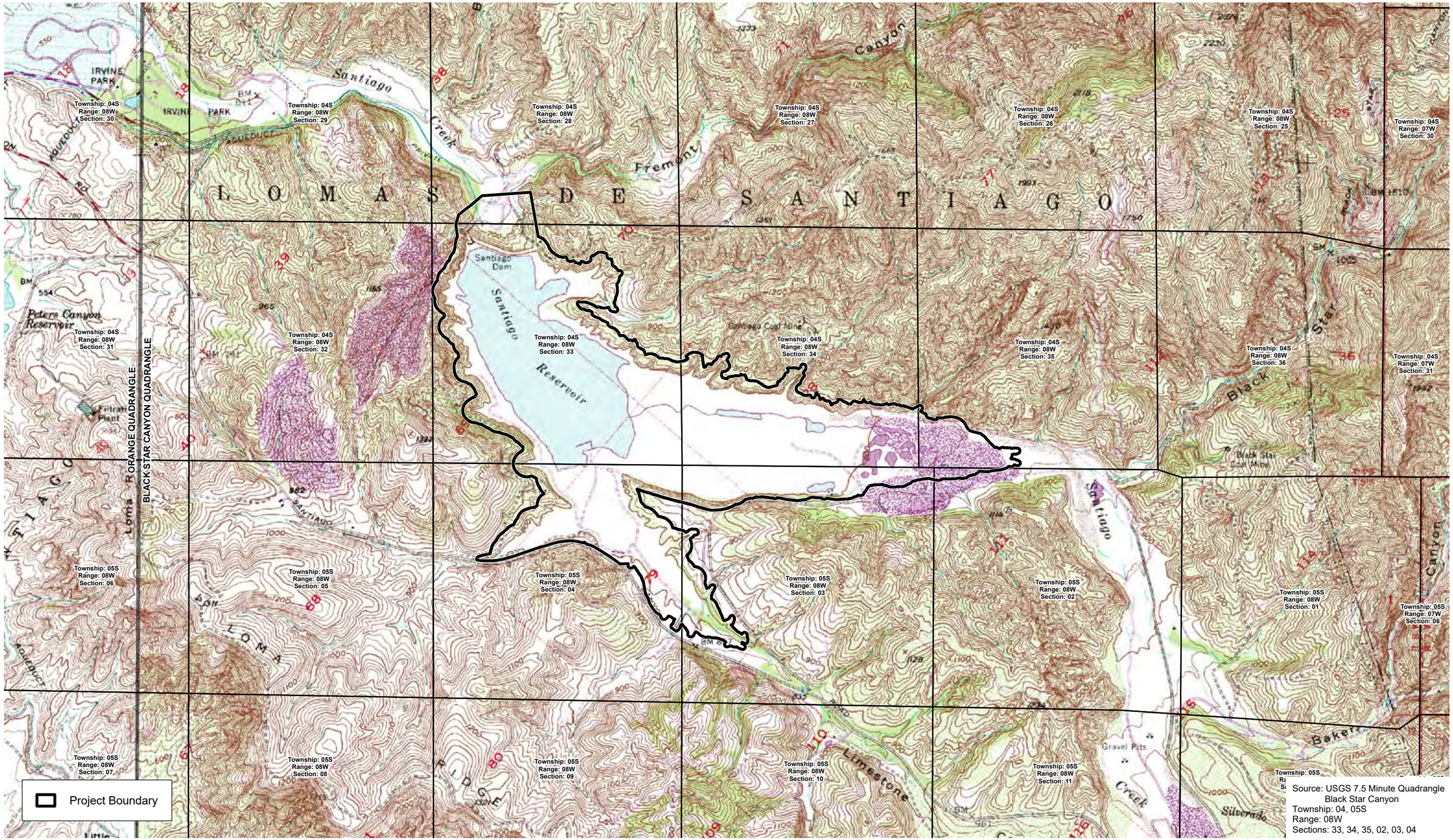
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

1,200 600 0 1,200 Feet

PSOMAS

(Rev: 11/03/2023 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\CEQA\ex_Aerial.pdf



Source: USGS 7.5 Minute Quadrangle
Black Star Canyon
Township: 04, 05S
Range: 08W
Sections: 33, 34, 35, 02, 03, 04

D:\Projects\3IRW\SantiagoCreek\PROSCD\SCD.aprx\USGS_11x17

USGS 7.5-Minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

N W E S

2,000 1,000 0 2,000 Feet

PSOMAS

(Rev: 11/03/2023 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\CEQA\ex_USGS.pdf

From October 2002 to September 2020, the reservoir has been filled to the spillway crest a total of four times and water has been high enough to flow over the spillway twice. The water levels in the lake during this period (2002 to 2020) fluctuated between approximately 736 feet elevation contour to 795 feet elevation contour. Between 2002 and 2020, the longest consecutive period that water was stored in the upper 2 feet of the reservoir (793.9 to 795.9 feet) was approximately 35 days.

1.2.2 Project Description

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Environmental Impact Report (EIR).

- The existing outlet tower would be demolished; the portion below the sediment would be filled with concrete and capped with a concrete plug. A new inclined outlet structure would be constructed on the left abutment. Each riser would include an intake fish screen.
- The inlet/outlet works would be configured to incorporate the new structure, including new valves and fittings. Water from the lake would enter the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow to the Irvine Lake Pipeline (ILP) or the emergency outlet pipeline. Water that enters the ILP would reach the Districts' distribution systems. Water that enters the emergency outlet pipeline would be released at the end of the new spillway.
- The ILP would be increased from 36 inches to 54 inches to match the pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line to improve the hydraulic performance of the system.
- The existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment.
- A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new retaining wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.
- A new dam control building would be constructed to house the valve system at the end of the existing dam crest. The preliminary layout shows a fire-hardened building with dimensions 52 feet by 18 feet and a height of 12 feet.
- The dam crest would be widened from 10 feet to 12 feet with a retaining wall on the downstream side of the crest. The retaining wall would be 1,300 feet in length and would have a height of 10 feet.
- The dam crest would be raised with an approximately 1.5-foot-tall concrete parapet wall on the upstream side of the dam crest.
- A new emergency access walkway (5 feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent landfill during a spillway event. The walkway would connect to the new access road (described above).
- A new steel bridge structure would be included for vehicles across the new spillway.
- Existing structures would be demolished, including the existing outlet tower, portions of the existing spillway, portions of the upstream dam embankment concrete facing, storage building on the dam crest, portions of the outlet work, portions of the ILP, catwalk/stairs across Santiago Creek, and piezometers/monitoring wells.

- The existing Southern California Edison (SCE) overhead power lines and power poles in the vicinity would be relocated outside the construction limits. This relocation would be completed by SCE.
- When construction is occurring, the lake would be dewatered and an access road would be located along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.

1.3 PROJECT PERSONNEL

The staff members for the proposed Project were selected based on their familiarity with the site's geographic location and understanding of the archaeology and paleontology discipline. The team includes experts with experience in California archaeology (precontact and historic era), paleontology, cultural resources management, project administration, and other appropriate skills including spatial analysis. Key personnel are Registered Professional Archaeologists (RPA) who meet or exceed the Secretary of the Interior's Professional Qualification Standards (NPS 1994) for archaeology. Project roles and responsibilities are summarized below.

1.3.1 Charles Cisneros, M.S., RPA

Charles Cisneros is a Registered Professional Archaeologist and served as the Project's Principal Investigator. Mr. Cisneros supervised all aspects of the archaeological Project, including the field survey and the preparation of this report.

1.3.2 Daniella Balassa, M.S.

Daniella Balassa was responsible for contributing to the geological and paleontological history and analysis section of this report.

2.0 REGULATORY SETTING

2.1 CULTURAL RESOURCES

Cultural resource laws, regulations, and guidelines set up the processes for defining what is or is not a significant cultural resource and include various agency procedures for managing these archaeological and historical resources and assessing the information from the cultural remains to determine their significance. Most importantly is whether these resources are eligible for inclusion in a national or State register (i.e., NRHP and CRHR). As defined by archaeologists Thomas Neumann and Robert Sanford (2001: 27), the laws and regulations serve to do the following:

- Set forth the criteria for assessing the relative importance of cultural remains;
- Outline the procedures for reviewing assessments;
- Delineate the responsible parties involved in making such assessments;
- Identify and then define the extent of jurisdiction and responsibility of each party in the evaluation process;
- Set forth the criteria for making a determination of significance, as well as indicating which party can or cannot make such determinations;
- Set forth the criteria for the archaeological and historic preservation work performed; and
- Set forth the criteria regarding who can perform the archaeological and historic preservation work.

A summary of both federal and State laws, regulations, and standards that govern cultural resource management within the Project's APE is provided below.

2.1.1 Federal Regulatory Setting

Section 106 of the National Historic Preservation Act

Section 106 of the NHPA of 1966, as amended, is required by the Advisory Council on Historic Preservation, with regulations contained in 36 CFR Part 800. Section 106 requires that federal agencies consider the effects of proposed projects on historic properties as part of the environmental assessment process, and it defines "historic properties" as follows (36 CFR Part 800, Protection of Historic Properties; Section 800.16[l][1], Definitions):

> Any Precontact or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

According to 36 CFR 60.4, a resource may be considered *historically significant* if it retains integrity and meets at least one of the following criteria. A property may be eligible for the NRHP if the resource:

A. is associated with events that have made a significant contribution to the broad patterns of our history;

B. is associated with the lives of persons significant in our past;

C. embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or

D. has yielded, or may be likely to yield, information important in prehistory or history.

For a property to be listed in the NRHP, it must meet one or more of the criteria of significance, and it must also retain integrity. The National Park Service's (1995a) *How to Apply the National Register Criteria* recognizes seven aspects or qualities that, in various combinations, define integrity. The seven aspects of integrity are described below:

- **Location:** Location is the place where the historic property was constructed or the place where the historic event occurred.
- **Design:** Design is the combination of elements that create the form, plan, space, structure, and style of a property.
- **Setting:** Setting is the physical environment of a historic property.
- **Materials:** Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- **Workmanship:** Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- **Feeling:** Feeling is a property's expression of the aesthetic or historic sense of a particular period of time.
- **Association:** Association is the direct link between an important historic event or person and a historic property.

The steps in evaluating integrity are further described by the National Park Service (1995):

- Define the essential physical features that must be present for a property to represent its significance;
- Determine whether the essential physical features are visible enough to convey their significance;
- Determine whether the property needs to be compared with similar properties; and
- Determine, based on the significance and essential physical features, which aspects of integrity are particularly vital to the property being nominated and if they are present.

Native American Graves and Repatriation Act

The Native American Graves and Repatriation Act (NAGPRA) established a means for Native Americans, including Indian Tribes, to request the return of human remains and other sensitive cultural items held by federal agencies or federally assisted museums or institutions. NAGPRA also contains provisions regarding the intentional excavation and removal of, inadvertent discovery of, and illegal trafficking in Native American human remains and sensitive cultural items.

2.1.2 State Regulatory Setting

California Register of Historical Resources

The CEQA requires a lead agency to determine whether a project would have a significant effect on one or more historical resources. According to Section 15064.5(a) of the State CEQA

Guidelines, a "historical resource" is defined as a resource listed in or determined to be eligible for listing in the CRHR (*California Public Resources Code* [PRC] Section 21084.1); a resource included in a local register of historical resources (*California Code of Regulations* [CCR], Title 14, Section 15064.5[a][2]); or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (14 CCR 15064.5[a][3]).

Section 5024.1 of the PRC, Section 15064.5 of the State CEQA Guidelines (CCR, Title 14, Chapter 3, Sections 15000–15387), and Sections 21083.2 and 21084.1 of the CEQA (PRC, Sections 21000–21189) were used as the basic guidelines for the cultural resources study. PRC Section 5024.1 requires an evaluation of historical resources to determine their eligibility for listing in the CRHR. The purpose of the CRHR is to maintain listings of the State's historical resources and to indicate which properties are to be protected from substantial adverse change. The criteria for listing resources in the CRHR, which were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP (per the criteria listed at 36 CFR 60.4), are stated below.

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and that:

(1) Are associated with events that have made a significant contribution to the broad patterns of our history; or

(2) Are associated with the lives of persons significant in our past; or

(3) Embody the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(4) Have yielded, or may be likely to yield, information important in prehistory or history.

According to Section 15064.5(a)(3) (A–D) of the State CEQA Guidelines, a resource is considered historically significant if it meets the criteria for listing in the NRHP, as stated above, in addition to the CRHR. Impacts that affect those characteristics of the resource, that qualify it for the NRHP or that would adversely alter the significance of a resource listed in or eligible for listing in the CRHR, are considered to have a significant effect on the environment. Impacts to cultural resources from the proposed Project are thus considered significant if the Project: (1) physically destroys or damages all or part of a resource; (2) changes the character of the use of the resource or physical feature within the setting of the resource that contributes to its significance; or (3) introduces visual, atmospheric, or audible elements that diminish the integrity of significant features of the resource.

The purpose of a cultural resources' investigation is to evaluate whether any cultural resources remain exposed on the surface of a project site or can reasonably be expected to exist in the subsurface. If resources are discovered, management recommendations would be required for evaluation of the resources for CRHR eligibility.

Assembly Bill 52

Assembly Bill (AB) 52 (Chapter 532, Statutes of 2014), which became effective on July 1, 2015, requires lead agencies to provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project, if they have requested such notice in writing. Once Native American tribes receive a project notification, they have 30 days to respond as to whether

they wish to initiate consultation regarding the project, including subjects such as mitigation for any potential project impacts to tribal cultural resources (TCR). A TCR is defined as either a site, feature, place, or cultural landscape that is geographically defined in terms of size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is eligible for the CRHR or a local historic register. If a tribe requests consultation and the lead agency and the tribe ultimately agree on mitigation to address any potentially significant impacts to TCRs, the mitigation measures agreed upon during consultation must be recommended for inclusion in the environmental document.

2.1.3 Human Remains

Section 7050.5 of the *California Health and Safety Code* provides for the disposition of accidentally discovered human remains. Section 7050.5 states that, if human remains are found, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains would occur until the County Coroner has determined the appropriate treatment and disposition of the human remains.

Section 5097.98 of the PRC states that, if remains are determined by the Coroner to be of Native American origin, the Coroner must notify the NAHC within 24 hours. The NAHC, in turn, must identify the person or persons it believes to be the most likely descendant of the deceased Native American. The descendant shall complete their inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

2.1.4 Paleontological Resources

Paleontological resources are afforded protection by environmental legislation set forth under CEQA. Appendix G of the CEQA Guidelines provides guidance relative to significant impacts on paleontological resources, indicating that a project will have a significant impact on paleontological resources if it disturbs or destroys a unique paleontological resource or site or unique geological feature.

Under Guidelines for the Implementation of CEQA, as amended on March 29, 1999 (Title 14, Division 6, Chapter 3, California Code of Regulations: 15000 et seq.), procedures define types of activities, persons, and public agencies required to comply with CEQA and include as one of the questions to be answered in the Environmental Checklist: “Will the proposed project disturb paleontological resources?” (Appendix G, Section VII, Part f)

The California Public Resources Code Section 5097.5 states:

a) “No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or Precontact ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

b) As used in this section, “public lands” means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.”

3.0 SETTING

3.1 CONTEMPORARY SETTING

The Project site is located on the USGS' Black Star Canyon 7.5-minute quadrangle. It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. Irvine Lake (also called the Santiago Creek Reservoir) was originally constructed in 1933 to store water for the benefit of the surrounding communities.

3.1.1 Embankment Dam

The Santiago Creek Dam is a compacted earthfill embankment completed in 1933 that is under the jurisdiction of the State of California, DWR, and DSOD. Santiago Creek Dam allows IRWD to impound water within Irvine Lake, a critical water supply reservoir for IRWD and SWD. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level within the lake varies throughout the lake; however, it is estimated that the accumulated sediment occupies approximately 2,150 acre-feet of the lake to date.

3.1.2 Outlet Works

The outlet works for the dam consists of a tower, an outlet conduit, and downstream control house. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where a bifurcation splits the flow into a main pipe and diverter pipe. The main pipe supplies water to IRWD and SWD.

3.1.3 Spillway

The existing spillway is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest elevation is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years). The downstream end of the spillway was extensively modified in 1969 and 1970 after sustaining significant damage during a February 1969 flood event. The damaged waste channel and spillway chute were removed, and a new flip bucket was constructed at the end of the existing spillway chute. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project area. Elevations in the Project area range from approximately 657 to 996 feet above mean sea level.

3.2 BASIN PHYSIOLOGY AND ENVIRONMENT

3.2.1 Basin Physiology

The Project APE is located on the western slope of the Santa Ana Mountains in southern California. Santiago Creek is within the APE and flows in a northwesterly direction for about 32 miles from its headwaters near Santiago Peak to its confluence with the Santa Ana River about 14.5 miles downstream of Santiago Creek Dam. Santiago Creek Dam drains about 63 square miles of the Santiago Creek watershed. The drainage basin upstream of the dam generally consists of steep and mountainous terrain, ranging in elevation from approximately 780 feet at the dam to 5,680 feet in the headwaters near Santiago Peak. Urban development and agricultural use within the watershed are limited, with much of the drainage basin located in the Cleveland National Forest. Vegetation within the basin generally consists of scrub/rangeland with areas of dense shrubs and trees. Most of the basin soils fall into Natural Resources Conservation Service (NRCS) hydrologic group D, indicating a poor infiltration rate and high runoff potential when thoroughly wet, though there are pockets of more well-drained soils.

The climate of the basin is characterized by hot, dry summers and mild, wet winters, with over 80 percent of annual precipitation falling between November and March. The Santiago Creek Dam watershed receives a 30-year mean annual precipitation of approximately 22 inches, ranging from approximately 14 inches at lower elevations to over 29 inches in the basin headwaters. Due to the basin's relatively low elevations and mild climate, precipitation within the basin generally falls as rain.

3.2.2 Environmental Setting

The Project APE is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan. The following vegetation types occur in the Project APE: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline. Many of these vegetation types would have been utilized by the first Californians, the ancestors of today's local Native American communities.

Other landcover includes cliff, open water, fluctuating shoreline, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

3.3 REGIONAL GEOLOGY

Principal sources of existing information for this subsection included geologic maps and reports on the regional geology published by the U.S. Geological Survey (Schoellhamer et al. 1981; Morton and Miller 1981; Morton and Miller 2006) and unpublished reports, drawings, and photographs related to site-specific studies and construction of Santiago Creek Dam (Kempkey 1930; Marliave 1939). Review of these geologic publications and unpublished project reports provided a framework of the subsurface geologic conditions at the Project site, which served as the basis for preparation of the geotechnical investigation work plan and subsurface exploration program discussed in the Project's Environmental Impact Report (EIR) and this technical study.

As discussed above, Santiago Creek Dam is on Santiago Creek, which is a major north-flowing drainage in the Northern Santa Ana Mountains. Geologic mapping by Schoellhamer et al. (1981) and other subsequent geologic maps (e.g., Morton and Miller 1981; Morton and Miller 2006),

show the Project APE to be underlain by Cretaceous to Eocene sedimentary rock, which is locally overlain by Pleistocene to Holocene age alluvium. Bedrock in the vicinity of the outlet tower and spillway consists of marine sediments of the Williams Formation (Schoellhamer et al. 1981; WCC 1979). The Williams Formation is subdivided into the Schulz Ranch Sandstone Member and the Pleasants Sandstone Member. The Schulz Ranch Member, which is the stratigraphically lower member of the Williams Formation, is typically a brownish yellow to gray, massive coarse-grained sandstone, and conglomerate. Schoellhamer et al. (1981) also reported that portions of the Schulz Ranch Member consist of interbedded conglomeratic sandstone with siltstone beds that are about 12 to 30 feet thick. Schoellhamer et al. (1981) described the Pleasants Sandstone Member as a light brown to gray, fine-grained sandstone (Schoelhammer et al. 1981). The contact between the two members is mapped in the vicinity of the spillway.

Although the published literature (Schoellhamer 1954, 1981) describes the Williams Formation as predominantly consisting of sandstone, Marliave (1939) and WCC (1979) mapped much of the Williams Formation in the left abutment and spillway area as shale. Marliave (1939) mapped much of the spillway excavation and the entire length of the trench for the outlet pipe, and his mapping indicates a predominance of shale. Shale also was encountered in a diamond drill hole (Drill Hole No. 9) about 50 feet south of the outlet tower that was done as part of the original dam explorations (Kempkey 1930). The log of the borehole suggests that the top of the brown shale bedrock was at an elevation of approximately 672 feet. Based on the mapping and outlet trench log by Marliave (1939), the orientation of the bedrock in the vicinity of the spillway and outlet tower typically strikes northwest and dips approximately 50 to 75 degrees toward the southwest.

3.4 PRECONTACT SETTING

Southern California has a long history of human occupation, with dates of the earliest evidence of human occupation during the late Pleistocene, circa (ca.) 11,000 years B.C. (Glassow et al. 2007: 191). Precontact material culture in the State's southern region has been categorized according to periods or patterns that define technological, economic, social, and ideological elements. Within these periods, archaeologists have defined cultural patterns or complexes specific to prehistory within the State's southern region, including the Project site.

The following text and table (Table 1) illustrates the chronological framework developed for Southern California. This framework is divided into four major periods: Paleoindian period (ca. 11,000–7000 B.C.), Milling Stone period (7000 B.C.–3000 B.C.), Intermediate period (3000 B.C.–A.D. 500), and Late Precontact period (A.D. 500–Historic Contact). Within these broad temporal periods are variations in the timing and nomenclature of cultural complexes for the region. The timescales referenced in the following discussion are presented as calendar dates (years B.C.–A.D.).

TABLE 1
CULTURAL CHRONOLOGY FOR SOUTHERN CALIFORNIA

Period	Cultural Traits	Years (B.C.–A.D.)
Paleoindian	Clovis and Folsom Fluted Projectile Points	11,000 B.C.–7000 B.C.
Milling Stone	Ground Stone Implements; Large Leaf-Shaped Projectile Points	7000 B.C.–3000 B.C.
Intermediate	Large Side-Notched, Stemmed, and Leaf-Shaped Projectile Points; Mortar and Pestle	3000 B.C.–A.D. 500
Late Precontact	Smaller Projectile Points with Convex or Concave Bases, Bow and Arrow; Increased Population Size	A.D. 500 –1769

3.4.1 Paleoindian Period (11,000–7000 B.C.)

Recent data from coastal and inland sites during this period indicate that the economy was a diverse mixture of hunting and gathering, with a major emphasis on aquatic resources in many coastal areas and on Pleistocene lakeshores (Moratto 1984:90–92). Although few Clovis-like or Folsom-like fluted points have been found in Southern California, it is widely thought that there was a greater emphasis on hunting at near-coastal and inland sites during the Paleoindian Period than in later periods (e.g., Dillon 2002; Erlandson et al. 1987). Subsistence patterns shifted around 6000 B.C., concurrent with the gradual desiccation associated with the onset of the Altithermal, a warm and dry period that lasted for about 3,000 years. As the climate changed, a greater emphasis was placed on plant foods and small animals.

3.4.2 Milling Stone Period (7000–3000 B.C.)

The Milling Stone Period (Wallace 1955, 1978) is the earliest well-established period of occupation in Southern California (Glassow et al. 2007: 192). This period is characterized by an ecological adaptation to collecting, accompanied by a dependence on ground stone implements associated with the horizontal motion of grinding small seeds: milling stones (metates, slabs) and hand stones (manos, mullers). Milling stones are found in large numbers for the first time and become more numerous toward the end of this period. As evidenced by their tool kits and shell middens in coastal sites, people during this period practiced a mixed food-procurement strategy. Subsistence patterns became more specialized as groups became better adapted to their regional or local environments. Projectile points from the period are relatively rare, but are large and generally leaf-shaped, and were probably employed with darts or spears thrown with atlatls. Bone tools, such as awls, and items made from shell, including beads, pendants, and abalone dishes, are also quite uncommon. Evidence of weaving or basketry is present at a few sites. The mortar and pestle, associated with the vertical motion of pounding foods such as acorns, were introduced during the Milling Stone Period but do not become common until the Intermediate Period.

3.4.3 Intermediate Period (3000 B.C.–A.D. 500)

The Intermediate Period is characterized by a shift toward a hunting and maritime subsistence strategy, along with a wider use of plant foods. During this period, a pronounced trend toward greater adaptation to regional or local resources can be observed. For example, the remains of fish, land mammals, and marine mammals are increasingly abundant and diverse in sites along the Southern California coast. Chipped stone tools suitable for hunting are more common and both stylistically and technologically varied. Projectile points include large side-notched, stemmed, and lanceolate or leaf-shaped forms. Larger knives, a variety of stone flake scrapers, and drill-like implements are also common during this period. Shell fishhooks become an integral part of the tool kit. Bone tools, including awls, are more numerous than in the preceding period; and the use of asphaltum adhesive becomes more common.

3.4.4 Late Precontact Period (A.D. 500–1769)

During the Late Precontact Period, use of plant food resources increased in conjunction with land and marine mammal hunting. The variety and complexity of material culture also increased during this period, demonstrated by more diverse classes of artifacts. The recovery of many small, finely chipped projectile points, usually stemless with convex or concave bases, suggests an increased utilization of the bow and arrow for hunting rather than the atlatl and dart.

During this period, an increase in population size is accompanied by the advent of larger, more permanent villages with greater numbers of inhabitants (Wallace 1955:223). Some coastal and near coastal settlements were occupied by as many as 1,500 people. Many of these larger

settlements were permanent villages where at least some people resided year-round. The populations of these villages may have also increased seasonally.

3.5 POST CONTACT HISTORY

Prior to European exploration and colonization efforts in the 18th century, Orange County and the Santiago Canyon was home to Juaneño and Gabrielino Native American communities. The earliest European colonizers traveled through Orange County as part of Don Gaspar de Portolá's overland expedition into Alta California. The Portola expedition camped in what is now Santiago Canyon in July of 1769 and again in January of 1770 when missionary Juan Crespi noted the location of the Santiago Creek and that the missionaries had named it Santiago after the patron Saint of Spain. In 1797, Father Junipero Serra founded Mission San Gabriel in present day Los Angeles and Mission San Juan Capistrano in 1776. Between these two missions, the majority of Orange County was under mission control and used primarily as grazing lands. In 1821, Mexico gained independence from Spain and in 1833 the Mexican government moved to secularize former mission lands and granted them to Mexican citizens. Teodocio Yorba, the youngest son of Jose Antonio Yorba who was one of the largest landowners in orange County, received the Rancho Lomas de Santiago land grant in 1846. Teodocio established his ranch headquarters at the present site of Irvine Lake.

With the signing of the Treaty of Guadalupe Hidalgo in 1848, Alta California was ceded to the United States and California became a U.S. Territory. The Congressional Act of 1851 forced landholders to reapply to the Board of Land Commissioners to get valid title to their ranchos. Yorba was able to retain his claim to Rancho Lomas de Santiago and sold the rancho to William Wolfskill in 1860. After suffering financial misfortune as a result of the drought of 1863–1864, Wolfskill sold the rancho to Llewellyn Bixby, Thomas and Benjamin Flint, and James Irvine in 1866. Bixby, the Flints, and Irvine had also purchased other large sections of rancho land, but the acquisition of Rancho Lomas de Santiago was important to securing water rights in the region. In 1877, James Irvine acquired his partner's shares in the various ranchos they had purchased together becoming sole owner of over 110,000 acres of land that stretched 23 miles from the Pacific Ocean to the Santa Ana River.

3.5.1 Santiago Dam

Unless otherwise noted, the following information regarding the Santiago Dam was excerpted from the DPR 523 Series Forms for P-30-176757 (Santiago Dam) prepared by Cary D. Cotterman of Chambers Group, Inc.

For most of the late 19th and early 20th centuries, the land around the present site of Santiago Dam was used for cattle and sheep grazing, as well as recreation. The Serrano Irrigation District (known today as the SWD) provided water for the earliest citrus groves in the Orange and Villa Park areas, beginning in 1876. By the late 1920's, the demand for irrigation water had increased to the point that a large storage reservoir was needed. In response to this demand, the Serrano Irrigation District and the John T. Carpenter Water Company of Villa Park undertook a joint project in 1930, selling bond issues worth $400,000 to finance half of the dam's construction. The Irvine Company, which owned the land, matched that amount, for a total of $800,000. By October of 1930, engineer A. Kempkey of San Francisco, assisted by Irvine Company engineer Roy Browning, was making exploratory drillings into the bedrock at the proposed dam site on Santiago Creek prior to drawing the construction blueprints. Santiago Dam was constructed, creating Santiago Reservoir (now called Irvine Lake), during 1931. Although the dam was designed by Kempkey, the on-site supervising engineer was Wess Albert, and the construction contractor was R.G. Tourneau. The dam was completed in December 1931, and the reservoir was first completely filled, with water running over the spillway at its west end, in 1937. In 1934, a dam keeper's residence was constructed on a hillside overlooking the east end of the dam. The water

provided by the creation of the dam and reservoir contributed significantly to the early and mid-20th century development of the citrus industry in Orange County, one of the leading citrus-producing regions of the U.S. at that time. The facility was originally intended only for irrigation water storage but was opened for recreational use in 1941. Today, the IRWD still distributes untreated water from the reservoir for irrigation, while the SWD supplies treated drinking water to Villa Park and portions of Orange and operates Irvine Lake's recreational concessions.

4.0 METHODS

4.1 CULTURAL RESOURCES

4.1.1 Cultural Resource Records Search and Literature Review

An archaeological resources records search was conducted by Psomas at the South-Central Coastal Information Center (SCCIC) at California State University, Fullerton on September 21, 2021, and provided to PaleoWest. The SCCIC is the designated branch of the California Historical Resources Information System (CHRIS) for the Project area and houses records concerning archaeological and historic resources in Los Angeles, Ventura, San Bernardino, and Orange Counties. The review consisted of an examination of the USGS Black Star Canyon 7.5-minute quadrangle to evaluate the Project area for any sites recorded or cultural resources studies conducted on the parcel and within a one-mile radius. Data sources consulted at the SCCIC include the Historic Property Data File maintained by the California Office of Historic Preservation, archaeological records, Archaeological Determinations of Eligibility, Historical Landmarks, and historic maps. The records were reviewed to accomplish the following:

- Identify cultural resources (e.g., archaeological sites) in the Project site and surrounding areas;
- Identify and determine the adequacy of previous cultural resources studies in the Project site;
- Develop management recommendations for cultural resources within or adjacent to the Project site; and
- Assess what additional cultural resources studies would need to be undertaken for the proposed Project.

The results of the records searches are presented below in Subsection 5.1.

4.1.2 Native American Sacred Lands File Review

An inquiry was made of the NAHC on September 11, 2020, to request a review of the Sacred Lands File (SLF) database regarding the possibility of Native American cultural resources and/or sacred places in the Project vicinity that are not documented on other databases. The results of the SLF Review are presented below in Subsection 5.2.

4.1.3 Natural History Museum of Los Angeles County

Psomas requested a paleontological literature and records search from the Natural History Museum of Los Angeles County (NHM) on October 20, 2020. The results of the NHM search are presented below in Subsection 5.3.

4.1.4 Archaeological and Paleontological Field Survey

Psomas surveyed the Project site on October 20, 2020. The entire Project site (Figure 1) was surveyed by walking evenly spaced transects spaced no more than 10 meters (32 feet) apart. The archaeologist examined all areas considered highly sensitive for cultural resources and the ground surface for the presence of the following:

- Precontact artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools);
- Historic artifacts (e.g., metal, glass, ceramics);

- Sediment discoloration that might indicate the presence of a cultural midden;
- Depressions and other features indicative of the former presence of structures or buildings (e.g., post holes, foundations); and
- Fossil Localities.

Psomas maintained transect accuracy in the Project site using a Garmin global positioning system (GPS) receiver and Project field maps. A field notebook and a digital camera were used to record the survey conditions and findings. The results of the archaeological field survey are presented below in Subsection 5.4.

FIGURE 1: OVERVIEW OF PROJECT SITE

5.0 REPORT OF FINDINGS

5.1 SOUTH CENTRAL COASTAL INFORMATION CENTER

The SCCIC record search identified 28 prior technical cultural resources studies and academic overviews within 1.6 kilometer (km) (i.e., 1 mile) of the Project APE. Of the 28 previous investigations, 14 of these studies occurred or overlapped within the Project APE (Table 2). The studies crossed the current Project site as early as 1979 and as recently as 2007. The types of studies include academic overviews, cultural resource surveys and assessments, mitigation monitoring, and testing and evaluations. The academic overview studies are a testament to the archaeological sensitivity of region, including the Project site. The records search results summary letter from SCCIC is presented as Attachment A.

TABLE 2
CULTURAL RESOURCE STUDIES WITHIN THE PROJECT SITE

Report	Author	Year	Study	Type of Study
OR-00305	Schroth, Adella	1979	The History of Archaeological Research on Irvine Ranch Property: The Evolution of a Company Tradition	Cultural Resources Research
OR-00648	Breece, Bill and Beth Padon	1982	Cultural Resource Survey: Archaeological Resources. Foothill Transportation Corridor, Phase II	Cultural Resources Research
OR-00752	Mason, Roger D.	1984	Eastern Corridor Alignment Study, Orange County, California. Volume II: Prehistory and History	Cultural Resources Research
OR-00983	Bissell, Ronald M.	1989	Cultural Resources Reconnaissance of East Orange Planning Area 1: 1,800 Acres in Eastern Orange County, California	Cultural Resources Research
OR-01005	Breece, William H.	1989	Archaeological Survey of Proposed Landfill Gas Recovery and Disposal System at the Santiago Canyon and Prima Descheta Landfills	Cultural Resources Research
OR-01026	Mason, Roger D.	1990	Cultural Resources Survey Report Santiago Canyon Road Alignment Study Orange County, California	Cultural Resources Research
OR-01039	Sturm, Bradley L.	Unknown	An Archaeological Assessment of the Irvine Lake Desilting Project	Cultural Resources Research
OR-01080	Palmer, Robert	1991	Archaeological Monitoring at Santiago Canyon Landfill Flare Station	Cultural Resources Research
OR-02225	Strozier, Hardy	1978	The Irvine Company Planning Process and California Archaeology: A Review and Critique	Cultural Resources Research
OR-02534	Anonymous	1976	Annual Report to the Irvine Company from Archaeological Research, Inc.	Cultural Resources Research
OR-02858	Chace, Paul G.	1971	The Black Star Canyon Project: A Landmarks Survey	Cultural Resources Research

TABLE 2
CULTURAL RESOURCE STUDIES WITHIN THE PROJECT SITE

Report	Author	Year	Study	Type of Study
OR-02882	Dice, Michael and Christeen Taniguchi	2004	Final Phase II Archaeological Testing Evaluation of Irvine Ranch Cultural Resources. Santiago Hills Planned Community – Tract Maps Nos 16199 and 16201 and East Orange Planned Community Area – Tract Map No 16514 and the East Orange Planned Community	Cultural Resources Research
OR-02918	Cotterman, Cary D., Evelyn N. Chandler, and Roger D. Mason	2003	Cultural Resources Survey Report for a Verizon Telecommunications Facility: Santiago Dam Located at Irvine Lake (Santiago Reservoir), Orange County, California	Cultural Resources Research
OR-03600	Garcia, Kyle H. and Marcy Rockman	2007	Results of Archaeological Survey and Monitoring for Southern California Edison's Pole Replacements After Santiago Fire Along Santiago Canyon Road, Modjeska Canyon Road, and Hicks Canyon Road; Orange County, California	Cultural Resources Research

The SCCIC records searches identified 18 previously recorded cultural resources within 1.6 km (1 mile) of the Project site (Table 3). The previously recorded resources include two precontact isolates (ground stone), 12 precontact sites, three historic sites/built environments and one multicomponent site. The precontact sites consist of rock shelters, lithic scatters (stone debris left over from making stone tools), hearths (roasting pits/remnants of campfires), cairns (rock features), bedrock milling features (ground stone technology), habitation debris (midden), and burials. The historic sites consist of roads/trails, single family residences, standing structures, wells/cisterns, water conveyance systems and a standing engineering structure (dam). Of the 18 cultural resources, two (P-30-001012 and P-30176757) were identified within the Project APE. Cultural resource P-30-001012 is described as a precontact lithic scatter and cultural resource P-30-17657 is the Santiago Dam.

TABLE 3
PRIOR CULTURAL RESOURCES WITHIN THE 1-MILE RADIUS OF THE PROJECT APE

Primary Number	Site Number	Site Type	Attribute Type	Year(s) Recorded	Proximity to Project Site
P-30-000237	CA-ORA-237	Precontact: lithic scatter; cairns/rock features; burials; hearth/pits; other	AP02; AP08; AP09; AP11; AP16	1969	Outside
P-30-000238	CA-ORA-238	Precontact: burials; hearths/pits	AP09; AP11	1969	Outside
P-30-000239	CA-ORA-239	Precontact: lithic scatter	AP02	1969	Outside
P-30-000240	CA-ORA-240	Precontact: habitation debris	AP15	1968	Outside
P-30-000304	CA-ORA-304	Precontact: lithic scatter; bedrock milling feature	AP02; AP04	1971	Outside
P-30-000319	CA-ORA-319	Precontact: lithic scatter	AP02	1982	Outside
P-30-000320	CA-ORA-320	Precontact: lithic scatter; hearth/pits; rock shelter/cave	AP02; AP11; AP14	1995	Outside
P-30-001012	CA-ORA-1012	Precontact: lithic scatter	AP02	1971	Within
P-30-001272	CA-ORA-1272	Precontact: lithic scatter	AP02	1990	Outside
P-30-001277	CA-ORA-1277	Precontact: lithic scatter; rock shelter/cave	AP02; AP14	1971	Outside
P-30-001294	CA-ORA-1294	Precontact: lithic scatter; hearth/pits	AP02; AP11	1990	Outside
P-30-001460	CA-ORA-460/H	Multicomponent: lithic scatter; monument/mural/gravestone	AP02; HP26	1982	Outside
P-30-001474	CA-ORA-1474H	Historic: foundations/structures pads; landscaping/orchard; water conveyance system; standing structures; single family property; farm/ranch	AH02; AH03; AH06; AH15; HP02; HP33	2004	Outside
P-30-001535	CA-ORA-1535	Precontact: lithic scatter; cairns/rock features	AP02; AP08	1991	Outside
P-30-001771	CA-ORA-1771H	Historic: foundations/structure pads; landscaping/orchard; roads/trails/railroad grades	AH02; AH03; AH07	1990	Outside
P-30-100304	–	Precontact: isolated lithic scatter	AP02 (Isolate)	1991	Outside
P-30-100460	–	Precontact: isolated lithic scatter	AP02 (Isolate)	2004	Outside
P-30-176757	–	Historic: engineering structure; dam	HP11; HP21	2018	Within

P-30-001012 (CA-ORA-1012)

This archaeological site was originally recorded by W. H. Bryce in 1982 as a precontact lithic scatter measuring 70 x 95 meters and consisting of debitage (debris from manufacturing stone tools) and groundstone (stone that has been pecked or ground into a specific shape). The debitage includes 16 pieces of secondary debitage comprising of 12 white chert secondary flakes and four chalcedony flakes, all described as small to medium in size. The groundstone assembly includes one piece (fragment) of a basin metate and one piece (fragment) of a shallow bowl. The metate fragment measured 19 x 19 x 7 centimeters (cm) and the stone bowl fragment measured 21 x 14 x 26 cm.

In 2004, Michael Brandman and Associates (MBA) relocated the archaeological site. None of the cultural resources (artifacts discussed above) identified by Bryce in 1982 were visible on the ground surface. However, it should be noted disturbance from agricultural activities may have displaced these resources after 1982.

Using the previous archaeological site record prepared by Bryce in 1982, MBA placed a backhoe trench 30 meters north of Santiago Canyon Road to determine if cultural resources and/or a cultural midden is located below the surface. The trench was placed northwest of the intersection of Santiago Canyon Road and Blue Diamond Road and was excavated to a depth of 2.5 meters below the surface. No cultural resources (i.e., groundstone, projectile points) were recovered from the excavations. Furthermore, no stratigraphic evidence for cultural middens (habitation debris) was observed in the trench. MBA also described the first 80 cm below the surface as a plow zone (top layer of soil through which a plow penetrates).

MBA evaluated the archaeological site in accordance with CEQA, using criteria outlined for the CRHR eligibility. MBA's conclusion was the site does not qualify for the CRHR and is not a unique archaeological resource for the purposes of CEQA. MBA also concluded it is unlikely that any of the characteristics from the site described by Bryce will be impacted should modifications to the road be necessary at a future date; however, MBA also concluded that should modifications take place within the site boundary beyond the area tested, additional subsurface investigations should be considered.

P-30-176757 (Santiago Dam)

As a cultural resource, Santiago Dam (Figure 2) was first documented by Cary D. Cotterman of Chambers Group, Inc in 2003. Cotterman prepared a DPR 523 Series Form documenting the dam was built in 1931 as an earthen and concrete structure containing 1,100,000 cubic yards of clay, porous soil, and rock. Cotterman notes the dam is 1,425 feet (0.27 mile) long as it's crest, which rises 136 feet above the surrounding ground at its highest point. Cotterman recommended the dam as eligible for listing on the NRHP under Criterion A (see Subsection 2.1.1 for eligibility criteria).

FIGURE 2: VIEW OF SANTIAGO DAM

5.2 NATIVE AMERICAN SACRED LANDS FILE REVIEW RESULTS

On September 11, 2020, Psomas requested that the NAHC conduct a search of its SLF to determine if cultural resources important to Native Americans have been recorded in the Project site or in the immediate vicinity. The results of the NAHC SLF search were received on October 9, 2020, and were positive for sacred lands in the vicinity of the Project APE. The NAHC recommended contacting the Juaneño Band of Mission Indians Acjachemen Nation – Belardes for more information.

The results letter also included a list of tribes affiliated with the Project APE (see Table 4). Consultation pursuit to AB 52 was conducted by the Districts. The results of the AB 52 consultation between the Districts and local Native American representatives will be documented as part of the CEQA review prepared for the Project. The SLF search results summary letter from the NAHC is presented as Attachment C.

TABLE 4
NAHC TRIBAL REPRESENTATIVES CONTACT LIST

Tribal Organization	Indigenous Affiliation	Contact(s)
Campo Band of Diegueno Mission Indians	Diegueno	Ralph Goff
Ewiiaapaayp Band of Kumeyaay Indians	Diegueno	Robert Pinto; Michael Garcia
Cabazon Band of Mission Indians	Cahuilla	Daniel Salgada
Gabrieleno Band of Mission Indians – Kizh Nation	Gabrieleno	Andrew Salas
Gabrieleno/Tongva San Gabriel Band of Mission Indians	Gabrieleno	Anthony Morales
Gabrielino/Tongva Nation	Gabrielino	Sandonne Goad
Gabrielino Tongva Indians of California Tribal Council	Gabrielino	Robert Dorame
Gabrielino-Tongva Tribe	Gabrielino	Charles Alvarez
Juaneño Band of Mission Indians Acjachemen - Belardes	Juaneño	Matias Belardes
La Posta Band of Diegueno Mission Indians	Diegueno	Gwendolyn Parada; Javaugh Miller
Pala Band of Mission Indians	Cupeno; Luiseno	Shasta Gaughen
Manzanita Band of Kumeyaay Nation	Diegueno	Angela Elliott
Mesa Grande Band of Diegueno Mission Indians	Diegueno	Michael Linton
Pala Band of Mission Indians	Cupeno; Luiseno	Shasta Gaughen
Santa Rosa Band of Cahuilla Indians	Cahuilla	Lovina Redner
Soboba Band of Luiseno Indians	Cahuilla; Luiseno	Isaiah Vivanco

5.2.1 Paleontological Record Search Results

The paleontological records search was completed on October 16, 2020. The record search included a thorough search of the NHM paleontology collection records for the locality and specimen data for the Project APE and surrounding area. The records search identified fossil localities that lie directly within the proposed Project APE as well as numerous fossil localities nearby from the same sedimentary deposits that occur in the proposed Project area, either at the surface or at depth. One locality, LACM IP 26171, is located along the northwest shore of Santiago Reservoir, where unspecified invertebrates were collected from the Williams Formation during excavations for the spillway in 1969 (depth of fossils is not known). Additionally, eight localities were located nearby from the same sedimentary deposits that occurs in the Project site, either at

the surface or at depth. As indicated above, the Project site is generally underlain by Pleistocene to Holocene age alluvium, which could contain unknown fossils.

5.3 ARCHAEOLOGICAL AND PALEONTOLOGICAL FIELD SURVEY RESULTS

As indicated above, a Psomas cross-trained archaeologist/paleontologist surveyed the Project APE on October 20, 2020. The Psomas archaeologist did not identify new archaeological and/or paleontological resources within the Project APE; however, it should be noted the ground visibility was obscured by several species of native and non-native vegetation. Additionally, Psomas relocated archaeological site P-30-001012 (Figure 3). None of the cultural resources recorded by W. H. Bryce 1982 were observed on the surface; however, as MBA noted in 2004 the artifact assemblage and site boundary were not observed due to the site being stripped for agricultural practices along with scattered debris piled and placed along a nearby small drainage (see Attachment D for updated record).

Additionally, the Santiago Dam is located within the Project APE. As noted in the Executive and Management Summary above, a separate historic built environment assessment of the structures and technical report has been prepared by South Environmental.

FIGURE 3: OVERVIEW OF P-30-001012 (CA-ORA-1012)

6.0 DISCUSSION AND IMPACT ANALYSIS

6.1 DISCUSSION

Psomas conducted archaeological resources field investigations within the proposed Project APE on October 20, 2020. The main goal of the investigations was to gather and analyze information needed to determine if the Project would have a significant impact on properties eligible for the NRHP and the CRHR and to provide mitigation measures for those resources. The results of the 2021 SCCIC cultural resources records searches identified 18 previously recorded cultural resources within 1.6 km (1 mile) of the Project site. The previously recorded resources include two precontact isolates (ground stone), 12 precontact sites, three historic sites/built environments and one multicomponent site. The precontact sites consist of rock shelters, lithic scatters (stone debris left over from making stone tools), hearths (roasting pits/remnants of campfires), cairns (rock features), bedrock milling features (ground stone technology), habitation debris (midden), and burials. The historic sites consist of roads/trails, single family residences, standing structures, wells/cisterns, water conveyance systems and a standing engineering structure (dam). Of the 18 cultural resources, two (P-30-001012 and P-30176757) were identified within the Project APE. Cultural resource P-30-001012 is described as a precontact lithic scatter and cultural resource P-30-17657 is the Santiago Dam. Furthermore, the NAHC SLF search was positive for sacred sites. Consultation with tribal representatives was initiated by the Districts.

Fieldwork (archaeological and paleontological survey) relocated P-30-001012; however, none of the cultural resources recorded by W. H. Bryce 1982 were observed on the surface; though, MBA noted in 2004 the artifact assemblage and site boundary for P-30-001012 were not relocated due to the site being stripped for agricultural practices and scattered debris piled placed along a nearby small drainage. No new archaeological resources and/or cultural resources were identified within the Project APE. Nevertheless, it should be noted both the Project APE and the surrounding area should be considered highly sensitive for archaeological resources dating to both the precontact period and the historic era.

Additionally, no new paleontological resources (fossil localities and/or unique geologic units) were identified during the field survey. As noted above, LACM IP 26171, located along the northwest shore of Santiago Reservoir, was collected from the Williams Formation during excavations for the spillway in 1969.

Moreover, the Santiago Dam is located within the Project APE. As noted in the Executive and Management Summary above, a separate historic built environment assessment of the structures and technical report has been prepared by South Environmental.

6.2 FINDINGS OF NO EFFECT/SIGNIFICANT IMPACT

This analysis is provided to assist the Lead Agencies in fulfilling their compliance responsibilities under NEPA and CEQA. The results of the 2021 field study did not identify new archaeological and/or cultural resources. Additionally, the archaeological resource, P-30-001012 was relocated; however, the artifact assemblage and original site boundary for P-30-001012 were not relocated due to the site being stripped for agricultural practices and scattered debris piled placed along a nearby small drainage. Furthermore, MBA evaluated the archaeological site in accordance with CEQA, using criteria outlined for the CRHR eligibility. MBA's conclusion was the site does not qualify for the CRHR and is not a unique archaeological resource for the purposes of CEQA. MBA also concluded it is unlikely that any of the characteristics from the site described by Bryce will be impacted should modifications to the road be necessary at a future date; however, MBA also concluded that should modifications take place within the site boundary beyond the area tested, additional subsurface investigations should be considered.

Moreover, no new fossil localities were identified during the field survey; therefore, all data considered, the proposed Project will not have a significant impact or adverse effect on eligible archaeological resources or known fossil localities and/or unique geological units within the Project APE.

7.0 RECOMMNENDED MITIGATION MEASURES

While no significant and/eligible archaeological and/or TCRs were identified in the Project site, several cultural resources from both the precontact and historic periods of California history have been documented within 1-mile of the Project APE.

Furthermore, no significant paleontological resources were identified in the Project site; however, the results from the NHM identified the Project APE and the surrounding area as highly sensitive for marine fossil localities and unique geologic units.

Therefore, Psomas recommends the following mitigation measures in the event of an accidental discovery of archaeological and/or paleontological resources and adherence to existing regulations and protocols for the discovery of human remains. Furthermore, additional mitigation measures may be requested during the AB 52 tribal consultation process.

7.1 MITIGATION MEASURES

MM CUL-1 Prior to the issuance of the grading permit, the applicant shall provide written evidence to the Districts that the applicant has retained an Orange County-certified archaeologist to observe grading activities within previously undisturbed soils, including geotechnical excavations, and to salvage and catalogue archaeological resources as necessary. The archaeologist shall be present at the pre-grade conference, shall establish procedures for archaeological resource surveillance within previously undisturbed soils, and shall establish, in cooperation with the applicant, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the artifacts as appropriate. If archaeological resources are inadvertently unearthed during excavation activities (within disturbed or undisturbed soils), the contractor shall immediately cease all earth-disturbing activities within a 100-foot radius of the area of discovery and the archaeologist and Districts shall be notified immediately. If the archaeological resources are found to be significant, the archeologist, in consultation with the Districts and tribal representatives, shall determine appropriate actions for exploration and salvage. After the find has been appropriately avoided or mitigated, work in the area may resume.

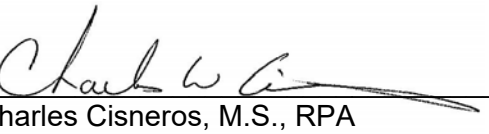
MM GEO 1 Prior to the issuance of the grading permit, the applicant shall provide written evidence to the Districts that the applicant has retained an Orange County-certified paleontologist to observe grading activities within previously undisturbed soils, including geotechnical excavations, and to salvage and catalogue paleontological resources as necessary. The paleontologist shall be present at the pre-grade conference, shall establish procedures for paleontological resource surveillance within previously undisturbed soils, and shall establish, in cooperation with the applicant, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the fossils/unique geological units as appropriate. In the event that paleontological resources are inadvertently unearthed during excavation activities, the contractor shall immediately cease all earth-disturbing activities within a 100-foot radius of the area of discovery and the contractor shall contact the Districts immediately. If the paleontological resources are found to be significant, the paleontologist, in consultation with the District, shall determine appropriate actions for exploration and salvage. After the find has been appropriately avoided or mitigated, work in the area may resume.

7.2 EXISTING REGULATORY REQUIREMENTS

RR CUL-1 If human remains are found during ground-disturbing activities, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur, in accordance with Section 7050.5 of the California Health and Safety Code. The County Coroner shall be notified of the discovery immediately. If the County Coroner determines that the remains are or believed to be Native American, s/he shall notify the NAHC in Sacramento within 24 hours of the discovery. In accordance with Section 5097.98 of the California Public Resources Code, the NAHC must immediately notify those persons it believes to be the most likely descended from the deceased Native American. The descendants shall complete their inspection within 48 hours of being granted access to the site by the Districts. The Districts would meet and confer with the most likely descendant regarding their recommendations prior to disturbing the site by further construction activity.

8.0 CERTIFICATION

I hereby certify that the statements furnished above in this draft report and in the attached exhibits present the data and information required for this Historic Property Identification Report (Archaeological Resources) and Paleontological Resources Study, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

DATE: February 9, 2024 SIGNED: 

Charles Cisneros, M.S., RPA
Senior Archaeologist

9.0 REFERENCES CITED

Dillon, Brian D. 2002. California Paleo-Indians: Lack of Evidence, or Evidence of a Lack? In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, edited by William J. Wallace and Francis A. Riddell, pp. 110–128. Contributions of the University of California Archaeological Research Facility, No. 60. University of California, Berkeley.

Erlandson, J. M., T. C., and R. Carrico.1987. A Fluted Projectile Point Fragment from the Southern California Coast: Chronology and Context at CA-SBA-1951. *Journal of California and Great Basin Anthropology* 9:120–128.

Glassow, M.A., L. Gamble, J.Perry, and G.S. Russell. 2007. Prehistory of the Northern California Bight and the Adjacent Transverse Ranges. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 191-213. Alta Mira Press, New York.

Kempkey. 1930. Construction Plans for Santiago Creek Dam and Appurtenances, 26 Sheets, December, A. Kempkey Consulting Engineer.

Marliave. 1939. Geological Report on Santiago Dam, situated on Santiago Creek in Orange County: California Division of Water Resources, 28 p. including figures and geologic maps.

Moratto, M. 1984. *California Archaeology*. Academic Press, New York.

Morton, P.K. and Miller R.V. 1981. Geologic map of Orange County, California, showing mines and mineral deposits. California Division of Mines and Geology, U.S. Geological Survey Professional Paper 420-D

Morton, D.M., Miller, F.K. 2006. Geologic Map of the San Bernardino and Santa Ana 30′× 60′ Quadrangles. US Geological Survey, California. U.S. Geological Survey Open-File Report 2006 1217, Version 1.0.

National Park Services. 1995a. How to Apply the National Register Criteria. United States Department of the Interior. Washington, D.C.

———. 1995b. Rim of the Valley Corridor: Draft Special Resource Study and Environmental Assessment. United States Department of the Interior. Washington, D.C.

———. 1984, revised 1994. Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (As Amended and Annotated). Washington, D.C.: NPS.

Neumann, Thomas and Robert Sanford. 2001. *Cultural Resources Archaeology*. Alta Mira Press, New York.

Office of Historic Preservation. 1990 (February). *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format.* Department of Parks and Recreation, Office of Historic Preservation. Sacramento, California: OHP.

Schoellhamer, J. E., D. M. Kinney, R. F. Yerkes, and J. G. Vedder, 1954, Geologic map of the northern Santa Ana Mountains, Orange and Riverside counties, California: USGS Oil and Gas Inv. Map OM-154.

Schoellhamer, J.G., Vedder, J.G., Yerkes, R.F. and Kinney, D.M. 1981. Geology of the Northern Santa Ana Mountains, California: U.S. Geological Survey Professional Paper 420-D.

Wallace, W. J. 1978. Post-Pleistocene Archaeology, 9000 to 2000 B.C. In *California*, edited by Robert F. Heizer, pp. 25–36. Handbook of North American Indians, Vol. 8, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

———. 1955. A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11(3):214–230.

ATTACHMENT A

SCCIC CULTURAL RESOURCES LITERAURE REVIEW AND RECORDS SEARCH RESULTS

ReportNum	DocAddlCitLetter	Status	OtherIDs	Xrefs	Authors	CitYear	CitMonth	CitTitle	CitPublisher
OR-00305					Schroth, Adella	1979		The History of Archaeological Research on Irvine Ranch Property: the Evolution of a Company Tradition	Archaeological Resource Management Corp.
OR-00648					Breece, Bill and Beth Padon	1982		Cultural Resource Survey: Archaeological Resources: Foothill Transportation Corridor, Phase Ii	LSA Associates, Inc.
OR-00752					Mason, Roger D.	1984		Eastern Corridor Alignment Study, Orange County, California; Volume II: Prehistory and History	Scientific Resource Surveys, Inc.
OR-00983					Bissell, Ronald M.	1989		Cultural Resources Reconnaisance of East Orange Planning Area 1, 1,800 Acres in Eastern Orange County, California	RMW Paleo Associates, Inc.
OR-01005					Breece, William H.	1989		Archaeological Survey of Proposed Landfill Gas Recovery and Disposal System at the Santiago Canyon and Prima Deschecha Landfills	LSA Associates, Inc.
OR-01026					Mason, Roger D.	1990		Cultural Resources Survey Report Santiago Canyon Road Alignment Study Orange County, California	The Keith Companies Archaeological Division
OR-01039					Sturm, Bradley L.			An Archaeological Assessment of the Irvine Lake Desilting Project	Bradley Strum
OR-01080					Palmer, Robert	1991		Archaeological Monitoring at Santiago Canyon Landfill Flare Station	LSA Associates, Inc.
OR-02225			Other - Irvine Ranch		Strozier, Hardy	1978		The Irvine Company Planning Process and California Archaeology- A Review and Critique	The Irvine Company
OR-02534						1976		Annual Report to The Irvine Company from Archaeological Research, Inc.	ARI

ReportNum	DocAddlCitLetter	Status	OtherIDs	Xrefs	Authors	CitYear	CitMonth	CitTitle	CitPublisher
OR-02858					Chace, Paul G.	1971		The Black Star Canyon Project a Landmarks Survey	Pacific Coast Archaeological Society Quarterly
OR-02882					Dice, Michael and Christeen Taniguchi	2004		Final Phase 2 Archaeological Testing Evaluation of Irvine Ranch Cultural Resources: Santiago Hill Ii Planned Community (shiipc)-tract Maps Nos. 16199 and 16201 and the East Orange Planned Community (eopc) Area I-tract Map No. 16514 and the East Orange Pla	Michael Brandman Associates
OR-02918			Cellular -		Cotterman, Cary D., Chandler, Evelyn N., and Mason, Roger D.	2003		Cultural Resources Survey Report for a Verizon Telecommunications Facility: Santiago Dam Located at Irvine Lake (Santiago Reservoir) Orange County, California	Chambers Group, Inc.
OR-03600					Garcia, Kyle H. and Marcy Rockman	2007		Results of Archaeological Survey and Monitoring for Southern California Edison's Pole Replacements After Santiago Fire Along Santiago Canyon Road, Modjeska Canyon Road, and Hicks Canyon Road; Orange County, California; Jo:6259-0468	PCR Services Corporation

ReportNum	CitPages	CitMaps	ReportType	InventorySize	InventoryDisclosure	InventoryCollections	InventoryNotes	Resources	ResourceCount	HasInformals	Counties	Maps
OR-00305	33		Literature search	QC	Not for publication	Unknown	Mapped to Irvine Ranch boundaries found online. Removed from unmappable folder.	30-000002, 30-000044, 30-000047, 30-000048, 30-000051, 30-000053, 30-000059, 30-000060, 30-000061, 30-000062, 30-000063, 30-000064, 30-000065, 30-000066, 30-000067, 30-000068, 30-000069, 30-000070, 30-000071, 30-000072, 30-000073, 30-000077, 30-000091, 30-000099, 30-000100, 30-000104, 30-000106, 30-000107, 30-000109, 30-000111	30	No	Orange	BLACK STAR CANYON, EL TORO, LAGUNA BEACH, ORANGE, SAN JUAN CAPISTRANO, TUSTIN
OR-00648	59		Archaeological, Field study	QC				30-000244, 30-000304, 30-000361, 30-000442, 30-000450, 30-000451, 30-000458, 30-000479, 30-000485, 30-000486, 30-000487, 30-000488, 30-000507, 30-000545, 30-000564, 30-000601, 30-000629, 30-000630, 30-000641, 30-000649, 30-000650, 30-000651, 30-000710, 30-000711, 30-000712, 30-000713, 30-000719, 30-000725, 30-000726, 30-000853, 30-000864, 30-000865, 30-000866	33	No	Orange	BLACK STAR CANYON, CANADA GOBERNADORA, EL TORO, ORANGE, SANTIAGO PEAK, TUSTIN
OR-00752	210		Archaeological, Field study	QC				30-000184, 30-000303, 30-000304, 30-000321, 30-000513, 30-000541, 30-000546, 30-000547, 30-000556, 30-000557, 30-000584, 30-000585, 30-000586, 30-000587, 30-000588, 30-000589, 30-000590, 30-000591, 30-000592, 30-000626, 30-000770, 30-000771, 30-000772, 30-000793, 30-000794, 30-000795, 30-000818, 30-000819, 30-000820, 30-000962, 30-001067, 30-001068, 30-001195, 30-001196, 30-001197, 30-001198, 30-001199, 30-001200, 30-001201	39	No	Orange	BLACK STAR CANYON, EL TORO, ORANGE, TUSTIN
OR-00983	25		Archaeological, Field study	QC				30-000304, 30-000770, 30-001068, 30-001218, 30-001219, 30-001220	6	No	Orange	BLACK STAR CANYON, ORANGE
OR-01005	15		Archaeological, Field study	QC					0	No	Orange	BLACK STAR CANYON, DANA POINT, SAN CLEMENTE
OR-01026	16		Archaeological, Field study	QC				30-000304, 30-000476, 30-000479, 30-000556, 30-000629, 30-000722, 30-000770, 30-001005, 30-001008, 30-001012, 30-001097, 30-001220, 30-001224, 30-001225, 30-001226, 30-001227, 30-001228	17	No	Orange	BLACK STAR CANYON, EL TORO, ORANGE, SANTIAGO PEAK
OR-01039	25		Archaeological, Field study	QC					0	No	Orange	BLACK STAR CANYON
OR-01080	3		Monitoring	QC					0	No	Orange	BLACK STAR CANYON
OR-02225	5		Management/planning	QC	Unrestricted	No			0	No	Orange	BLACK STAR CANYON, EL TORO, LAGUNA BEACH, NEWPORT BEACH, ORANGE, SAN JUAN CAPISTRANO, TUSTIN
OR-02534	17		Archaeological, Other research	QC	Not for publication	Yes	Mapped to Irvine Ranch boundaries found online, removed from unmappable folder.	30-000051, 30-000064, 30-000099, 30-000100, 30-000106, 30-000119, 30-000130, 30-000184, 30-000196, 30-000197, 30-000484, 30-000518, 30-000575	13	No	Orange	BLACK STAR CANYON, EL TORO, LAGUNA BEACH, ORANGE, SAN JUAN CAPISTRANO, TUSTIN

ReportNum	CitPages	CitMaps	ReportType	InventorySize	InventoryDisclosure	InventoryCollections	InventoryNotes	Resources	ResourceCount	HasInformals	Counties	Maps
OR-02858	40		Archaeological, Evaluation, Field study	QC				30-000132, 30-000317, 30-000318, 30-000319, 30-000320	5	No	Orange	BLACK STAR CANYON
OR-02882	193		Excavation, Other research	QC				30-000237, 30-000238, 30-000239, 30-001012, 30-001218, 30-001240, 30-001294, 30-001474, 30-001548, 30-001549	10	No	Orange	BLACK STAR CANYON, ORANGE
OR-02918	37		Archaeological, Field study	QC				30-176757	1	No	Orange	BLACK STAR CANYON
OR-03600	13		Monitoring	QC					0	No	Orange	BLACK STAR CANYON, EL TORO, SANTIAGO PEAK

PrimaryString	TrinomialString	ResourceName	Status	OtherIDs	Xrefs	ResType	Age	InfoBase	Attribs	ResourceDisclosure	ResourceCollections	RecordingEvents	Reports	CountyName	Maps	Address
P-30-000237	CA-ORA-000237	Limestone Canyon Site, Santiago Canyon Site		Resource Name - Limestone Canyon Site, Santiago Canyon Site		Site	Prehistoric	Survey, Excavation	AP02; AP08; AP09; AP11; AP16	Not for publication	Yes	1969 (HUDSON, PCAS)	OR-00302, OR-00528, OR-00530, OR-01353, OR-01995, OR-02882	Orange	BLACK STAR CANYON	
P-30-000238	CA-ORA-000238	Limestone Canyon Site, Santiago Canyon Site		Resource Name - Limestone Canyon Site, Santiago Canyon Site		Site	Prehistoric	Survey, Excavation	AP09; AP11	Not for publication	No	1969 (HUDSON, D.T., PCAS)	OR-00302, OR-00528, OR-00530, OR-01995, OR-02882	Orange	BLACK STAR CANYON	
P-30-000239	CA-ORA-000239	Santiago Canyon Site, Limestone Canyon Site		Resource Name - Santiago Canyon Site, Limestone Canyon Site		Site	Prehistoric	Survey, Excavation	AP02	Not for publication	Unknown	1969 (HUDSON, PCAS)	OR-00302, OR-00528, OR-00530, OR-01995, OR-02882	Orange	BLACK STAR CANYON	
P-30-000240	CA-ORA-000240					Site	Prehistoric	Survey	AP15	Not for publication	No	1968 (HUDSON, PCAS)	OR-00302, OR-01995	Orange	BLACK STAR CANYON	
P-30-000304	CA-ORA-000304					Object, Site	Prehistoric	Survey, Testing, Excavation, Other	AP02; AP04	Not for publication	Yes	1971 (Fritz, Ken, PCAS); 1982 (Breece, William H., LSA); 1995 (Schultz, Lynna, Raytheon Infrastructure Services)	OR-00302, OR-00648, OR-00752, OR-00983, OR-01026, OR-01484, OR-01995	Orange	BLACK STAR CANYON	
P-30-000319	CA-ORA-000319					Site	Prehistoric	Survey	AP02	Not for publication	Unknown	1971 (COLEGROVE, Archaeological Research, Inc); 1990 (Evans, Stuart, RMW Paleo Associates)	OR-00521, OR-01106, OR-01758, OR-01995, OR-02858	Orange	BLACK STAR CANYON	
P-30-000320	CA-ORA-000320					Site	Prehistoric	Survey	AP02; AP11; AP14	Not for publication	Yes	1971 (Colegrove, S., Archaeological Research Inc); 1990 (Becker, Kenneth, RMW Paleo Associates)	OR-00521, OR-01106, OR-01758, OR-01995, OR-02858	Orange	BLACK STAR CANYON	
P-30-001012	CA-ORA-001012	WH8-#1		Resource Name - WH8-#1		Site	Prehistoric	Survey, Testing	AP02	Not for publication	No	1982 (W.H. Breece); 2004 (Keasling; Dice, Michael Brandman Associates)	OR-01026, OR-02882	Orange	BLACK STAR CANYON	
P-30-001272	CA-ORA-001272	NOCLATS-91-1		Resource Name - NOCLATS-91-1		Site	Prehistoric	Survey	AP02	Not for publication	No	1991 (BECKER / EVANS, RMW Paleo Associates)	OR-01089, OR-02009, OR-02073	Orange	BLACK STAR CANYON	
P-30-001277	CA-ORA-001277	NOCLATS-SE-2		Resource Name - NOCLATS-SE-2		Site	Prehistoric	Survey	AP02; AP14	Not for publication	No	1990 (EVANS, RMW Paleo Associates, Inc.)	OR-01089, OR-01106	Orange	BLACK STAR CANYON	
P-30-001294	CA-ORA-001294	MCKENNA NO. 1		Resource Name - MCKENNA NO. 1		Site	Prehistoric	Survey, Testing, Excavation	AP02; AP11	Not for publication	Yes	1991 (MCKENNA, McKenna et al.); 2004 (Keasling; Dice, Michael Brandman Associates); 2018 (Hubert Switalski, Stantec)	OR-01136, OR-02882	Orange	BLACK STAR CANYON	
P-30-001460	CA-ORA-001460/H	ETC 96-1, ETC 96-2, ETC 96-3		Resource Name - ETC 96-1, ETC 96-2, ETC 96-3		Site	Prehistoric, Historic	Survey, Testing, Excavation	AP02; HP26	Not for publication	No	1996 (Davy, D., Foster Wheeler Environmental Corp.); 2015 (T. Fulton, LSA)	OR-03418, OR-04513, OR-04559, OR-04560	Orange	BLACK STAR CANYON	
P-30-001474	CA-ORA-001474H	Wilmont Camp, ETC-97-2		Resource Name - Wilmont Camp, ETC-97-2		Site	Historic	Survey, Testing, Other	AH02; AH03; AH06; AH15; HP02; HP33	Not for publication	No	1997 (McKeehan, Judy, Foster Wheeler Environmental Corp.); 2004 (Keasling; Dice, Michael Brandman Associates)	OR-02882	Orange	BLACK STAR CANYON	Santiago Canyon Road
P-30-001535	CA-ORA-001535	Jail 3		Resource Name - Jail 3		Site	Prehistoric	Survey	AP02; AP08	Not for publication	Unknown	1999 (D. Ferraro, RMW Paleo Associates, Inc.)	OR-02073	Orange	BLACK STAR CANYON	
P-30-001771	CA-ORA-001771H	Saddleback Park		Resource Name - Saddleback Park		Site	Historic	Survey	AH02; AH03; AH07	Not for publication	No	2018 (Hubert Switalski, Stantec)		Orange	BLACK STAR CANYON	
P-30-100304		Santiago Road Overcrossing Isolates		Resource Name - Santiago Road Overcrossing Isolates; Voided - 30-100042	See also 30-100042	Other	Prehistoric	Survey	AP02	Not for publication	Unknown	1995 (B. Padon, Petra Resources, Inc); 2018 (Hubert Switalski, Stantec)		Orange	BLACK STAR CANYON	
P-30-100460		Isolate (Mano)		Resource Name - Isolate (Mano)		Other	Prehistoric	Survey, Surface collection	AP02	Not for publication	Yes	1991 (J. McKenna, McKenna et al); 2018 (Hubert Switalski, Stantec)		Orange	BLACK STAR CANYON	
P-30-176757		Santiago Dam		OHP Property Number - 152819; Resource Name - Santiago Dam; Other - California Department of Water Resources Dam No. 75-000		Structure	Historic	Survey	HP11; HP21	Unrestricted		2003 (C. D. Cotterman, Chambers Group, Inc)	OR-02918	Orange	BLACK STAR CANYON	3301 Santiago Rd Orange

ATTACHMENT B

NATIVE AMERICAN HERITAGE COMMISSION
SACRED LANDS FILE SEARCH RESULTS

NATIVE AMERICAN HERITAGE COMMISSION

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
Reginald Pagaling
Chumash

SECRETARY
Merri Lopez-Keifer
Luiseño

PARLIAMENTARIAN
Russell Attebery
Karuk

COMMISSIONER
Marshall McKay
Wintun

COMMISSIONER
William Mungary
Paiute/White Mountain Apache

COMMISSIONER
Julie Tumamait-Stenslie
Chumash

COMMISSIONER
[**Vacant**]

COMMISSIONER
[**Vacant**]

EXECUTIVE SECRETARY
Christina Snider
Pomo

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

October 9, 2020

Charles Cisneros
Psomas

Via Email to: Charles.Cisneros@psomas.com

Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Santiago Dam Project, Orange County

Dear Mr. Cisneros:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

      All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was positive. Please contact the Juaneno Band of Mission Indians Acjachemen Nation - Belardes on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Tribal Consultation List
Orange County
10/9/2020

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Diegueno
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Robert Pinto, Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
wmicklin@leaningrock.net

Ewiiaapaayp Band of Kumeyaay Indians
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393 — Gabrieleno
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693 — Gabrieleno
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231 — Gabrielino
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490 — Gabrielino
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street — Gabrielino
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com

Juaneno Band of Mission Indians Acjachemen Nation - Belardes
Matias Belardes, Chairperson
32161 Avenida Los Amigos — Juaneno
San Juan Capisttrano, CA, 92675
Phone: (949) 293 - 8522
kaamalam@gmail.com

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Santiago Dam Project, Orange County.

Native American Heritage Commission
Tribal Consultation List
Orange County
10/9/2020

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 Diegueno
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O Box 270 Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

Pala Band of Mission Indians
Shasta Gaughen, Tribal Historic Preservation Officer
PMB 50, 35008 Pala Temecula Rd. Cupeno Luiseno
Pala, CA, 92059
Phone: (760) 891 - 3515
Fax: (760) 742-3189
sgaughen@palatribe.com

Santa Rosa Band of Cahuilla Indians
Lovina Redner, Tribal Chair
P.O. Box 391820 Cahuilla
Anza, CA, 92539
Phone: (951) 659 - 2700
Fax: (951) 659-2228
lsaul@santarosacahuilla-nsn.gov

Soboba Band of Luiseno Indians
Scott Cozart, Chairperson
P. O. Box 487 Cahuilla
San Jacinto, CA, 92583 Luiseno
Phone: (951) 654 - 2765
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Sycuan Band of the Kumeyaay Nation
Cody Martinez, Chairperson
1 Kwaaypaay Court Kumeyaay
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Santiago Dam Project, Orange County.

ATTACHMENT C

NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY
PALEONTOLOGY RECORDS SEARCH RESULTS

Records Removed for Purposes of Confidentiality

ATTACHMENT D

CONFIDENTIAL DEPARTMENT OF PARKS & RECREATION 523 FORM P-30-001012 (CA-ORA-1012)

Records Removed for Purposes of Confidentiality

ATTACHMENT E

SOUTH ENVIRONMENTAL HISTORICAL RESOURCES EVALUATION REPORT

Historic Property Identification Report

Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California

Prepared For:
Psomas
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707

Prepared By:

2061 N. Los Robles Avenue, Suite 205
Pasadena, California 91104

Authors: Laura Carias, MA and Samantha Murray, MA

November 2023

Table of Contents

Executive Summary iii
1 Introduction 1
1.1 Project Location and Description 1
2 Regulatory Framework 6
2.1 Federal 6
2.2 State 7
2.3 Local 9
3 Survey and Research Methods 13
3.1 Built Environment Survey 13
3.2 Background Research 13
4 Historic Context: Santiago Dam 15
4.1 Rancho Lomas de Santiago 15
4.2 Development of the Irvine Ranch 15
4.3 Consolidation of Orange County Water Districts 19
4.4 Property Types 21
5 Historic Context: Southern California Edison 24
5.1 Organizational History 24
5.2 Transmission Lines 25
5.3 Wooden Distribution Lines 26
6 Identified Resources 27
6.1 Santiago Dam Complex (P-30-176757) 27
6.2 Taiwan 12kV Overhead Distribution Line 41
7 Significance Evaluation 43
7.1 Santiago Dam Complex (30-176757) 43
7.2 Taiwan 12kV Overhead Distribution Line 45
8 Project Effects/Impacts Assessment 48
8.1 Historic Properties Identified 48
8.2 Application of the Criteria of Adverse Effect 48
8.3 Physical Effects of the Proposed Project 49

8.4 Analysis of Potential Adverse Effects 49
9 Findings 50
10 Bibliography 51

Map Figures

Figure 1. Project Location Map 2
Figure 2. Area of Potential Effects Map 5
Figure 3. Orange County California Map, 1889. Shows the Ranchos and the growing population areas of Orange County. Compiled by S.H. Finley. Approximate Project Location in red (Library of Congress, Geography and Map Division) (Finley 1889). 17

Exhibits

Exhibit 1: South elevation of Santiago Dam and view of Irvine Lake, view north (Psomas 2023) . 28
Exhibit 2: South elevation of Santiago Dam, view west (Psomas 2023) 28
Exhibit 3: North elevation of Santiago Dam and outlet tower, view southwest (Psomas 2023) 29
Exhibit 4: View of Santiago Dam concrete spillway, view north (PaleoWest 2021) 29
Exhibit 5: View of Santiago Dam concrete spillway, view north (Psomas 2023) 30
Exhibit 6. Dam Keeper Residence and Garage, view north (Psomas 2023) 31
Exhibit 7. Dam Keeper Residence, primary south elevation, view north (Provided by Psomas: Moeder 2023) 32
Exhibit 8. Dam Keeper Residence, west elevation, view northeast (Psomas 2023) 32
Exhibit 9. Dam Keeper Garage, north elevation, view south (Psomas 2023) 33
Exhibit 10. Second Garage, north elevation, view south (Psomas 2023) 34
Exhibit 11. Storage Shed, north elevation, view south (Psomas 2023) 34
Exhibit 12. OCWR Landfill Flare Facility, view southwest. 35
Exhibit 13. Control Building and Valve Vault, south and east elevations, view northwest (Psomas 2023) 36
Exhibit 14: Base of outlet tower circa 1931 (Courtesy of IRWD) 37
Exhibit 15: Outlet tower under construction circa 1931 (Courtesy of IRWD) 38
Exhibit 16: Spillway crest and chute under construction circa 1931 (Courtesy of IRWD) 39
Exhibit 17: Santiago Dam and outlet tower under construction circa 1931 (Courtesy of IRWD) .. 40
Exhibit 18. Taiwan 12kV Overhead Distribution Line, view north (Psomas 2023) 42

Appendices

Appendix A: DPR Forms
Appendix B: Resumes

Executive Summary

South Environmental was retained by Psomas to complete a Historic Property Inventory Report (HPIR) for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project (proposed project) located in Orange County, California. This report includes the results of an intensive-level pedestrian survey of all built environmental resources over 45 years old within the project's Area of Potential Effect (APE); building development and archival research; recordation and evaluation of the Santiago Creek Dam Complex (P-30-176757) and the Southern California Edison (SCE) Taiwan 12 kilovolt (kV) overhead distribution line for historical significance in consideration of federal, state, and local designation criteria and integrity requirements; and an assessment of project-related effects on historic properties/historical resources.

The report was prepared in conformance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation Title 36 Code of Federal Regulations (CFR) Part 800, the California Environmental Quality Act (CEQA) Section 15064.5 for historical resources, and in consideration of all applicable local guidelines and regulations concerning cultural resources.

One historic property/historical resource was identified within the project APE: the Santiago Dam Complex (P-30-176757), which currently has a status code of 2S2, indicating it has been determined eligible for the NRHP and is listed in the CRHR. The updated evaluation completed as part of the current study found that the Dam remains eligible for the NRHP/CRHR under Criterion A/1. The Dam is eligible for its important historical associations with water resources development in Orange County, as well as with the citrus agriculture industry.

Although specific aspects of the Dam will be modified, it will remain recognizable as an earthen embankment dam and will continue to perform the historic function for which it is eligible. The character-defining features of the Dam necessary for it to continue to convey its historical significance under Criterion A/1 include its ongoing function as an earthen embankment dam on Santiago Creek, maintaining the same general massing and scale. Therefore, the proposed project will result in no adverse effects to historic properties under Section 106 of the NHPA, and no significant impacts to historical resources under CEQA.

1 Introduction

South Environmental was retained by Psomas to complete a Historic Property Inventory Report (HPIR) for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project (proposed project) located in Orange County, California. This report includes the results of an intensive-level pedestrian survey of all built environmental resources over 45 years old within the project's Area of Potential Effect (APE); building development and archival research; recordation and evaluation of the Santiago Creek Dam Complex (P-30-176757) and the Southern California Edison (SCE) Taiwan 12 kilovolt (kV) overhead distribution line for historical significance in consideration of federal, state, and local designation criteria and integrity requirements; and an assessment of project-related effects on historic properties/historical resources.

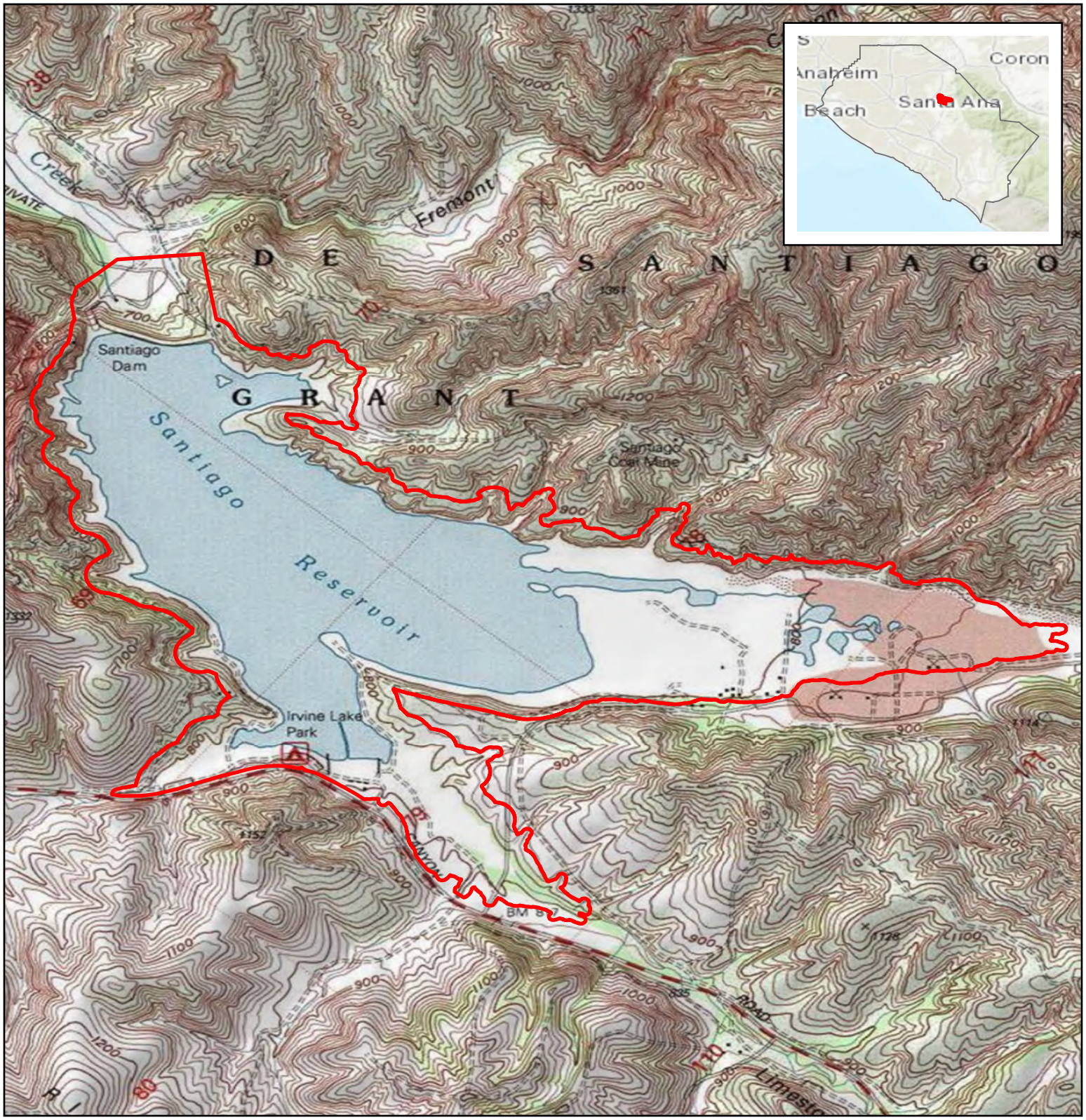
The report was prepared in conformance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation Title 36 Code of Federal Regulations (CFR) Part 800, the California Environmental Quality Act (CEQA) Section 15064.5 for historical resources, and in consideration of all applicable local guidelines and regulations concerning cultural resources.

This report was prepared by South Environmental Senior Architectural Historian Laura Carias, MA and Cultural Resources Director Samantha Murray, MA. All project personnel meet the Secretary of the Interior's Professional Qualifications Standards for Architectural History and History (Appendix B).

1.1 Project Location and Description

1.1.1 Project Location

The project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Figure 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper's house, Irvine Lake pipeline, and dam access road (Figure 2). The project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle within the Santa Ana Watershed. The drainage area for the project encompasses approximately 63.4 square miles.



Source: ESRI USA Topo Maps and World Topo Map 2023

IRWD Santiago Dam Project

Figure 1. Project Location Map

Project Site

Project Location is within unincorporated, California, in Orange County on the USGS Black Star Canyon 7.5-minute quadrangle map in Sections 28, 33, 34, and 35 of Township 04 South and Range 08 West and Sections 2, 3, and 4 of Township 05 South and Range 08 West

Center Coordinate (Decimal Degrees):
Latitude: 33.7759880N Longitude: -117.7150020W

0 1,000 2,000 Feet

Scale: 1:24,000

N

SOUTH ENVIRONMENTAL

1.1.2 Project Description

Project Objectives

The primary objective of the proposed Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities. In implementing the proposed Project, the Districts would:

- Ensure the new facilities meet or exceed the current seismic, safety and design requirements established by the California DWR DSOD, which is the governing state agency associated with this Project;
- Satisfy IRWD and SWD's operational requirements;
- Extend the useful life of the facilities;
- Improve water supply reliability; and
- Minimize impacts to local environmental resources and surrounding property owners.

Project Description

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Environmental Impact Report (EIR).

- The existing outlet tower would be demolished; the portion below the sediment would be filled with concrete and capped with a concrete plug. A new inclined outlet structure would be constructed on the left abutment. Each riser would include an intake fish screen.
- The inlet/outlet works would be configured to incorporate the new structure, including new valves and fittings. Water from the lake would enter into the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow to the Irvine Lake Pipeline (ILP) or the emergency outlet pipeline. Water that enters the ILP would reach the Districts' distribution systems. Water that enters the emergency outlet pipeline would be released at the end of the new spillway.
- The ILP would be increased from 36 inches to 54 inches to match the pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line to improve the hydraulic performance of the system.
- The existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment.
- A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new retaining wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.

- A new dam control building would be constructed to house the valve system at the end of the existing dam crest. The preliminary layout shows a fire-hardened building with dimensions 52 feet by 18 feet and a height of 12 feet.
- The dam crest would be widened from 10 feet to 12 feet with a retaining wall on the downstream side of the crest. The retaining wall would be 1,300 feet in length and would have a height of 10 feet.
- The dam crest would be raised with an approximately 1.5-foot-tall concrete parapet wall on the upstream side of the dam crest.
- A new emergency access walkway (5 feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent landfill during a spillway event. The walkway would connect to the new access road (described above).
- A new steel bridge structure would be included for vehicles across the new spillway.
- Existing structures would be demolished, including the existing outlet tower, portions of the existing spillway, portions of the upstream dam embankment concrete facing, storage building on the dam crest, portions of the outlet works, portions of the ILP, catwalk/stairs across Santiago Creek, and piezometers/monitoring wells.
- The existing Southern California Edison (SCE) overhead power lines and power poles in the vicinity would be relocated outside the construction limits. This relocation would be completed by SCE.
- When construction is occurring, the lake would be dewatered and an access road would be located along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.

1.1.3 Area of Potential Effect

The APE is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties if any such properties exist. Determination of the APE is influenced by a project's setting, the scale and nature of the undertaking, and the different kinds of effects that may result from the undertaking (36 CFR 800.16(d)).

The project APE for built environment resources includes the entirety of the Santiago Dam Complex, which includes Irvine Lake and the Santiago Dam and its associated infrastructure to the north where project-related impacts will occur. The APE Map (Figure 2) identifies all the existing built environment within the APE.

Source: Bing Aerial Imagery 2023

IRWD Santiago Dam Project

Figure 2. APE Map

0 300 600 Feet

N

Scale: 1:6,000

Project Site/APE

Structure

1. Dam
2. Spillway
3. Outlet Tower
4. Storage Shed
5. Control Building and Valve Vault
6. OCWR Landfill Flare Facility
7. Dam Keeper's Residence
8. Dam Keeper's Garage
9. Second Garage
10. Dock
11. Taiwan 12kV Overhead Distribution Line

SOUTH ENVIRONMENTAL

2 Regulatory Framework

2.1 Federal

2.1.1 The National Historic Preservation Act

Section 106 of the NHPA (16 United States Code 470f) requires federal agencies to account for the effects of their undertakings on historic properties, and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. Historic properties are defined as buildings, structures, districts, sites, or objects which are included in or eligible for inclusion in the NRHP. Section 106 is implemented through 36 Code of Federal Regulations (CFR) Part 800, which outlines the process for historic preservation review, including participants, identification efforts, and the assessment and resolution of adverse effects. Per 36 CFR 800.16(y), a federal undertaking is defined as any project requiring or receiving a federal permit, license, approval, or funding. Federal agencies must take steps to determine if the undertaking would result in adverse effect to historic properties and take measures to avoid or resolve those effects as feasible.

2.1.2 National Register of Historic Places

The NRHP is the United States' official list of districts, sites, buildings, structures, and objects worthy of preservation. Overseen by the National Park Service, under the U.S. Department of the Interior, the NRHP was authorized under the National Historic Preservation Act, as amended. Its listings encompass all National Historic Landmarks and historic areas administered by the National Park Service (NPS).

NRHP guidelines for the evaluation of historic significance were developed to be flexible and to recognize the accomplishments of all who have made significant contributions to the nation's history and heritage. Its criteria are designed to guide federal agencies, state and local governments, and others in evaluating potential entries in the NRHP. For a property to be listed in or determined eligible for listing, it must be demonstrated to possess integrity and to meet at least one of the following criteria:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent

a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history.

Integrity is defined in NRHP guidance, How to Apply the National Register Criteria for Evaluation, as "the ability of a property to convey its significance. To be listed in the NRHP, a property must not only be shown to be significant under the NRHP criteria, but it also must have integrity" (NPS 1990). NRHP guidance further asserts that properties be completed at least 50 years ago to be considered for eligibility. Properties completed fewer than 50 years before evaluation must be proven to be "exceptionally important" (criteria consideration G) to be considered for listing.

2.2 State

2.2.1 California Register of Historical Resources

In California, the term "historical resource" includes but is not limited to "any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California" (California PRC Section 5020.1(j)). In 1992, the California legislature established the California Register of Historical Resources (CRHR) "to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change" (California PRC Section 5024.1(a)). The criteria for listing resources on the CRHR were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP, enumerated below. According to California PRC Section 5024.1(c)(1–4), a resource is considered historically significant if it (i) retains "substantial integrity," and (ii) meets at least one of the following criteria:

(1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

(2) Is associated with the lives of persons important in our past.

(3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

(4) Has yielded, or may be likely to yield, information important in prehistory or history.

In order to understand the historic importance of a resource, sufficient time must have passed to obtain a scholarly perspective on the events or individuals associated with the resource. A resource less than 50 years old may be considered for listing in the CRHR if it can be demonstrated that sufficient time has passed to understand its historical importance (see 14 CCR 4852(d)(2)).

The CRHR protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources. The criteria for the CRHR are nearly identical to those for the NRHP, and properties listed or formally designated as eligible for listing in the NRHP are automatically listed in the CRHR, as are the state landmarks and points of interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys.

2.2.2 California Environmental Quality Act

As described further below, the following CEQA statutes and CEQA Guidelines are of relevance to the analysis of archaeological, historic, and tribal cultural resources:

- California PRC Section 21083.2(g) defines "unique archaeological resource."
- California PRC Section 21084.1 and CEQA Guidelines Section 15064.5(a) define "historical resources." In addition, CEQA Guidelines Section 15064.5(b) defines the phrase "substantial adverse change in the significance of an historical resource." It also defines the circumstances when a project would materially impair the significance of an historical resource.
- California PRC Section 21074(a) defines "tribal cultural resources."
- California PRC Section 5097.98 and CEQA Guidelines Section 15064.5(e) set forth standards and steps to be employed following the accidental discovery of human remains in any location other than a dedicated ceremony.
- California PRC Sections 21083.2(b)-(c) and CEQA Guidelines Section 15126.4 provide information regarding the mitigation framework for archaeological and historic resources, including examples of preservation-in-place mitigation measures; preservation-in-place is the preferred manner of mitigating impacts to significant archaeological sites because it maintains the relationship between artifacts and the archaeological context and may also help avoid conflict with religious or cultural values of groups associated with the archaeological site(s).

More specifically, under CEQA, a project may have a significant effect on the environment if it may cause "a substantial adverse change in the significance of an historical resource" (California PRC Section 21084.1; CEQA Guidelines Section 15064.5(b).) If a site is either listed or eligible for listing in the CRHR, or if it is included in a local register of historic resources or identified as significant in a historical resources survey (meeting the requirements of California PRC Section 5024.1(q)), it is a "historical resource" and is presumed to be historically or culturally significant for purposes of CEQA (California PRC Section 21084.1; CEQA Guidelines Section 15064.5(a)). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California PRC Section 21084.1; CEQA Guidelines Section 15064.5(a)).

A "substantial adverse change in the significance of an historical resource" reflecting a significant effect under CEQA means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (CEQA Guidelines Section 15064.5(b)(1); California PRC Section 5020.1(q)). In turn, CEQA Guidelines section 15064.5(b)(2) states the significance of an historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or
2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the PRC or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the PRC, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
3. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

Pursuant to these sections, the CEQA inquiry begins with evaluating whether a project site contains any "historical resources," then evaluates whether that project will cause a substantial adverse change in the significance of a historical resource such that the resource's historical significance is materially impaired.

2.3 Local

2.3.1 Orange County General Plan

Chapter VI. Resources Element; Cultural-Historic Resources

Preservation of Orange County's significant archaeological, paleontological and historical resources in a manner that both preserves the site and is compatible with development is desirable. The County encourages early identification of significant resources in order that cultural resources can be given major consideration in land use planning.

Goals, Objectives, and Policies: Cultural-Historic Resources

Goal 1. To raise the awareness and appreciation of Orange County's cultural and historic heritage.

Objectives

1.1 Facilitate and participate in activities that inform people about the social, cultural, economic, and scientific values of Orange County's heritage.

1.2 Work through the Orange County Historical Commission in the areas of history, paleontology, archaeology, and historical preservation.

Policies

1.1 To stimulate and encourage financial support for projects in the public and private sector.

1.2 To coordinate countywide programs and be the liaison for local organizations.

1.3 To advise and aid the public and private sectors in meeting museum needs and finding funding sources for same.

1.4 To stimulate and encourage research, writing, and publication of articles on Orange County subjects.

1.5 To develop and maintain a County archive for historically valuable records.

1.6 To encourage and facilitate cooperation among local historical societies.

Goal 2. To encourage through a resource management effort the preservation of the county's cultural and historic heritage.

Objectives

2.1 Promote the preservation and use of buildings, sites, structures, objects, and districts of importance in Orange County through the administration of planning, environmental, and resource management programs.

2.2 Take all reasonable and proper steps to achieve the preservation of archaeological and paleontological remains, or their recovery and analysis to preserve cultural, scientific, and educational values.

2.3 Take all reasonable and proper steps to achieve the preservation and use of significant historic resources including properties of historic, historic architectural, historic archaeological, and/or historic preservation value.

2.4 Provide assistance to County agencies in evaluating the cultural environmental impact of proposed projects and reviewing EIRs.

2.5 Provide incentives to encourage greater private sector participation in historic preservation.

Policies

The following policies addressing archaeological, paleontological, and historical resources shall be implemented at appropriate stage(s) of planning, coordinated with the processing of a project application, as follows:

- Identification of resources shall be completed at the earliest stage of project planning and review such as general plan amendment or zone change.
- Evaluation of resources shall be completed at intermediate stages of project planning and review such as site plan review, subdivision map approval, or at an earlier stage of project review.
- Final preservation actions shall be completed at final stages of project planning and review such as grading, demolition, or at an earlier stage of project review.

Historic Resources Policies

1. To identify historic resources through literature and records research and/or on-site surveys.

2. To evaluate historic resources through comparative analysis or through subsurface or materials testing.

3. To preserve significant historic resources by one or a combination of the following alternatives, as agreed upon by RDMD and the project sponsor:

a) Adaptive reuse of historic resource.

b) Maintaining the historic resource in an undisturbed condition.

c) Moving the historic resource and arranging for its treatment.

d) Salvage and conservation of significant elements of the historic resources.

e) Documentation (i.e., research narrative, graphics, photography) of the historic resource prior to destruction.

Goal 3. To preserve and enhance buildings structures, objects, sites, and districts of cultural and historic significance.

Objectives

3.1 Undertake actions to identify, preserve, and develop unique and significant cultural and historic resources.

3.2 Develop and maintain a County archive for historically valuable records, thereby promoting knowledge and understanding of the origins, programs, and goals of the County of Orange.

Policies

3.1 To pursue grants and innovative funding strategies for acquisition or development of significant properties.

3.2 To develop, utilize, and promote effective technical conservation and restoration strategies.

3.3 To appraise, collect, organize, describe, preserve, and make available County of Orange records of permanent, historical value.

3.4 To serve as a research center for the study of County history

2.3.2 Orange County Municipal Code

Sec. 7-9-42.2. - Definitions

Historic structure. Any structure that is:

(1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

(2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of Interior; or

(4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either by an approved state program as determined by the Secretary of the Interior or directly by the Secretary of the Interior in states without approved programs.

3 Survey and Research Methods

3.1 Built Environment Survey

A survey of all built environment within the APE was completed by Psomas on July 17, 2023. The survey included documenting all built environment with notes and photographs, as well as the immediate setting.

3.2 Background Research

3.2.1 Previous Evaluations of the Santiago Dam (30-176757)

The Santiago Dam is listed in the Office of Historic Preservation's (OHP's) Built Environment Resources Directory (BERD) with a status code of 2S2, indicating it was determined eligible for the NRHP by consensus through the Section 106 process and is listed in the CRHR.

The Santiago Dam was first recorded and evaluated for historical significance by Carey D. Cotterman of Chambers Group, Inc. in 2003, who found the dam eligible under NRHP Criterion A for its important historical associations (Cotterman 2003:3, see Appendix A, DPR Forms):

> The water provided by the creation of Santiago Dam and Reservoir contributed significantly to the early and mid-20th century development of the citrus industry in Orange County, which was a leading supplier of oranges, lemons, and grapefruit to the entire nation at that time. Therefore, given its strong association with the history of water resources development in Orange County, as well as with the citrus agriculture industry on not only a regional but on a state and national level, the dam is recommended eligible for listing on the NRHP under Criterion A. Because the dam has undergone little modifications since its construction, it retains good integrity of location, design, materials, workmanship, and association.

In 2021, PaleoWest LLC prepared a Continuation Sheet update to Cotterman's 2003 evaluation stating they "found no evidence to indicate that the historic integrity of the Santiago Dam has been compromised subsequent to its initial recordation in 2003. Therefore, PaleoWest, LLC concurs with the 2003 recommendation that the Santiago Dam is eligible for listing on the NRHP under Criterion A at the local, state, and national level and retains sufficient integrity to convey that historical significance" (PaleoWest LLC 2021:1 see Appendix A, DPR Forms).

Neither of these studies appear to have addressed the eligibility of other aspects of the Dam Complex, such as the Dam Keeper's Residence, Dam Keeper's Garage, Second Garage, Storage Shed, Orange County Waster & Recycling (OCWR) Landfill Flare Facility, or Control Building and Valve Vault.

3.2.2 Psomas-Provided Materials

South Environmental reviewed all background materials provided by Psomas regarding the dam. These materials included previously conducted built environment studies, historic photographs and current architectural and engineering plans.

3.2.3 Historical Newspaper Search

South Environmental reviewed all available historical newspapers covering the APE in an effort to understand the development of the project APE and surrounding areas and to review relevant articles pertaining to Santiago Dam development and other structures within the project APE.

3.2.4 Sanborn Fire Insurance Maps

South Environmental reviewed Sanborn Fire Insurance Company maps, available on the Los Angeles Public Library website, to understand the development of properties in and around the project APE. No Sanborn maps were available for the location of the project APE.

3.2.5 Historical Aerial Photographs

South Environmental reviewed all available historic topographic maps and aerial imagery to understand the development history of the project APE. Historic topographic maps of the APE were available from USGS topoView for various years for the Black Star Canyon (1949, 1950, 1967, 1974, 1997, 2012, 2015, 2018, 2022) Quadrangle. Historic aerial photographs of the APE were available from Nationwide Environmental Title Research LLC (NETR) for the years 1946, 1948, 1952, 1963, 1966, 1967, 1972, 1980, 1981, 1985, 1987, 1988, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2002, 2003, 2004, 2005, 2009, 2010, 2012, 2014, 2016, 2018, and 2020 and from the University of California, Santa Barbara, FrameFinder Maps for the years 1931, 1938, 1947, 1952, 1960, 1969, 1977, 1983, 1989, 2002, and 2007 (NETR var., UCSB var.).

4 Historic Context: Santiago Dam

The following historic context is adapted from Donovan-Boyd, Kaiser, and Murray 2021.

4.1 Rancho Lomas de Santiago

Extensive land grants or ranchos were established in the interior during the Mexican period (1822-1848), in part to increase the population inland from the more settled coastal areas where the Spanish first concentrated their colonization efforts. The APE is located in Ranchos Lomas de Santiago, originally owned by José Antonio Yorba's youngest son, Teodocio Yorba. Yorba was granted Rancho Lomas de Santiago (Ranch of the Hills of St. James) in 1846, just before California was annexed to the United States at the end of the Mexican American War. The Yorba family was one of the most successful landowners in Southern California during the Mexican Period. Beginning in the 1840s and 1850s, the Yorba family had acquired six adjoining ranchos (Nelson 2009:2). Yorba filed a United States claim for the Rancho Lomas de Santiago in 1852.

Teodosio Yorba sold Rancho Lomas de Santiago to William Wolfskill in 1860 for $7,000 and Joseph E. Pleasants took charge of Wolfskill's new cattle operations. Already overgrazed, and largely unfarmable due to its steep, hilly terrain, the Santa Ana range could not sustain large cattle herds. In 1866, Benjamin and Thomas Flint, Llewellyn Bixby and James Irvine acquired the rancho from Wolfskill, and it eventually became part of the Irvine Ranch (Irvine Historical Society 2020).

4.2 Development of the Irvine Ranch

The APE is located in the northern portion of what would become known as the Irvine Ranch, one of the largest, most prosperous agricultural operations in Orange County. William Wolfskill purchased the land that would become the Irvine Ranch from Teodocio Yorba in c. 1860 with plans to use the land for grazing sheep (Nelson 2009:2). Wolfskill was a California pioneer, and a prolific landowner, businessman, and rancher. He is also credited with being one of California's first Valencia orange ranchers (OCHC 1983: Section 8). In 1866, Wolfskill sold the 47,000-acre property to Benjamin and Thomas Flint, Llewellyn Bixby, and James Irvine (Irvine Historical Society 2020). Flint and Bixby were also sheep men, who were expanding their land holdings to increase their annual production of wool (Nelson 2009:2).

James Irvine, a pioneer of California agriculture and prosperous San Francisco merchant, purchased the Flint and Bixby shares of the Rancho Lomas Santiago in 1876 for $150,000 dollars. This gave Irvine control of approximately 110,000 acres of land in and around the Santa Ana Canyon (Nelson 2009:3). Irvine, an Irishman, came to America in 1846, and lived for a time in New York City. He came to California in 1849, to find his fortunes in the California Gold Rush. After working in the mines for several years, Irvine began selling merchandise to miners, and eventually established a successful market in San Francisco (The San Francisco Examiner 1886:3). James Irvine died in 1886, leaving his estate to his

son, James Irvine Jr. George Irvine, James Irvine Sr.'s brother, managed the property until Irvine Jr. came into possession of the estate at the age of 25 (Nelson 2009:2; The Mail 1886:2).

When James Irvine Jr. took over the estate in 1892, he converted the ranch into an "increasingly modern, productive enterprise of field crops, grain and irrigated orchards," which was achieved by digging wells, building reservoirs, and laying pipeline to irrigate the crops (Nelson 2009:3). In 1893, Irvine Jr. began to divert water from Santiago Creek to an area known as "The Flats" where the property's new ranch house was located. Also, in the 1880s, Irvine Jr. began to lease land to tenant farmers. These farmers grew grain and bean crops that required minimal rainfall and little to no irrigation. Historic aerials from 1946 suggest the Project site was never brought under agricultural use during the Irvine ownership. While the Project site does not appear to have been cultivated, the road through Santiago Canyon, along the Santiago Creek, that eventually becomes Santiago Canyon Road, is visible on the 1901 topographic map of the area in generally the same orientation as it found today.

4.2.1 The Irvine Company

In 1894, James Irvine Jr. incorporated the Ranch as the Irvine Company and became the company's first president (Brower 2013: xxi). One of James Irvine Jr's first acts as president was to donate 160 acres of land, that had long been a popular pioneer picnic spot, to the State Board of Supervisors. This donation, land northeast of Irvine Lake, became the Irvine Ranch Historic Park, which is now the oldest park in Orange County (OCHC 1983: section 8). Around this same time, in 1889, Orange County formed out of parts of Los Angeles County (Figure 3). When Orange County was formed, the Irvine Company owned almost one-fifth of the County's acreage.

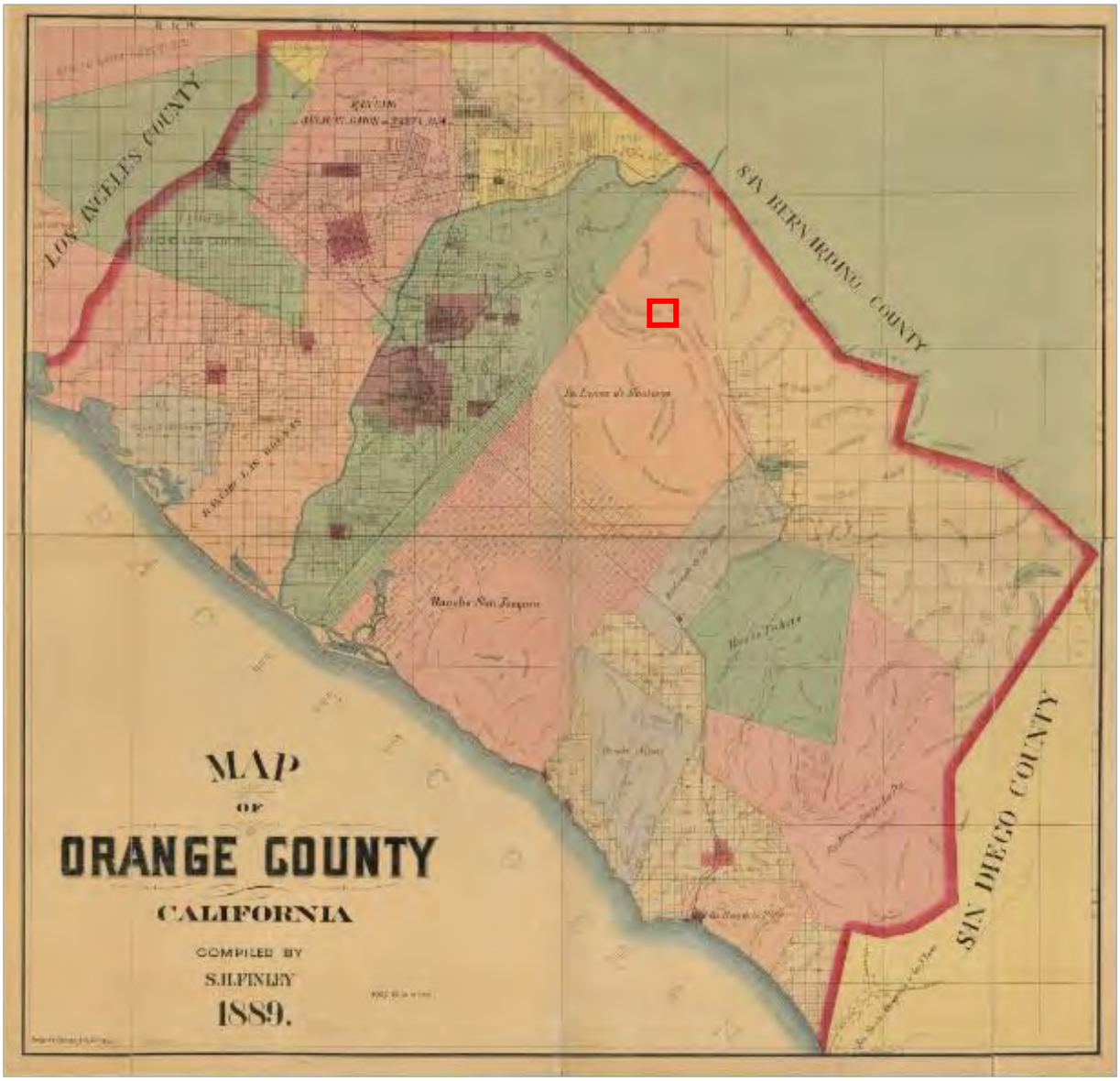


Figure 3. Orange County California Map, 1889. Shows the Ranchos and the growing population areas of Orange County. Compiled by S.H. Finley. Approximate Project Location in red (Library of Congress, Geography and Map Division) (Finley 1889).

Irvine Ranch quickly became one of the most productive tracts in California, known for the growing of lima beans, black-eyed peas, barley, oats, sugar beets, olives, walnuts, lemons, and oranges (Santa Ana Daily Register 1915:8). As the tenants on the Irvine Ranch increased, James Irvine Jr. developed an extensive system of wells to irrigate the land (Nelson 2009:7). By 1920, it is estimated that nearly 1,200 wells had been drilled on his acreage and many were running with electric pumps. By 1930, the Irvine Ranch had 31,000 acres of lima beans under cultivation, which was often described as the "largest lima bean field in the world" (Nelson 2009:7).

In 1935, James Irvine III (known as Jase), Irvine Jr.'s oldest son, tragically died of tuberculosis. Jase was on track to be the president of the Irvine Company and his death left James Irvine Jr. distraught and without sound leadership for the future of the company (Brower 2013: xxi). Several years later, in 1937, James Irvine Jr. established the James Irvine Foundation with 51% of the company's stock to be held by the foundation and the other 49% to be distributed to family (Brower 2013: xxii).

4.2.2 Irvine Ranch Water Management Facilities

Ongoing water quality problems and water scarcity made it clear that further work was necessary to irrigate crops at Irvine Ranch. The water conveyance facilities on the Ranch became one of the largest water management systems in Orange County. The first distribution irrigation feature on the Irvine Ranch property was the Irvine Ditch, constructed in 1893 from the Santiago Canyon to the Peters "Flats" (near the present-day location of the Peters Canyon Dam, which is approximately 2 miles to the west of the Project site). Wells were the primary source of water at the turn of the century, with 1,200 wells constructed in the area, most equipped with electric pumps. These wells allowed for large citrus orchards to be planted starting in 1906 (Nelson 2009: 17).

Irvine began to construct a series of winter water conservation features on the Ranch starting in the 1920s. Water runoff and irrigation rights were a constant struggle between the Irvine, Carpenter, and Serrano Irrigation Districts and the conservation projects were an effort to offset the marked decline in his groundwater system. P. R. Browning was the principal designer of all the Ranch's water conservation facilities except for the Santiago Dam which was designed by Augustus Kempkey (Nelson 2009:7). The dispute between the competing irrigation districts was eventually settled in 1928, with an agreement between the three litigants that led to the construction of the Santiago Dam and Outlet Tower (Nelson 2009:8). This period also saw the establishment of a massive irrigation system on the site (Brower 2013: xxi). In 1950, there were 4,550 irrigated acres and 33,430 dry farming acreage. Just ten years later, the Irvine company had increased the irrigated acreage to 7,417 acres and dry farming acres accounted for only 16,853 acres (Nelson 2009: 18).

County-wide flood control bonds failed to gather appropriate support in 1929 and 1931, leaving James Irvine Jr. to complete some large-scale water management projects without government support. Flood control created both land security and pooled runoff water for domestic and agricultural uses. Irvine was increasingly worried about water rights, and in 1932 he filed suit against upper basin users to protect the rights to the Santa Ana River (OCWD 2015: 24). The following water conservation projects were completed on the Irvine Ranch Site between 1929 and 1959: Lambert Reservoir (1929); Santiago Dam (1931); Irvine Conservation Dam (1932); Peters Canyon Dam (1931); the High Line Canal (1930s); Laguna Reservoir (1937-38); Bonita Reservoir (1937-38); Little Peters Reservoir (1940); Sand Canyon Reservoir (1942); Syphon (sometimes spelled Siphon) Canyon Dam (1948-49); and the Rattlesnake Canyon Reservoir (1959) (Nelson 2009:8). In 1970, the construction of the Irvine Lake Pipeline brought water from the Colorado River to the Rattlesnake Canyon Reservoir.

4.3 Consolidation of Orange County Water Districts

While the Irvine Ranch was creating a sophisticated water system for Ranch operations, the rest of Orange County was using a patchwork method of establishing water rights. Early water conveyance developments in Orange County generally organized as groups of property owners that banded together to provide water services through groundwater wells, these co-ops were called "mutuals." The mutuals sold shares of water to landowners based on the number of acres held by each property owner. As metropolitan areas grew it became clear that the current system, collections of property owners, would not be sufficient for the rapidly growing population in Orange County (MWDOC 2017).

In 1928, several southern Orange County cities banded together to form the Metropolitan Water District of Southern California (MWD) with the lofty goal of importing water from the Colorado River. The MWD succeeded in the planning and construction of the Colorado River Aqueduct, which, starting in 1939, brought water from the Colorado River near the Arizona border to the east side of the Santa Ana Mountains. This ongoing consolidation of the cooperative system became a necessity as water became Southern California's most precious resource. In 1957, there were an estimated 151 of these mutual water groups remaining in Orange County. By 1963, it was estimated that by 1965, no more than 25 would remain. Postwar population growth further encouraged the consolidation of mutuals and districts and in other areas, growth brought city services within reach of previously rural areas (LAT 1963c:2).

The success of the MWD, and the continued need for more water lead to the formation of several other large districts who hoped to tap into Colorado River water as well as Northern California water from the State Water Project. Developments continued into the 1960s and 1970s to move water through areas in eastern Orange County. The Santiago lateral, completed in 1961, and the East Orange County Feeder Line No, 2, both extended water into the southeast section of the County (LAT 1961a: E:2; LAT 1961b: 52).

4.3.1 Irvine Ranch Water District

The IRWD was formed by the Irvine Company in 1961 as a California Special District with headquarters in Irvine. Orange County approved the boundaries of the District in December of 1960, with the District being bound on the west by Newport Avenue, the south by the Santa Ana Marine Corps Air Facility, the east by the Rancho Canada De Los Alisos, and the north by the Coastal Municipal Water District (LAT 1960: R-28cia). The District's boundaries initially included approximately 60 square miles (IRWD 2021: Liquid News). Initially, the IRWD served mainly agricultural customers, but the quickly growing Orange County population included many residential customers in need of water. The IRWD grew through annexations in the 1960s and 1970s and by 1991, the District provided water to one-sixth of Orange County (LAT 1991: A3).

As water districts became more established, growth continued through consolidation of districts. Between 1997 and 2008, the IRWD consolidated with five other water districts, including the South

Coast Water District in 2006. Other districts that joined the IRWD include: Orange Park Acres Mutual Water Company (2008), Los Alisos Water District (2001), Carpenter Irrigation District (2000), and the Santa Ana Height Mutual Water Company in (1997) (IRWD 2021: Consolidations). Today the IRWD serves more than 425,000 residential customers and spans 181 square miles (IRWD 2021: Liquid News).

4.3.2 Serrano Irrigation District

The Serrano Irrigation District, now known as the Serrano Water District (SWD), was developed in 1876 by a consolidation of several water companies and associations privately-owned by ranchers and farmers in Villa Park. The Serrano Water Association, the John T. Carpenter Water District, and the Irvine Company came together in 1927 to form the Serrano Irrigation District as a public corporation under the Irrigation Districts Act of the State of California. "This enabled the district to hold elections to establish the bonds to finance their share of the construction of the Santiago Dam." (OAC n.d.). The Serrano Irrigation District was responsible for issuing bonds and borrowing money for the construction of the Santiago Dam and The Irvine Company provided the land (Serrano Irrigation District n.d.).

In the early 1960s, the decrease in need for agricultural water led the district to build a water filtration plant and then later reservoirs at Sycamore and Taft to use water from the Irvine Lake for residential use (Serrano Irrigation District n.d.). Today, the district has 43 miles of pipe, three wells, two reservoirs, and one treatment plant. The district owns fifty percent of Irvine Lake and is the managing district for Irvine Lake (Serrano Water District 2023).

4.3.3 Post St. Francis Dam Disaster Development (1928-1947)

In 1928 the St. Francis Dam, located in the Santa Clara Valley just outside Los Angeles, failed, killing 430 people, destroying 1,250 buildings and 7,900 acres of farmland, to become one of the greatest dam failure disasters of the 20th century. Between 1929 and 1931, the State engineer examined 827 dams and found near one third of them to require significant repairs according to new safety guidelines.

In 1929, the State of California also required any person that practices civil engineering or any of its branches to be registered with the state. This also included any person that acted in the position of an "assistant engineer" or higher. The state also created a board which developed standards for applicants that wanted to register with the state as an engineer. Some standards included: must be over 25 years of age, demonstrate no less than six years of professional experience, work references, and an application fee (Rogers n.d.).

4.4 Property Types

The following discussion of property types is adapted from Murray et al 2020:

Reservoir complexes, like Irvine Lake, are usually comprised of several elements including the water-retaining structure (dam), a water-retention area (reservoir), a water-releasing structure (spillway), a water-conveying structure (conduits and outlet tower), and other essential elements including water treatment plants (Zhang et al 2016). Each of these portions of the reservoir provides an essential function that ensures water will be retained and released safely.

4.4.1 Dams

The purpose of a dam is to store water and facilitate flood control for human and livestock water supply, irrigation, energy generation, recreation, and pollution control. Typically, dams fulfill a combination of these functions. Manmade dams are classified according to their type of construction, materials, slope, seepage control method, and resistance to the forces of water pressure. The materials used to construct modern dams included earth, rocks, concrete, masonry, steel, timber, rubber, and sometimes a combination of these materials. Dams can be classified into five basic types including embankment, concrete, gravity, buttress, and arch (ASDSO 2020).

Embankment Dams

Embankment dams are a type of massive dam that is built with natural materials, either rock or earth instead of concrete, leading to the sub-classification of earth-filled embankment dams and rock-filled embankment dams. The basic elements of embankment dams consist of a core, an earth- or rock-filled embankment on both sides, and protection on the upstream face. Embankment dams are trapezoidal in shape and resist the flow of water by both their strength and weight. Embankment dams can retain water because they have a low permeability throughout the structure or a layer of low-permeability material (Billington et al. 2005; TCEQ 2018).

Earth-filled Embankment Dams

Earth-filled embankment dams were the first type of dam to be constructed by humans and were first documented in approximately 3,000 BC in the Middle East. In fact, earth-filled embankment dams are still the most prevalent dam-type, and a 2005 report on large federal dams estimated that of the 70,000 dams present in the United States, 85% were earth-filled embankment dams. Many of the dams in the United States were built in the early twentieth century prior to the advent of technology that would have facilitated the construction of structural dams. However, the report goes on to say that throughout the twentieth century, even with the advent of new technology, 65% of the dams built were earth-filled embankment dams. Earth-filled dams are the most prevalent type of dam because they can be built from locally available materials that require minimal processing, saving money on the construction process. The main detraction from earth-filled dams is that they are subject to the erosive

action of water if a sufficient spillway is not provided as part of the dam design (Billington et al. 2005; Bureau of Reclamation 1987). Examples of other earth-filled embankment dams in Orange County include:

- Peters Canyon Dam (1929)
- Villa Park Dam (1963)
- Seven Oaks Dam (1993)

4.4.2 Reservoirs

A reservoir is typically formed by the construction of a dam across a linear water source, such as a river or creek, to create an artificial lake where water is stored. The adjacent dam is responsible for the amount of water that flows out of the reservoir, therefore controlling its water level. The amount of water in a reservoir can also be controlled by natural elements including rainfall, snowfall, and droughts. In conjunction with storing water, reservoirs often become recreation centers for boating and fishing. The water in a reservoir is very still causing sediment to sink to the bottom which over time can reduce the total amount of water in the reservoir (NG 2020).

4.4.3 Spillways

A spillway is a structure used for the control of flood flows and diverting surplus water from a reservoir after it has been filled. The primary purpose of a spillway is to ensure water does not overtop the dam and destroy it. A controlled spillway manages flood water through the use of gates, where an uncontrolled spillway only utilizes the elevation of the spillway crest to control the water. The gates allow small amounts of water to be released to prevent a sudden large discharge of water which could cause the dam to fail. There are seven types of spillways including straight drop, ogee, shaft, chute, side channel, siphon, and labyrinth (PE 2019).

4.4.4 Outlet Towers

The outlet tower is a vertical structure located within the reservoir used for capturing water and conveying it to a hydroelectric or water-treatment plant. The tower sits above an outlet tunnel or pipe used to transport the water out of the reservoir which is controlled by the opening and closing of valves or gates. The value controls are usually located in a room at the top of the outlet tower (BDS 2020).

4.4.5 Secondary Property Types

Unlike the primary property types discussed above, secondary property types are not necessarily vital to keeping the reservoir complex running. Although secondary property types range greatly in their design and function, they are frequently associated with dam and reservoir sites. Examples of

secondary property types include Dam Keeper's houses, cisterns and water tanks, pumping stations, wells, vaults, and any other components the larger water system built to support the reservoir complex.

- Dam Keeper's House: a small purpose-built cottage constructed to house the dam's keeper who moderated water levels in response to drought and heavy rain
- Cistern and Water Tank: an artificial reservoir, tank, or container used for the storing or holding of water on a dam site
- Pumping Station: Building(s) of this type can vary in size, their function is to house machinery that transport water from one site to another.
- Well: An excavation or structure created by digging, driving, or drilling to access water underground

5 Historic Context: Southern California Edison

SCE's Historic-Era Electrical Infrastructure Management Program (HEIMP) requires examination of electrical infrastructure in consideration of three major themes: 1) association with SCE's organizational history; 2) association with SCE's construction and implementation campaigns or the established period of significance for 66kV, 220kV, and 500kV systems; and 3) association and embodiment of SCE's architectural programming and aesthetic ideology at SCE Substations (Tinsley Becker et al 2017). The following historic context examines relevant portions of these major themes in consideration of the types of SCE resources identified within the APE (see Section 6, Identified Resources), referencing information from the HEIMP and other relevant sources throughout.

5.1 Organizational History

The West Side Lighting Company was formed by a syndicate of businessmen from Los Angeles in 1896. One year later, the company merged with General Electric to become the new Edison Electric Company of Los Angeles. Soon after, the newly formed Edison Electric Company began to look for additional power supplies in Downtown Los Angeles and purchased the Southern California Power Company in 1898. Over the next few years, Edison merged with other electric lighting and power companies, expanding its footprint beyond Los Angeles to areas as far as Santa Barbara and Redlands. By 1909, the Edison Electrical Company provided service to over 600,000 customers across five counties. "To reflect this expanded presence, the company was reincorporated as the Southern California Edison Company (SCE)." (Williams et al 2016).

In the early part of the twentieth century, SCE continued to expand its service territory throughout Southern California, beginning construction of the Long Beach Steam Plant in 1910 and new 66kV steel tower transmission lines to upgrade the old 33kV network of wood poles. After successfully merging with Henry Huntington's Pacific Light and Power Company (PLPC) in 1916, SCE added 69 additional communities to its service territory. SCE then focused its efforts on expanding the existing 150kV Big Creek Hydroelectric System, upgrading it to 220kV in 1923. In the 1920s SCE undertook a massive building campaign which included "dams and reservoirs, building of powerhouses, rail lines, and tunnels, as well as support camps replete with food and housing for workers, recreation and entertainment offerings, medical facilities, and administrative offices." (Williams et al 2016)

In 1930, SCE contracted with the U.S. Department of the Interior to generate power for construction of the Hoover Dam. Similar contracts were established between the U.S. federal government and the City of Los Angeles and Southern Sierras Power Company (SSP) in order to pay for project costs over a 50-year period. Initially constructed for the purpose of powering construction of the Hoover Dam, the SSP Boulder Dam to San Bernardino Transmission line went into service in 1931. Upon completion of the dam, the line carried electricity to San Bernardino. This line was acquired by SCE as part of the 1964 Calectric merger (Tinsley Becker et al 2017).

Calectric and SCE had overlapping service territories from approximately 1917 until 1964 throughout the Los Angeles Basin and Inland Empire. In order to improve costs, Calectric was acquired by SCE in 1964. This was last major merger/change in the company's organizational history (Tinsley Becker et al 2017).

5.2 Transmission Lines

In the first part of the twentieth century, SCE was continuing to expand in response to a growing Southern California region. "By 1904 the common voltage capacity of transmission lines was reported to be 66,000 volts (66kV), which was considered the minimum voltage necessary for lighting plants in major United States cities." (Tinsley 2017). The earliest identified steel lattice towers within the existing SCE System were installed for the Kern River-Los Angeles Transmission Line in 1907. Shortly thereafter, SCE implemented additional all-steel lattice tower lines throughout its 66kV system. In 1910, SCE began construction of its Long Beach Steam Plant and implemented a new 66kV transmission line system to replace the old 33kV wooden pole lines that had been installed at the end of the 19th century. By 1912, double-circuit 66kV towers were widely used, coinciding with the completion of the Long Beach Steam Plant between 1910 and 1914 (Tinsley Becker et al 2017).

The SCE Big Creek Hydroelectric System East-West Transmission Line was put into service in 1912-1913 to carry 150kV from the Big Creek Hydroelectric System in the Sierra National Forest northeast of Fresno to the Eagle Rock Substation in Los Angeles. The purpose of the 241-mile transmission line was to convey electricity from the powerhouses at Big Creek to Los Angeles for distribution to SCE service territories (Tinsley Becker et al 2012). The East and West lines were upgraded in 1922-1923 to carry 220kV, doubling the capacity of the lines (Pomona Progress 1922). In May 1923, the last span of the 241-mile 220kV transmission line was tied in, touted as being "the world's greatest achievement in long distance, high voltage transmission." (The Bulletin 1923). SCE continued to develop the Big Creek Hydroelectric System into the 1920s with the construction of dams, reservoirs, powerhouses, rail lines, and tunnels. Additionally, updates were made to the existing East and West Transmission Lines, with new lines installed to convey electricity between Big Creek and Los Angeles.

"By 1930 the backbone of SCE's 66kv and 220kV system was fully developed and included the use of 220kV double-circuit towers and 66kV multi-circuit towers ranging from 4 to 14 circuits." (Tinsley Becker et al 2017). SCE continued to develop new tower types for its 220kV system into the 1930s, creating larger single- and double-circuit towers inspired by old designs. These designs became standard, 'off the shelf' tower types by the 1940s.

The identified period of significance for 66kV and below transmission lines is 1907-1930, which includes the construction of the Kern River-Los Angeles Transmission Line in 1907 through completion of the 66kV system by 1930 (Tinsley Becker et al 2017).

5.3 Wooden Distribution Lines

The use of wood pole support structures for electrical transmission or distribution lines represents borrowed technology from the telegraph transmission system, and the technology itself has changed little over time. Wood poles carry the electrical wires (with voltages 33kV and below) on cross arms or via a connection to their insulators. Given this lack of change in technology and appearance over time, it is difficult for a wooden distribution line to convey a particular period of significance in electrical infrastructure history, and by extension, to any significant themes and associations (Tinsley Becker et al. 2017, Williams 2023).

> The "typical" life of a wood pole transmission or distribution line structure is 50 years, although some last longer and others deteriorate much sooner. Wood pole supported transmission or distribution lines over 50 years of age usually lack original integrity of materials despite substantially retaining the look and feel of the original wood-pole transmission or distribution line. Replacement wood-poles or hardware parts, therefore, can continue the utilitarian historic fabric representative of the original potentially historic transmission or distribution line structures because of the lack of any distinct engineering or architectural attributes. The common and indistinctive nature of wood-pole transmission or distribution line structures disqualify them as potentially National Register eligible. They are purely functional and utilitarian in use and common in appearance (Tinsley Becker et al. 2017:64).

6 Identified Resources

6.1 Santiago Dam Complex (P-30-176757)

6.1.1 Property Description

The Santiago Dam Complex consists of the various dam components (i.e., the dam, spillway, outlet tower), reservoir, and associated structures, including the Dam Keeper's Residence and Garage, Storage Shed, Second Garage, Control Building and Valve Vault, Boat Dock, and the OCWR Landfill Flare Facility which sits above the dam on a ridge to the west. All of these elements are numbered on the APE Map and referenced throughout the discussion below (Figure 2).

Dam Components

The Santiago Dam is an earthen and concrete structure constructed in 1931 (Exhibit 1) (APE Map #1). It contains 1.1 million cubic yards of clay, porous clay and rock that was moved in for its construction. The upstream portion of the dam was filled with clay material to prevent water seepage and has a 2.5 to 1 slope and is capped with concrete blocks that measure six feet by 6 inches thick (Exhibit 2). The Irvine Lake (also called the Santiago Creek Reservoir) has a storage capacity of approximately 25,000-acre feet of water. The Dam's footprint features a gentle "S" curve, with a concrete spillway at its west end (APE Map #2). Eight narrow pylons support a 12-foot-wide concrete catwalk that extends over the spillway (Exhibit 3). Safety railings for the catwalk are provided by 4-foot-high concrete parapets (Exhibit 4). An outlet tower is located southwest of the spillway (Castells 2021)(APE Map #3).

Exhibit 1: South elevation of Santiago Dam and view of Irvine Lake, view north (Psomas 2023)

Exhibit 2: South elevation of Santiago Dam, view west (Psomas 2023)

Exhibit 3: North elevation of Santiago Dam and outlet tower, view southwest (Psomas 2023)

Exhibit 4: View of Santiago Dam concrete spillway, view north (PaleoWest 2021)

Exhibit 5: View of Santiago Dam concrete spillway, view north (Psomas 2023)

Associated Buildings and Structures

Dam Keeper Residence and Garage

The Dam Keeper Residence and Garage were constructed in 1931 and are visible in the 1938 historic aerial photograph (APE Map #7, #8). The Dam Keeper Residence is a one-story, single-family residence located on a hill east of the dam with a front gabled roof clad in composition shingles (Exhibit 6). The residence is clad in vertical clapboard siding. The primary elevation faces south and features a covered porch located under a secondary front gabled roof (Exhibit 7). There are three replaced single-hung windows at the primary elevation. The west elevation consists of a screened porch that extends almost the entire width of the building. The porch cantilevers over the hill and provides a full view of the dam (Exhibit 8).

Directly south of the residence, across the asphalt paved driveway, is a two-car garage with a front facing gable clad with composition shingles (APE Map #9). The building features narrow, horizontal wood siding and north facing primary elevation. The garage does not have a door, rather the interior has been modified and sectioned off, now featuring a smaller room within the garage. Single hung windows are visible on the east, west, and south elevations (Exhibit 9).

Alterations to the Dam Keeper Residence include replacement of all original windows and siding. The siding may have been replaced in the 1980s, but the windows were likely replaced more recently.

Exhibit 6. Dam Keeper Residence and Garage, view north (Psomas 2023)

Exhibit 7. Dam Keeper Residence, primary south elevation, view north (Provided by Psomas: Moeder 2023)

Exhibit 8. Dam Keeper Residence, west elevation, view northeast (Psomas 2023)

Exhibit 9. Dam Keeper Garage, north elevation, view south (Psomas 2023)

Second Garage

A second garage is located approximately 190 feet south of the Dam Keeper Residence and Garage along an asphalt and gravel driveway (APE Map #9). Although it appears that other garages with smaller footprints were once located in the same vicinity, the current Second Garage first appears in a 2002 historic aerial. The garage is located at the base of hill. It has a rectangular floor plan and a front gabled roof clad in composition shingles. The Second Garage is clad in vertical clapboard siding and the main entrance is located on the north elevation. The garage door is a modern sectional door (Exhibit 10).

Exhibit 10. Second Garage, north elevation, view south (Psomas 2023)

Storage Shed

The Storage Shed is located above the dam spillway, approximately 55 feet to the east (APE Map #4). It appears in historic aerial photographs as early as 1947. It has a rectangular floor plan and a front gabled roof clad in composition shingles. The building is clad with vertical clapboard siding and features a contemporary sectional garage door (Exhibit 11).

Exhibit 11. Storage Shed, north elevation, view south (Psomas 2023)

OCWR Landfill Flare Facility

The OCWR Landfill Flare Facility is an industrial structure located approximately 266 feet southwest of the concrete catwalk, on the northwesternmost hillside adjacent to the reservoir (APE Map #6). It consists of three squared metal towers with metal catwalks that surround each tower on three elevations. The facility is made up of other industrial components such as tanks and pipes (Exhibit 12). It can be accessed via a private road stemming from Santiago Canyon Road.

Exhibit 12. OCWR Landfill Flare Facility, view southwest.

Control Building and Valve Vault

The Control Building and Valve Vault is located northeast of the spillway. It is located at the base of a hill and features a single-story building with a rectangular floor plan and front gabled roof (APE Map #5). The roof is clad with composition shingles and the building is clad with vertical wood siding. A single door is located on the east elevation and a sectional garage door is located on the south elevation. A chain linked fence is located east of the building surrounding a small shed building (Exhibit 13). The building is isolated and there is a road to its east that extends east before it travels north connecting to State Road 241.

Exhibit 13. Control Building and Valve Vault, south and east elevations, view northwest (Psomas 2023)

Boat Dock

The boat dock is not permanently attached or anchored to the lakeshore. It currently sits on the southwest end of the lake and is a rectangular dock with a shed (APE Map #10). The dock measures approximately 193 feet long and 18 feet wide.

6.1.2 Construction History

The land surrounding the current site of the Santiago Dam Complex was used during the 19th and early 20th century for cattle and sheep grazing. Beginning in 1876, the Serrano Irrigation District provided water for citrus groves in the Orange and Villa Park areas. By the late 1920s, the demand for irrigation water intensified and required the construction of a reservoir (Serrano Irrigation District n.d.).

At the request of the Serrano and Irvine Irrigation Districts, bids for a contractor for the new construction of the Santiago Dam began in early 1931. The lowest bidder, R.G. Letourneau Company Inc., won the contract at the value of $507,721.50 which was well below the engineer's estimate of $725,000 (LAT 1931). Augustus Kempkey was the consulting engineer on the project. The dam was a "earth fill" type which was constructed to be 125 feet high above the Santiago Creek bed, 600 feet through the base and narrowing to 10 feet at the top. The dam was 1,400 feet long and could accommodate approximately 25,000-acre feet of water. The Wheatland Construction Company placed

all the steel and concrete on the dam including 400 tons of steel and 7,000 cubic yards of concrete; the spillway required an additional 400 tons of reinforcing steel and 5,000 yards of concrete (Whittier News 1931). The dam was completed in 1931 and its reservoir, Irvine Lake, was filled by 1933. The lake opened to the public in 1941 (Orange County Grand Jury 2018-2019). A dam keeper residence was added in 1931 and was located on the east end of the dam (Santa Ana Register 1932).

Exhibit 14: Base of outlet tower circa 1931 (Courtesy of IRWD)

Exhibit 15: Outlet tower under construction circa 1931 (Courtesy of IRWD)

Exhibit 16: Spillway crest and chute under construction circa 1931 (Courtesy of IRWD)

Exhibit 17: Santiago Dam and outlet tower under construction circa 1931 (Courtesy of IRWD)

Review of historic aerial photographs indicates that the dam has always been located in a mountainous, undeveloped area. In the earliest photograph dating from 1931, Santiago Creek was visible but the dam was not yet in place (UCSB 1931). The Dam, Dam Keeper's Residence, and Dam Keeper's Garage were visible in the 1938 historic aerial as well as the Storage Shed. By 1947, the boat dock was visible at the south end of Irvine Lake for recreational purposes (UCSB 1938, 1947). The Control Building and Valve Vault appears in the 1960 aerial approximately 400 feet northeast of the spillway. By 1977, a parking lot has been added near the dock, presumably for those making use of recreational activities at the lake (UCSB 1977). Grading of the hills west of the dam appears to begin circa 1969, expands in 1977, and is visibly larger by 1989 (UCSB 1989). The location of the parking lot and dock appear to move several times throughout the years. Aerial photographs show water levels were low between 2016 and 2020 and the dock was moved further north along the western bank presumably to deeper water. the OWCR Landfill Flare Facility first appears in the 2002 historic aerial, located west of the dam, and is still present today (UCSB 2002).

Review of historic architectural drawings show that in 1956 a pipeline connecting Metropolitan Water District and Santiago Dam was constructed (Santiago Creek Dam Drawings 1956). A spillway overflow recorder was added in 1957 by Boyle Engineering (Santiago Creek Dam Drawings 1957). In 1969 Leeds, Hill, and Jewett Inc. were the consulting engineers on record that designed a series of updates on the dam including embankment construction, spillway reconstruction and reinforcement, and outlet works

reconstruction (Santiago Creek Dam Drawings 1959). An extension of the water tower was completed in 2001 by Cho Design Associates, Inc. The drawing set consists of three sheets and does not indicate the level of work proposed. The drawing set included cover sheet, sheet index, and as-built information (Santiago Creek Dam Drawings 2001). In 2003, Verizon added a cellphone tower near the dam (Santiago Creek Dam Drawings 2003).

6.1.3 Engineer: Augustus Kempkey (c. 1885-1975)

Augustus Kempkey was a native of Oakland and graduated from the University of California in 1902. Upon graduation, he worked as assistant engineer for the Berkeley branch of the Contra Costa Water Works (Oakland Tribune 1902). He belonged to a number of Masonic bodies and was the grand commander of California Knights of Templar in 1938. He worked as a consulting civil engineer (Sacramento Bee 1975). Through archival research Kempkey appeared to work as a consultant very early in his career for various agencies. He worked on projects such as the Patterson irrigation system, Turlock irrigation project, Modesto irrigation project, and Brentwood irrigation project. Most of his work was on at advisory level. Other dams he worked on include Conn Dam and Lake Hodges Dam.

6.2 Taiwan 12kV Overhead Distribution Line

The Taiwan 12kV wooden overhead distribution line was first energized in c. 1952 (Communication with SCE). SCE has no original drawings or other information pertaining to the line's construction.

The Taiwan 12kV line runs as far north as the Windy Ridge Toll Plaza on State Road 241 (Eastern Transportation Toll Road); as far east as the intersection of Blackstar Canyon Road and State Spur Road; as far south as intersection of Black Star Canyon Road, Silverado Canyon Road, and Santiago Canyon Road; and as far west as East Chapman Avenue, just west of South Rancho Santiago Road. The line is mostly concentrated in a housing development bounded by East Chapman Avenue and Canyon View Avenue to the west, east Chapman Avenue to the north, Jamboree Road to the east, and Canyon View Avenue to the south.

The Taiwan line interests the project boundary at the northern and southern borders. To the north, the line runs east to west from the spillway to the Dam Keeper's Residence and is located just north of the spillway. To the south, the line intersects the project boundary at three different points running north to south.

Exhibit 18. Taiwan 12kV Overhead Distribution Line, view north (Psomas 2023)

7 Significance Evaluation

7.1 Santiago Dam Complex (P-30-176757)

7.1.1 NRHP, CRHR, and County Designation Criteria

The Santiago Dam appears to remain eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements.

NRHP Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history.

CRHR Criterion 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

Santiago Dam is directly associated with events that made significant contributions to the development of the citrus industry in Orange County in the late 19th and early 20th century with a period of significance of 1931, when the dam was built. The subject property was constructed by the Serrano Irrigation District, John T. Carpenter Water Company, and the Irvine Company. Prior to construction on the dam, farmers dug wells, built reservoirs, and laid pipelines to irrigate their crops. Water quality and water scarcity prompted a change in water distribution and the installation of wells. Water runoff and irrigation rights were a constant struggle between the Irvine, Carpenter, and Serrano Irrigation Districts. The dispute between the three districts was resolved when they came together to construct the Santiago Dam. The Dam provided water for domestic and agricultural uses and is directly related to the development of the citrus industry in Orange County during the late 19th and early 20th century.

The Santiago Dam, including the dam, outlet tower, spillway, and reservoir, is directly associated with the historical and current function of the Dam. Although the Dam Keeper's Residence and Garage appear to have been constructed around the same time as the Dam, their significantly altered appearance makes them unrecognizable from the period of significance of the Dam. The remaining features within the Dam complex such as the Storage Shed, Second Garage, Control Building and Valve Vault, Boat Dock, and OCWR Landfill Flare Facility are non-contributing features constructed outside the period of significance of the Dam.

Therefore, the Santiago Dam Complex is eligible under NRHP Criterion A and CRHR Criterion 1 for its important contributions to local water and agricultural history.

NRHP Criterion B. That are associated with the lives of persons significant in our past.

CRHR Criterion 2. Is associated with the lives of persons important in our past.

The subject property is a dam constructed by the John T. Carpenter Water Company, Serrano Irrigation District, and the Irvine Company. Review of local publications and newspaper articles failed to indicate that the subject property has any important associations with significant persons in regional history. Therefore, the subject property is not eligible under NRHP Criterion B or CRHR Criterion 2.

NRHP Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

CRHR Criterion 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

The Santiago Dam is an earthen and concrete structure constructed in 1931. Although Augustus Kempkey appears to have consulted on numerous water projects throughout California, he does not appear to have been a master engineer when considered among others in his field. Further, the Santiago Dam is an earthen embankment dam, the most common type of dam in the United States; they can be built from locally available materials that require minimal processing, saving money on the construction process. The Dam does not possess high artistic value or innovative engineering features. Therefore, the Santiago Dam is not eligible under NRHP Criterion C or CRHR Criterion 3.

NRHP Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRHR Criterion 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The subject property is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials or technologies. Therefore, the subject property is not eligible under NRHP Criterion D or CRHR Criterion 4.

7.1.2 Integrity

Location: The subject property retains integrity of location as it remains in its current location.

Design: The subject property has integrity of design. Although there have been a few alterations, the design of the Dam remains relatively unchanged.

Setting: The subject property has integrity of setting. The Dam is still located in an undeveloped rural setting.

Materials: The subject property retains integrity of materials as the dam and spillway retain original materials.

Workmanship: The subject property retains integrity of workmanship as evidence of the original craftsmanship is present.

Feeling: The subject property retains integrity of feeling as the area remains undeveloped and rural.

Association: The subject property continues to be associated with the distribution of water for agricultural and domestic use.

The Santiago Dam is eligible for listing under NRHP and CRHR under Criterion A/1.

7.2 Taiwan 12kV Overhead Distribution Line

The Taiwan 12kV Overhead Distribution Line is not eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements.

NRHP Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history.

CRHR Criterion 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

Guidance provided in Tinsley Becker et al. 2015 states that subtransmission lines and their associated infrastructure should be evaluated under two important themes, which are most appropriately examined below under Criteria A/1/2:

(1) An association with and representation of SCE's organizational history as evidence of key expansion periods that contributed to or served as the genesis of settlement or marked growth in community services by SCE.

The Taiwan 12kV Overhead Distribution line was energized c. 1952. Information regarding the construction of the line is limited. The design for distribution lines was borrowed from telegraph transmission technology and uses infrastructure that is found state-wide. The principles of the design of distribution systems is rudimentary with minor changes since its inception and is unable to reflect significance from the period from which they were constructed

(2) An association with SCE's original construction and implementation campaigns or the established period of significance for the company's 66kV, 220kV, and 500kV systems.

The Taiwan 12kV Overhead Distribution line is not associated with SCE's early construction and implementation campaigns, nor does it fall within the period of significance for either SCE's 66kV, 220kV, or 500kV systems.

For the reasons demonstrated above, the subject property is not eligible under NRHP Criterion A or CRHR Criterion 1,

NRHP Criterion B. That are associated with the lives of persons significant in our past.

CRHR Criterion 2. Is associated with the lives of persons important in our past.

The subject property is a transmission line that is not associated with any specific owners. Its only owners have been SCE. Review of local publications and newspaper articles failed to indicate that the subject property has any important associations with significant persons in regional or SCE history. Therefore, the subject property is not eligible under NRHP Criterion B, CRHR Criterion 2, or County Criterion 3.

NRHP Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

CRHR Criterion 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

The Taiwan 12kV Overhead Distribution Line does not serve as an important example of electrical infrastructure on SCE's system. Under this criterion, wood poles are considered ubiquitous and indistinctive utilitarian structures that are purely functional and do not exhibit any important construction methods or technologies. Further, the line is not an early example of electrical voltage or transmission technology and does not represent an innovation in engineering design or for construction material technology. Therefore, the subject line is not eligible under NRHP Criterion C or CRHR Criterion 3.

NRHP Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRHR Criterion 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The subject property is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials, or technologies. Therefore, the property is not eligible under NRHP Criterion D or CRHR Criterion 4.

7.2.1 Integrity

Location: The subject property retains integrity of location as it remains in its current location.

Design: The subject property has integrity of design. Although there have been a few alterations, the design of the dam and spillway remain unchanged.

Setting: The subject property has integrity of setting. The line continues to be located in an undeveloped rural setting.

Materials: The subject property appears to retain integrity of materials as they do not appear to have been replaced.

Workmanship: The subject property retains integrity of workmanship as evidence of the original craftsmanship is present.

Feeling: The subject property retains integrity of feeling as the presence of wood poles help it retain a circa 1952 feeling.

Association: The subject property has no important associations with any patterns of regional development or SCE organization history and falls outside the period of significance for 66kV electrical transmission.

The Taiwan 12kV Overhead Distribution line is not eligible for listing under NRHP and CRHR under any designation criteria.

8 Project Effects/Impacts Assessment

8.1 Historic Properties Identified

One historic property/historical resource was identified within the project APE: the Santiago Dam Complex (P-30-176757), which currently has a status code of 2S2, indicating it has been determined eligible for the NRHP and is listed in the CRHR. The updated evaluation completed as part of the current study found that the Dam remains eligible for the NRHP/CRHR under Criterion A/1. The Dam is eligible for its important historical associations with water resources development in Orange County, as well as with the citrus agriculture industry. Therefore, it is necessary to consider the proposed project's potential to adversely affect this historic property/historical resource.

8.2 Application of the Criteria of Adverse Effect

As stated in 36 CFR 800.5(a)(1), Criteria of adverse effect:

> An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Examples of adverse effects on historic properties include, but are not limited to (36 CFR 800.5(a)(2)):

(i) Physical destruction of or damage to all or part of the property;

(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines;

(iii) Removal of the property from its historic location;

(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;

(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and

(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

8.3 Physical Effects of the Proposed Project

The following project-related physical effects were identified for the Santiago Dam Complex (P-30-176757):

- Demolition of the existing outlet tower, spillway, and portions of the upstream Dam embankment concrete facing
- Construction of a new spillway
- Widening and raising of the Dam crest
- Construction of a new 1.5-foot-tall concrete parapet wall on the upstream side of the Dam
- Construction of a 10-foot-tall, 1,300-foot-long retaining wall on the downstream face of the Dam
- Construction of a new emergency access walkway and stair system
- Construction of a new steel bridge structure

8.4 Analysis of Potential Adverse Effects

The major components of the Santiago Dam Complex include the dam, spillway, outlet tower, and reservoir, as these elements are directly associated with the historical and current function of the resource. However, the Dam is not eligible for its engineering or construction techniques, and it is not the specifics of the Dam's design or individual elements that make it eligible for the NRHP/CRHR under Criterion A/1. Rather, it is the Dam's ongoing function and location that conveys its historical associations with Orange County water development and the citrus industry. Although the proposed project will result in the loss of some original historic materials, design, and workmanship associated with the spillway and outlet tower, the loss of these elements will not prevent the Dam from conveying its important historical associations. The same is true for proposed alterations to the Dam crest. Although specific aspects of the Dam will be modified, it will remain recognizable as an earthen embankment dam and will continue to perform the historic function for which it is eligible. The character-defining features of the Dam necessary for it to continue to convey its historical significance under Criterion A/1 include its ongoing function as an earthen embankment dam on Santiago Creek, maintaining the same general massing and scale. Therefore, the proposed project will result in no adverse effects to historic properties under Section 106 of the NHPA, and no significant impacts to historical resources under CEQA.

9 Findings

One historic property/historical resource was identified within the project APE: the Santiago Dam Complex (P-30-176757), which currently has a status code of 2S2, indicating it has been determined eligible for the NRHP and is listed in the CRHR. The updated evaluation completed as part of the current study found that the Dam remains eligible for the NRHP/CRHR under Criterion A/1. The Dam is eligible for its important historical associations with water resources development in Orange County, as well as with the citrus agriculture industry.

Although specific aspects of the Dam will be modified, it will remain recognizable as an earthen embankment dam and will continue to perform the historic function for which it is eligible. The character-defining features of the Dam necessary for it to continue to convey its historical significance under Criterion A/1 include its ongoing function as an earthen embankment dam on Santiago Creek, maintaining the same general massing and scale. Therefore, the proposed project will result in no adverse effects to historic properties under Section 106 of the NHPA, and no significant impacts to historical resources under CEQA.

10 Bibliography

Association of State Dam Safety Officials. 2020. "Dams 101." Accessed June 12, 2020. https://www.damsafety.org/dams101#Return%20to%20Top.

Billington, David P., Donald C. Jackson, and Martin V. Melosi. 2005. "The History of Large Federal Dams: Planning, Design and Construction in the Era of Big Dams." Denver, Colorado: U.S. Department of the Interior, Bureau of Reclamation.Boden, Charles R. Dec. 1934. "Michael Maurice O'Shaughnessy Obituary." California Historical Society Quarterly. California: University of California Press. Vol. 13, No. 4 (Dec., 19, 1934), pp. 415-416. Accessed November 16, 2018. http://www.jstor.org/stable/25160549

British Dam Society. 2020. "Dam Information: Spillways and Outlets." Accessed June 12, 2020. https://britishdams.org/about-dams/dam-information/.

Brower, Martin A. 2013. The Irvine Ranch: A Time for People. Author House, Bloomington, Indiana

The Bulletin. "World's High Voltage Record Made by Edison Company Today." The Bulletin. May 10, 1923. Pg. 7. Accessed via newspapers.com: https://www.newspapers.com/image/622986146.

Bureau of Reclamation. 1987. Design of Small Dams, 3rd edition. Water Resources Technical Publication. Denver, Colorado: U.S. Department of the Interior, Bureau of Reclamation. Denver, Colorado. Accessed June 2018. https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/SmallDams.pdf.

Castells, Justin, M.A. 2021. "Historical Resource Assessment in Support of the Santiago Dam Outlet Tower Replacement Project, Orange County, California."Prepared for Irvine Ranch Water District by PaleoWest, LLC.

Orange County Grand Jury. 2018-2019. "Re-opening Irvine Lake: A Win-Win for Taxpayers and Outdoor Enthusiasts." Accessed online: https://www.ocgrandjury.org/pdfs/2018_2019_GJreport/2019-05-13_Irvine_Lake_GJ_Rep.pdf

Irvine Historical Society. N.D. "The Irvine Ranch History: From Mexican Land Grant to Great Irvine Ranch." Irvine Ranch Historical Society. Accessed online: https://irvinehistory.org/wp-content/uploads/2020/10/From-Mexican-Landgrant-to-Great-Irvine-Ranch.pdf

IRWD. 2021. Consolidations. Accessed February 9, 2021: https://www.irwd.com/about-us/consolidations.

IRWD. 2021. Liquid News. Accessed February 9, 2021: https://www.irwd.com/liquid-news/irwd-celebrates-60-years-of-value-2021.

Los Angeles Times (LAT) 1931. "Santiago Creek Dam Bids Below Estimate." Los Angeles Times. March 31, 1931. Accessed online: https://www.newspapers.com/clip/122764451/19310301latbids/

LAT. 1960. "Ranch Water District Proposal to be Aired." Los Angeles Times. November 27, 1960. Accessed online: https://www.newspapers.com/image/381346141/?terms=%22Coastal%20Municipal%20Water%20District%22&match=1LAT. 1961a. "County Oks Water District Boundaries." Los Angeles, California. Newspapers.com: The Los Angeles Times. December 4, 1960, pg. R-35.

LAT. 1961b. "Feeder line project OKd by Board." Los Angeles, California. Newspapers.com: The Los Angeles Times. September 3, 1961, pg. 52.

LAT. 1961c. "Water Agreements." September 14, 1961. Accessed online: https://www.newspapers.com/image/385580949/?terms=%22santiago%20lateral%22&match=1

LAT. 1963c. "Old Mutual Water Firms Drying Up." Los Angeles, California. Newspapers.com: The Los Angeles Times. November 18, 1963, pg. 2.

LAT. 1991. "Pioneer Recycler." Los Angeles, California. Newspapers.com: The Los Angeles Times. April 09, 1991, pg. A3.

The Mail. 1886. "The Death of a San Francisco Millionaire." Stockton, California. Newspapers.com: The Mail. March 15, 1886, pg. 2

Moeder, Jacob. 2023. Santiago Creek Dam: Dam Keeper's House Photo Album. July 13, 2023.

MWDOC (Municipal Water District of Orange County). 2017. "About MWDOC." Published 2017. Accessed Feb 8, 2021: https://www.mwdoc.com/about-us/about-mwdoc/

Murray, Samantha, Sarah Corder, Nicole Frank, Kate Kaiser, and Jessica Colston. City of San Diego Source Water System Historic Context Statement. Prepared for the City of San Diego Public Utilities Department in 2020. On file with the City of San Diego.

National Geographic. 2020. "Resource Library Encyclopedia Entry: Reservoir." Accessed June 12, 2020. https://www.nationalgeographic.org/encyclopedia/reservoir/.

Nelson, Carl R. 2009. "A History of Water Resource Development on the Irvine Ranch Orange County, CA." Accessed February 9, 2021. http://www.asceoc.org/images/uploads/A_History_of_Water_Resources_Development_on_the_Irvine_Ranch.pdf

NETR (Nationwide Environmental Title Research, LLC). *Historicaerials.com*. Historic aerial photographs of Orange County dating from years 1946, 1948, 1952, 1963, 1966, 1967, 1972, 1980, 1981, 1985, 1987, 1988, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2002, 2003, 2004, 2005, 2009,

2010, 2012, 2014, 2016, 2018, and 2020. Accessed April 10, 2023 online via: https://historicaerials.com/viewer.

Practical Engineering. 2019. "Spillways." May 28, 2019. Accessed June 12, 2020. https://practical.engineering/blog/2019/5/28/how-do-spillways-work.

Oakland Tribune. "Popular Course at the State University." Oakland Tribune July 15, 1902. Accessed online: https://www.newspapers.com/image/72436238/?terms=%22Kempkey%22%20engineer&match=1

Online Archive of California (OAC). "Serrano Irrigation District Records." Accessed online: https://oac.cdlib.org/findaid/ark:/13030/kt167nd04q/

OCHC (Orange County Historical Commission). 1983. Irvine Ranch. National Register of Historic Places. April 7, 1983.

OCWD (Orange County Water District). 2015. Orange County Water District Groundwater Management Plan: 2015 Update. June 7, 2015. Accessed February 11, 2021: https://www.ocwd.com/media/3503/groundwatermanagementplan2015update_20150624.pdf

The Pomona Progress. "New Power House." The Pomona Progress. March 16, 1922. Pg. 4. Accessed via newspapers.com: https://www.newspapers.com/image/623408426.

Practical Engineering. 2019. "Spillways." May 28, 2019. Accessed June 12, 2020.

https://practical.engineering/blog/2019/5/28/how-do-spillways-work

Rogers, J. David. "The 1928 St .Francis Dam Failure and Its Impact on American Civil Engineering"n.d. Accessed online: https://web.mst.edu/~rogersda/st_francis_dam/St-Francis-Dam-for-ASCE-Press.pdf

Sacramento Bee. "Augustus Kempkey, 95, Retired Civil Engineer."May 24, 1975. Sacramento, California. Accessed online: https://www.newspapers.com/clip/123167075/19750524sacbeekempkey-obit/

The San Francisco Examiner 1886. "James Irvine: Another Pioneer Called to His Last Account." San Francisco, California. Newspapers.com: The San Francisco Examiner. March 16, 1886, pg. 2

Santa Ana Daily Register. "Residence of James Irvine." Newspapers.com: The Santa Ana Register Daily. August 13, 1915, pg. 8.

Santa Ana Register. "Dam Keeper Marooned by High Water." Newspapers.com: The Santa Ana Register. February 3, 1932, pg 7.

Serrano Irrigation District. "Serrano Irrigation District. Appendix A: Background Information on Serrano Irrigation District." No date. Accessed via Orange Public Library, Local History Room, Serrano Irrigation District vertical files.

Serrano Irrigation District. "Serrano Irrigation District." No date. Accessed via Orange Public Library, Local History Room, Serrano Irrigation District vertical files.

Serrano Water District. 2023 "History." Accessed online: https://serranowater.org/History.html

TCEQ (Texas Commission on Environmental Quality). 2018. "Guidelines for Operation and Maintenance of Dams in Texas." Accessed June 2018. https://www.tceq.texas.gov/publications/gi/gi_357.

Tinsley Becker, Wendy L. and Heather Crane. *Historic American Engineering Record: Big Creek Hydroelectric System East & West Transmission Line*. HAER No, CA-167-N. Prepared by Urbana Preservation Planning, LLC, 2012. On file with the Library of Congress: http://lcweb2.loc.gov/master/pnp/habshaer/ca/ca3900/ca3976/data/ca3976data.pdf.

Tinsley Becker, Wendy L., Audry Williams, Thomas Jackson and Adam Sriro. *Historic-Era Electrical Infrastructure Management Program*. Prepared by Urbana Preservation & Planning, LLC and SCE, 2015 (updated 2017).

UCSB (University of California, Santa Barbara). *FrameFinder Maps*. Historic aerial photographs of Orange County dating from years 1931, 1938, 1947, 1952, 1960, 1969, 1977, 1983, 1989, 2002, and 2007. Map & Imagery Laboratory (MIL) UCSB Library. Accessed April 10, 2023: https://mil.library.ucsb.edu/ap_indexes/FrameFinder/

Williams, Audry and Wendy Tinsely Becker, Historical Resource Analysis Report / Historic Property Survey Report, Southern California Edison Company, Saugus-Santa Susana 66kV Transmission Line. Prepared for SCE, July 2016.

Whittier News. 1931. "Local Firm at Work on Dam." Whittier News. November 14, 1931. Accessed online: https://www.newspapers.com/clip/122764812/19311114whittier-newswheatland/

Zhang, Limin, Ming Peng, Dongsheng Chang, and Yao Xu. 2016. "Dams and Their Components: Dam zFailure Mechanisms and Risk Assessment." June 3, 2016. Accessed June 12, 2020. https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118558522.ch1.

Appendix A:
DPR Forms

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary # 19-176757 (Update)
HRI #
Trinomial
NRHP Status Code 2S2

Other Listings
Review Code _____ Reviewer _____ Date _____

Page 1 **of** 28 ***Resource Name or #:** Santiago Dam Complex
P1. Other Identifier:
***P2. Location:** ☐ **Not for Publication** ■ **Unrestricted**
***a. County** Orange **and** (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.)
***b. USGS 7.5' Quad** Black Star Canyon **Date** 2023 **T** 4S; **R** 8W ; _ ☐ **of** _ ☐ **of Sec** 28, 33, 24, 35 SB **B.M.**
c. Address n/a City Silverado Zip 92676
d. UTM: Zone 11S, 432961.61 mE/ 3738156.58 mN;
e. Other Locational Data:
APN: 043-0-070-055. The Santiago Dam is located at the northwest end of Irvine Lake in unincorporated Orange County, California. It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road.

***P3a. Description:** The Santiago Dam Complex consists of the various dam components (i.e., the dam, spillway, outlet tower), reservoir, and associated structures, including the Dam Keeper's Residence and Garage, Storage Shed, Second Garage, Control Building and Valve Vault, and the OCWR Landfill Flare Facility which sits above the dam on a ridge to the west. All of these elements are numbered on the APE Map and referenced throughout the discussion below (Figure 2). (see Continuation Sheet).

***P3b. Resource Attributes:** HP2. Single family property; HP4. ancillary building; HP11, engineering structure
***P4.Resources Present:** ■ Building ■ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)
P5b. Description of Photo: Photograph 1. Santiago Dam, view facing northwest

***P6. Date Constructed/Age and Source:** ■ Historic ☐ Prehistoric ☐☐Both
1931 (Los Angeles Times 1931)

***P7. Owner and Address:**
Serrano Water District
P.O. Box 57000
Irvine, CA 92619

***P8. Recorded by:**
Laura Carias
South Environmental
2061 N Los Robles Ave. #205
Pasadena, CA 91104

***P9. Date Recorded:** 11/3/2023

***P10. Survey Type:** Intensive

***P11. Report Citation:**
Historical Resources Assessment Santiago Creek Dam Outlet Tower and Spillway Improvements Project (South Environmental 2023)

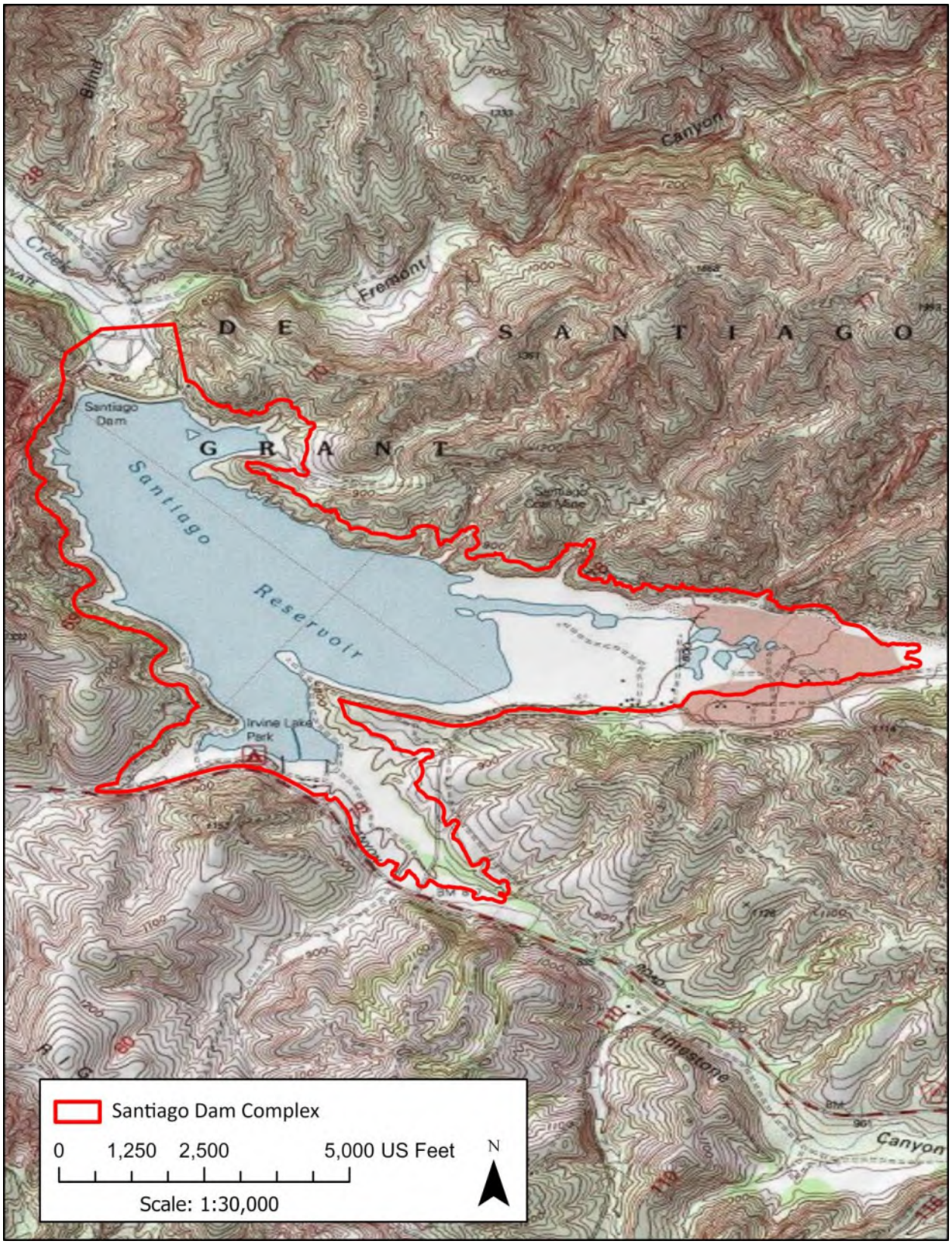
***Attachments:** ☐NONE ■Location Map
■Continuation Sheet ■Building, Structure, and Object Record
☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record
☐Artifact Record ☐Photograph Record ☐ Other (List): _____

State of California Natural Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary # 19-176757 (Update)
HRI#
Trinomial

 ***Resource Name or #** (Assigned by recorder) _Santiago Dam Complex
***Map Name:** Black Star Canyon, California ***Scale:** 1:30,000 ***Date of map:** _2023__



Dam Spur Rd
Dam Spur Rd
Dam Spur Rd
Lake View Scenic Rd
Santiago Creek
1
2
3
4
5
6
7
8
9
10
N
bing

BUILDING, STRUCTURE, AND OBJECT RECORD

***Resource Name or #** (Assigned by recorder) Santiago Dam Complex ***NRHP Status Code** 2S2

B1. Historic Name: Santiago Dam
B2. Common Name: Santiago Dam
B3. Original Use: Dam B4. Present Use: dam
***B5. Architectural Style:** earth-filled embankment dam
***B6. Construction History:**
The dam was constructed in 1931 (LAT 1931). The Dam Keeper's Residence and Garage were constructed in 1931 (Santa Ana Register 1932). A second garage was added in circa 2002; storage shed added circa 1947; OCWR landfill flare facility circa 1992; control building and valve vault in 1960; and boat dock in circa 1947.

***B7. Moved?** □No □Yes ■Unknown **Date:** _____ **Original Location:** _____
***B8. Related Features:**
B9a. Architect: Engineer: Augustus Kempkey b. Builder: R.G. Letourneau Company
***B10. Significance: Theme** Water and agricultural history **Area** Orange County **Period of Significance** 1931 **Property Type** Dam **Applicable Criteria** A/1

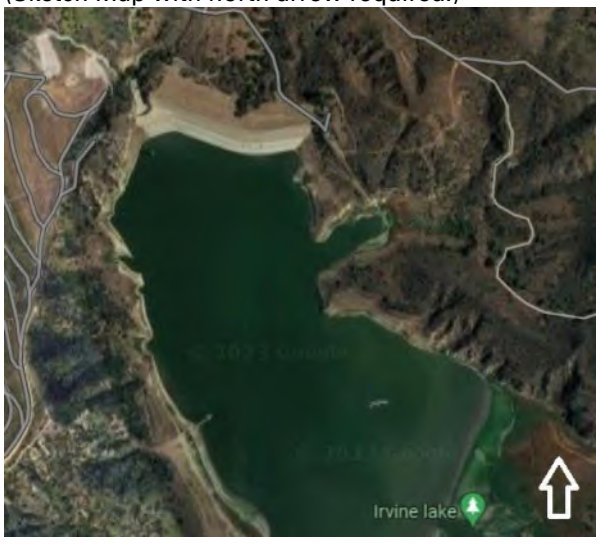
The Santiago Dam appears eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements. (see Continuation Sheets).

B11. Additional Resource Attributes: (List attributes and codes) _____
***B12. References:** See Continuation Sheets

B13. Remarks:

B14. Evaluator: Laura Carias, South Environmental
***Date of Evaluation:** 11/3/2023

(Sketch Map with north arrow required.)



(This space reserved for official comments.)

***P3a. Description (Continued):**

Dam Components

The Santiago Dam is an earthen and concrete structure constructed in 1931 (Exhibit 1) (APE Map #1). It contains 1.1 million cubic yards of clay, porous clay and rock that was moved in for its construction. The upstream portion of the dam was filled with clay material to prevent water seepage and has a 2.5 to 1 slope and is capped with concrete blocks that measure six feet by 6 inches thick (Exhibit 2). The Irvine Lake (also called the Santiago Creek Reservoir) has a storage capacity of approximately 25,000-acre feet of water. The Dam's footprint features a gentle "S" curve, with a concrete spillway at its west end (APE Map #2). Eight narrow pylons support a 12-foot-wide concrete catwalk that extends over the spillway (Exhibit 3). Safety railings for the catwalk are provided by 4-foot-high concrete parapets (Exhibit 4). An outlet tower is located southwest of the spillway (Castells 2021)(APE Map #3).

Exhibit 1: South elevation of Santiago Dam and view of Irvine Lake, view north (Psomas 2023)

Exhibit 2: South elevation of Santiago Dam, view west (Psomas 2023)

Exhibit 3: North elevation of Santiago Dam and outlet tower, view southwest (Psomas 2023)

Exhibit 4: View of Santiago Dam concrete spillway, view north (PaleoWest 2021)

Exhibit 5: View of Santiago Dam concrete spillway, view north (Psomas 2023)

Associated Buildings and Structures

Dam Keeper Residence and Garage

The Dam Keeper Residence and Garage were constructed in 1931 and are visible in the 1938 historic aerial photograph (APE Map #7, #8). The Dam Keeper Residence is a one-story, single-family

residence located on a hill east of the dam with a front gabled roof clad in composition shingles (Exhibit 6). The residence is clad in vertical clapboard siding. The primary elevation faces south and features a covered porch located under a secondary front gabled roof (Exhibit 7). There are three replaced single-hung windows at the primary elevation. The west elevation consists of a screened porch that extends almost the entire width of the building. The porch cantilevers over the hill and provides a full view of the dam (Exhibit 8).

Directly south of the residence, across the asphalt paved driveway, is a two-car garage with a front facing gable clad with composition shingles (APE Map #9). The building features narrow, horizontal wood siding and north facing primary elevation. The garage does not have a door, rather the interior has been modified and sectioned off, now featuring a smaller room within the garage. Single hung windows are visible on the east, west, and south elevations (Exhibit 9).

Alterations to the Dam Keeper Residence include replacement of all original windows and siding. The siding may have been replaced in the 1980s, but the windows were likely replaced more recently.

Exhibit 6. Dam Keeper Residence and Garage, view north (Psomas 2023)

Exhibit 7. Dam Keeper Residence, primary south elevation, view north (Provided by Psomas: Moeder 2023)

Exhibit 8. Dam Keeper Residence, west elevation, view northeast (Psomas 2023)

Exhibit 9. Dam Keeper Garage, north elevation, view south (Psomas 2023)

Second Garage

A second garage is located approximately 190 feet south of the Dam Keeper Residence and Garage along an asphalt and gravel driveway (APE Map #9). Although it appears that other garages with smaller footprints were once located in the same vicinity, the current Second Garage first appears in a 2002 historic aerial. The garage is located at the base of hill. It has a rectangular floor plan and a front gabled roof clad in composition shingles. The Second Garage is clad in vertical clapboard siding and the main entrance is located on the north elevation. The garage door is a modern sectional door (Exhibit 10).

Exhibit 10. Second Garage, north elevation, view south (Psomas 2023)

Storage Shed

The Storage Shed is located above the dam spillway, approximately 55 feet to the east (APE Map #4). It appears in historic aerial photographs as early as 1947. It has a rectangular floor plan and a front gabled roof clad in composition shingles. The building is clad with vertical clapboard siding and features a contemporary sectional garage door (Exhibit 11).

Exhibit 11. Storage Shed, north elevation, view south (Psomas 2023)

OCWR Landfill Flare Facility

The OCWR Landfill Flare Facility is an industrial structure located approximately 266 feet southwest of the concrete catwalk, on the northwesternmost hillside adjacent to the reservoir (APE Map #6). It consists of three squared metal towers with metal catwalks that surround each tower on three elevations. The facility is made up of other industrial components such as tanks and pipes

(Exhibit 12). It can be accessed via a private road stemming from Santiago Canyon Road.

Exhibit 12. OCWR Landfill Flare Facility, view southwest.

Control Building and Valve Vault

The Control Building and Valve Vault is located northeast of the spillway. It is located at the base of a hill and features a single-story building with a rectangular floor plan and front gabled roof (APE Map #5). The roof is clad with composition shingles and the building is clad with vertical wood siding. A single door is located on the east elevation and a sectional garage door is located on the south elevation. A chain linked fence is located east of the building surrounding a small shed building (Exhibit 13). The building is isolated and there is a road to its east that extends east before it travels north connecting to State Road 241.

Exhibit 13. Control Building and Valve Vault, south and east elevations, view northwest (Psomas 2023)

Boat Dock

The boat dock is not permanently attached or anchored to the lakeshore. It currently sits on the southwest end of the lake and is a rectangular dock with a shed (APE Map #10). The dock measures approximately 193 feet long and 18 feet wide.

Construction History

The land surrounding the current site of the Santiago Dam Complex was used during the 19th and early 20th century for cattle and sheep grazing. Beginning in 1876, the Serrano Irrigation District provided water for citrus groves in the Orange and Villa Park areas. By the late 1920s, the demand for irrigation water intensified and required the construction of a reservoir (Serrano Irrigation District n.d.).

At the request of the Serrano and Irvine Irrigation Districts, bids for a contractor for the new construction of the Santiago Dam began in early 1931. The lowest bidder, R.G. Letourneau Company Inc., won the contract at the value of $507,721.50 which was well below the engineer's estimate of $725,000 (LAT 1931). Augustus Kempkey was the consulting engineer on the project. The dam was a "earth fill" type which was constructed to be 125 feet high above the Santiago Creek bed, 600 feet through the base and narrowing to 10 feet at the top. The dam was 1,400 feet long and could accommodate approximately 25,000-acre feet of water. The Wheatland Construction Company placed all the steel and concrete on the dam including 400 tons of steel and 7,000 cubic yards of concrete; the spillway required an additional 400 tons of reinforcing steel and 5,000 yards of concrete (Whittier News 1931). The dam was completed in 1931 and its reservoir, Irvine Lake, was filled by 1933. The lake opened to the public in 1941 (Orange County Grand Jury 2018-2019). A dam keeper residence was added in 1931 and was located on the east end of the dam (Santa Ana Register 1932).

Exhibit 14: Base of outlet tower circa 1931 (Courtesy of IRWD)

Exhibit 15: Outlet tower under construction circa 1931 (Courtesy of IRWD)

Exhibit 16: Spillway crest and chute under construction circa 1931 (Courtesy of IRWD)

Exhibit 17: Santiago Dam and outlet tower under construction circa 1931 (Courtesy of IRWD)

Review of historic aerial photographs indicates that the dam has always been located in a mountainous, undeveloped area. In the earliest photograph dating from 1931, Santiago Creek was visible but the dam was not yet in place (UCSB 1931). The Dam, Dam Keeper's Residence, and Dam Keeper's Garage were visible in the 1938 historic aerial as well as the Storage Shed. By 1947, the boat dock was visible at the south end of Irvine Lake for recreational purposes (UCSB 1938, 1947). The Control Building and Valve Vault appears in the 1960 aerial approximately 400 feet northeast of the spillway. By 1977, a parking lot has been added near the dock, presumably for those making use of recreational activities at the lake (UCSB 1977). Grading of the hills west of the dam appears to begin circa 1969, expands in 1977, and is visibly larger by 1989 (UCSB 1989). The location of the parking lot and dock appear to move several times throughout the years. Aerial photographs show water levels were low between 2016 and 2020 and the dock was moved further north along the western bank presumably to deeper water. the OWCR Landfill Flare Facility first appears in the 2002 historic aerial, located west of the dam, and is still present today (UCSB 2002).

Review of historic architectural drawings show that in 1956 a pipeline connecting Metropolitan Water District and Santiago Dam was constructed (Santiago Creek Dam Drawings 1956). A spillway overflow recorder was added in 1957 by Boyle Engineering (Santiago Creek Dam Drawings 1957). In 1969 Leeds, Hill, and Jewett Inc. were the consulting engineers on record that designed a series of updates on the dam including embankment construction, spillway reconstruction and reinforcement, and outlet works reconstruction (Santiago Creek Dam Drawings 1959). An extension of the water tower was completed in 2001 by Cho Design Associates, Inc. The drawing set consists of three sheets and does not indicate the level of work proposed. The drawing set included cover sheet, sheet index, and as-built information (Santiago Creek Dam Drawings 2001). In 2003, Verizon added a cellphone tower near the dam (Santiago Creek Dam Drawings 2003).

Engineer: Augustus Kempkey (c. 1885-1975)

Augustus Kempkey was a native of Oakland and graduated from the University of California in 1902. Upon graduation, he worked as assistant engineer for the Berkeley branch of the Contra Costa Water Works (Oakland Tribune 1902). He belonged to a number of Masonic bodies and was the grand commander

of California Knights of Templar in 1938. He worked as a consulting civil engineer (Sacramento Bee 1975). Through archival research Kempkey appeared to work as a consultant very early in his career for various agencies. He worked on projects such as the Patterson irrigation system, Turlock irrigation project, Modesto irrigation project, and Brentwood irrigation project. Most of his work was on at advisory level. Other dams he worked on include Conn Dam and Lake Hodges Dam.

***B10. Significance (Continued):**

Historic Context

The following historic context is adapted from Donovan-Boyd, Kaiser, and Murray 2021.

Rancho Lomas de Santiago

Extensive land grants or ranchos were established in the interior during the Mexican period (1822-1848), in part to increase the population inland from the more settled coastal areas where the Spanish first concentrated their colonization efforts. The APE is located in Ranchos Lomas de Santiago, originally owned by José Antonio Yorba's youngest son, Teodocio Yorba. Yorba was granted Rancho Lomas de Santiago (Ranch of the Hills of St. James) in 1846, just before California was annexed to the United States at the end of the Mexican American War. The Yorba family was one of the most successful landowners in Southern California during the Mexican Period. Beginning in the 1840s and 1850s, the Yorba family had acquired six adjoining ranchos (Nelson 2009:2). Yorba filed a United States claim for the Rancho Lomas de Santiago in 1852.

Teodosio Yorba sold Rancho Lomas de Santiago to William Wolfskill in 1860 for $7,000 and Joseph E. Pleasants took charge of Wolfskill's new cattle operations. Already overgrazed, and largely unfarmable due to its steep, hilly terrain, the Santa Ana range could not sustain large cattle herds. In 1866, Benjamin and Thomas Flint, Llewellyn Bixby and James Irvine acquired the rancho from Wolfskill, and it eventually became part of the Irvine Ranch (Irvine Historical Society 2020).

Development of the Irvine Ranch

The APE is located in the northern portion of what would become known as the Irvine Ranch, one of the largest, most prosperous agricultural operations in Orange County. William Wolfskill purchased the land that would become the Irvine Ranch from Teodocio Yorba in c. 1860 with plans to use the land for grazing sheep (Nelson 2009:2). Wolfskill was a California pioneer, and a prolific landowner, businessman, and rancher. He is also credited with being one of California's first Valencia orange ranchers (OCHC 1983: Section 8). In 1866, Wolfskill sold the 47,000-acre property to Benjamin and Thomas Flint, Llewellyn Bixby, and James Irvine (Irvine Historical Society 2020). Flint and Bixby were also sheep men, who were expanding their land holdings to increase their annual production of wool (Nelson 2009:2).

James Irvine, a pioneer of California agriculture and prosperous San Francisco merchant, purchased the Flint and Bixby shares of the Rancho Lomas Santiago in 1876 for $150,000 dollars. This gave Irvine control of approximately 110,000 acres of land in and around the Santa Ana Canyon (Nelson 2009:3). Irvine, an Irishman, came to America in 1846, and lived for a time in New York City. He came to California in 1849, to find his fortunes in the California Gold Rush. After working in the mines for several years, Irvine began selling merchandise to miners, and eventually established a successful market in San Francisco (The San Francisco Examiner 1886:3). James Irvine died in 1886, leaving his estate to his son, James Irvine Jr. George Irvine, James Irvine Sr.'s brother, managed the property until Irvine Jr. came into possession of the estate at the age of 25 (Nelson 2009:2; The Mail 1886:2).

When James Irvine Jr. took over the estate in 1892, he converted the ranch into an "increasingly modern, productive enterprise of field crops, grain and irrigated orchards," which was achieved by digging wells, building reservoirs, and laying pipeline to irrigate the crops (Nelson 2009:3). In 1893, Irvine Jr. began to divert water from Santiago Creek to an area known as "The Flats" where the property's new ranch house was located. Also, in the 1880s, Irvine Jr. began to lease land to tenant farmers. These farmers grew grain and bean crops that required minimal rainfall and little to no irrigation. Historic aerials from 1946 suggest the Project site was never brought under

agricultural use during the Irvine ownership. While the Project site does not appear to have been cultivated, the road through Santiago Canyon, along the Santiago Creek, that eventually becomes Santiago Canyon Road, is visible on the 1901 topographic map of the area in generally the same orientation as it found today.

The Irvine Company

In 1894, James Irvine Jr. incorporated the Ranch as the Irvine Company and became the company's first president (Brower 2013: xxi). One of James Irvine Jr's first acts as president was to donate 160 acres of land, that had long been a popular pioneer picnic spot, to the State Board of Supervisors. This donation, land northeast of Irvine Lake, became the Irvine Ranch Historic Park, which is now the oldest park in Orange County (OCHC 1983: section 8). Around this same time, in 1889, Orange County formed out of parts of Los Angeles County (Figure 3). When Orange County was formed, the Irvine Company owned almost one-fifth of the County's acreage.

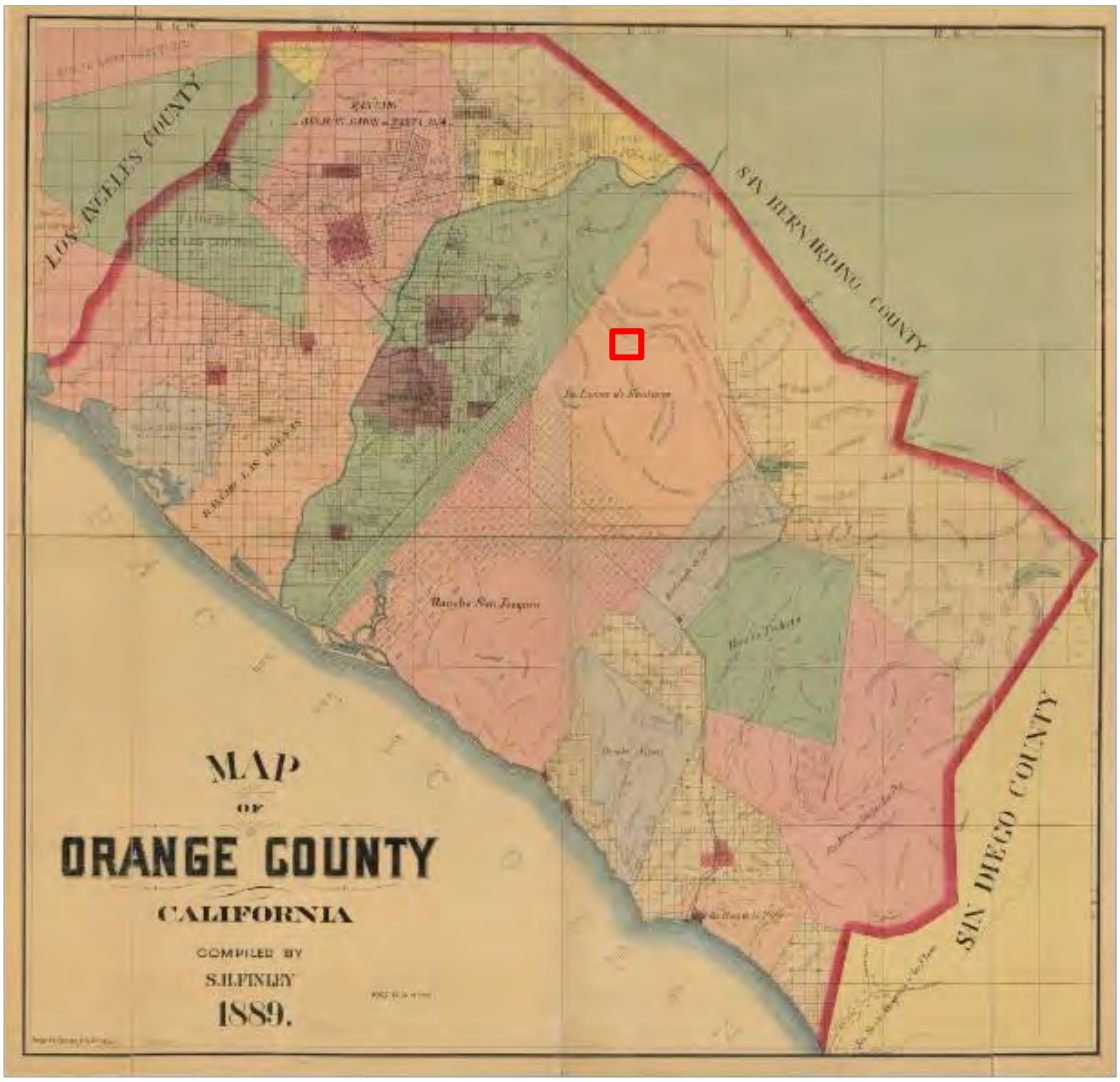


Figure 1. Orange County California Map, 1889. Shows the Ranchos and the growing population areas of Orange County. Compiled by S.H. Finley. Approximate Project Location in red (Library of Congress, Geography and Map Division) (Finley 1889).

Irvine Ranch quickly became one of the most productive tracts in California, known for the growing of lima beans, black-eyed peas, barley, oats, sugar beets, olives, walnuts, lemons, and oranges (Santa Ana Daily Register 1915:8). As the tenants on the Irvine Ranch increased, James Irvine Jr. developed an extensive system of wells to irrigate the land (Nelson 2009:7). By 1920, it is estimated that nearly 1,200 wells had been drilled on his acreage and many were running with electric pumps. By 1930, the Irvine Ranch had 31,000 acres of lima beans under cultivation, which was often described as the "largest lima bean field in the world" (Nelson 2009:7).
In 1935, James Irvine III (known as Jase), Irvine Jr.'s oldest son, tragically died of tuberculosis. Jase was on track to be the president of the Irvine Company and his death left James Irvine Jr. distraught and without sound leadership for the future of the company (Brower 2013: xxi). Several years later, in 1937, James Irvine Jr. established the James Irvine Foundation with 51% of the company's stock to be held by the foundation and the other 49% to be distributed to family (Brower 2013: xxii).

Irvine Ranch Water Management Facilities

Ongoing water quality problems and water scarcity made it clear that further work was necessary to irrigate crops at Irvine Ranch. The water conveyance facilities on the Ranch became one of the largest water management systems in Orange County. The first distribution irrigation feature on the Irvine Ranch property was the Irvine Ditch, constructed in 1893 from the Santiago Canyon to the Peters "Flats" (near the present-day location of the Peters Canyon Dam, which is approximately 2 miles to the west of the Project site). Wells were the primary source of water at the turn of the century, with 1,200 wells constructed in the area, most equipped with electric pumps. These wells allowed for large citrus orchards to be planted starting in 1906 (Nelson 2009: 17).

Irvine began to construct a series of winter water conservation features on the Ranch starting in the 1920s. Water runoff and irrigation rights were a constant struggle between the Irvine, Carpenter, and Serrano Irrigation Districts and the conservation projects were an effort to offset the marked decline in his groundwater system. P. R. Browning was the principal designer of all the Ranch's water conservation facilities except for the Santiago Dam which was designed by Augustus Kempkey (Nelson 2009:7). The dispute between the competing irrigation districts was eventually settled in 1928, with an agreement between the three litigants that led to the construction of the Santiago Dam and Outlet Tower (Nelson 2009:8). This period also saw the establishment of a massive irrigation system on the site (Brower 2013: xxi). In 1950, there were 4,550 irrigated acres and 33,430 dry farming acreage. Just ten years later, the Irvine company had increased the irrigated acreage to 7,417 acres and dry farming acres accounted for only 16,853 acres (Nelson 2009: 18).

County-wide flood control bonds failed to gather appropriate support in 1929 and 1931, leaving James Irvine Jr. to complete some large-scale water management projects without government support. Flood control created both land security and pooled runoff water for domestic and agricultural uses. Irvine was increasingly worried about water rights, and in 1932 he filed suit against upper basin users to protect the rights to the Santa Ana River (OCWD 2015: 24). The following water conservation projects were completed on the Irvine Ranch Site between 1929 and 1959: Lambert Reservoir (1929); Santiago Dam (1931); Irvine Conservation Dam (1932); Peters Canyon Dam (1931); the High Line Canal (1930s); Laguna Reservoir (1937-38); Bonita Reservoir (1937-38); Little Peters Reservoir (1940); Sand Canyon Reservoir (1942); Syphon (sometimes spelled Siphon) Canyon Dam (1948-49); and the Rattlesnake Canyon Reservoir (1959) (Nelson 2009:8). In 1970, the construction of the Irvine Lake Pipeline brought water from the Colorado River to the Rattlesnake Canyon Reservoir.

Consolidation of Orange County Water Districts

While the Irvine Ranch was creating a sophisticated water system for Ranch operations, the rest of Orange County was using a patchwork method of establishing water rights. Early water conveyance developments in Orange County generally organized as groups of property owners that banded together to provide water services through groundwater wells, these co-ops were called "mutuals." The mutuals sold shares of water to landowners based on the number of acres held by each property owner. As metropolitan areas grew it became clear that the current system, collections of property owners, would not be sufficient for the rapidly growing population in Orange County (MWDOC 2017).

In 1928, several southern Orange County cities banded together to form the Metropolitan Water District of Southern California (MWD) with the lofty goal of importing water from the Colorado River. The MWD succeeded in the planning and construction of the Colorado River Aqueduct, which, starting in 1939, brought water from the Colorado River near the Arizona border to the east side of the Santa Ana Mountains. This ongoing consolidation of the cooperative system became a necessity as water became Southern California's most precious resource. In 1957, there were an estimated 151 of these mutual water groups remaining in Orange County. By 1963, it was estimated that by 1965, no more than 25 would remain. Postwar population growth further encouraged the consolidation of mutuals and districts and in other areas, growth brought city services within reach of previously rural areas (LAT 1963c:2).

The success of the MWD, and the continued need for more water lead to the formation of several other large districts who hoped to tap into Colorado River water as well as Northern California water from the State Water Project. Developments continued into the 1960s and 1970s to move water through areas in eastern Orange County. The Santiago lateral, completed in 1961, and the East Orange County Feeder Line No, 2, both extended water into the southeast section of the County (LAT 1961a: E:2; LAT 1961b: 52).

Irvine Ranch Water District

The IRWD was formed by the Irvine Company in 1961 as a California Special District with headquarters in Irvine. Orange County approved the boundaries of the District in December of 1960, with the District being bound on the west by Newport Avenue, the south by the Santa Ana Marine Corps Air Facility, the east by the Rancho Canada De Los Alisos, and the north by the Coastal Municipal Water District (LAT 1960: R-28cia). The District's boundaries initially included approximately 60 square miles (IRWD 2021: Liquid News). Initially, the IRWD served mainly agricultural customers, but the quickly growing Orange County population included many residential customers in need of water. The IRWD grew through annexations in the 1960s and 1970s and by 1991, the District provided water to one-sixth of Orange County (LAT 1991: A3).

As water districts became more established, growth continued through consolidation of districts. Between 1997 and 2008, the IRWD consolidated with five other water districts, including the South Coast Water District in 2006. Other districts that joined the IRWD include: Orange Park Acres Mutual Water Company (2008), Los Alisos Water District (2001), Carpenter Irrigation District (2000), and the Santa Ana Height Mutual Water Company in (1997) (IRWD 2021: Consolidations). Today the IRWD serves more than 425,000 residential customers and spans 181 square miles (IRWD 2021: Liquid News).

Serrano Irrigation District

The Serrano Irrigation District, now known as the Serrano Water District (SWD), was developed in 1876 by a consolidation of several water companies and associations privately-owned by ranchers and farmers in Villa Park. The Serrano Water Association, the John T. Carpenter Water District, and the Irvine Company came together in 1927 to form the Serrano Irrigation District as a public corporation under the Irrigation Districts Act of the State of California. "This enabled the district to hold elections to establish the bonds to finance their share of the construction of the Santiago Dam." (OAC n.d.). The Serrano Irrigation District was responsible for issuing bonds and borrowing money for the construction of the Santiago Dam and The Irvine Company provided the land (Serrano Irrigation District, Appendix A, n.d.).

In the early 1960s, the decrease in need for agricultural water led the district to build a water filtration plant and then later reservoirs at Sycamore and Taft to use water from the Irvine Lake for residential use (Serrano Irrigation District n.d.). Today, the district has 43 miles of pipe, three wells, two reservoirs, and one treatment plant. The district owns fifty percent of Irvine Lake and is the managing district for Irvine Lake (Serrano Water District 2023).

Post St. Francis Dam Disaster Development (1928-1947)

In 1928 the St. Francis Dam, located in the Santa Clara Valley just outside Los Angeles, failed, killing 430 people, destroying 1,250 buildings and 7,900 acres of farmland, to become one of the greatest dam failure disasters of the 20th century. Between 1929 and 1931, the State engineer

examined 827 dams and found near one third of them to require significant repairs according to new safety guidelines.

In 1929, the State of California also required any person that practices civil engineering or any of its branches to be registered with the state. This also included any person that acted in the position of an "assistant engineer" or higher. The state also created a board which developed standards for applicants that wanted to register with the state as an engineer. Some standards included: must be over 25 years of age, demonstrate no less than six years of professional experience, work references, and an application fee (Rogers n.d.).

Property Types

The following discussion of property types is adapted from Murray et al 2020:

Reservoir complexes, like Irvine Lake, are usually comprised of several elements including the water-retaining structure (dam), a water-retention area (reservoir), a water-releasing structure (spillway), a water-conveying structure (conduits and outlet tower), and other essential elements including water treatment plants (Zhang et al 2016). Each of these portions of the reservoir provides an essential function that ensures water will be retained and released safely.

Dams

The purpose of a dam is to store water and facilitate flood control for human and livestock water supply, irrigation, energy generation, recreation, and pollution control. Typically, dams fulfill a combination of these functions. Manmade dams are classified according to their type of construction, materials, slope, seepage control method, and resistance to the forces of water pressure. The materials used to construct modern dams included earth, rocks, concrete, masonry, steel, timber, rubber, and sometimes a combination of these materials. Dams can be classified into five basic types including embankment, concrete, gravity, buttress, and arch (ASDSO 2020).

Embankment Dams

Embankment dams are a type of massive dam that is built with natural materials, either rock or earth instead of concrete, leading to the sub-classification of earth-filled embankment dams and rock-filled embankment dams. The basic elements of embankment dams consist of a core, an earth- or rock-filled embankment on both sides, and protection on the upstream face. Embankment dams are trapezoidal in shape and resist the flow of water by both their strength and weight. Embankment dams can retain water because they have a low permeability throughout the structure or a layer of low-permeability material (Billington et al. 2005; TCEQ 2018).

Earth-filled Embankment Dams

Earth-filled embankment dams were the first type of dam to be constructed by humans and were first documented in approximately 3,000 BC in the Middle East. In fact, earth-filled embankment dams are still the most prevalent dam-type, and a 2005 report on large federal dams estimated that of the 70,000 dams present in the United States, 85% were earth-filled embankment dams. Many of the dams in the United States were built in the early twentieth century prior to the advent of technology that would have facilitated the construction of structural dams. However, the report goes on to say that throughout the twentieth century, even with the advent of new technology, 65% of the dams built were earth-filled embankment dams. Earth-filled dams are the most prevalent type of dam because they can be built from locally available materials that require minimal processing, saving money on the construction process. The main detraction from earth-filled dams is that they are subject to the erosive action of water if a sufficient spillway is not provided as part of the dam design (Billington et al. 2005; Bureau of Reclamation 1987). Examples of other earth-filled embankment dams in Orange County include:

- Peters Canyon Dam (1929)
- Villa Park Dam (1963)
- Seven Oaks Dam (1993)

Reservoirs
A reservoir is typically formed by the construction of a dam across a linear water source, such as a river or creek, to create an artificial lake where water is stored. The adjacent dam is responsible for the amount of water that flows out of the reservoir, therefore controlling its water level. The amount of water in a reservoir can also be controlled by natural elements including rainfall, snowfall, and droughts. In conjunction with storing water, reservoirs often become recreation centers for boating and fishing. The water in a reservoir is very still causing sediment to sink to the bottom which over time can reduce the total amount of water in the reservoir (NG 2020).

Spillways
A spillway is a structure used for the control of flood flows and diverting surplus water from a reservoir after it has been filled. The primary purpose of a spillway is to ensure water does not overtop the dam and destroy it. A controlled spillway manages flood water through the use of gates, where an uncontrolled spillway only utilizes the elevation of the spillway crest to control the water. The gates allow small amounts of water to be released to prevent a sudden large discharge of water which could cause the dam to fail. There are seven types of spillways including straight drop, ogee, shaft, chute, side channel, siphon, and labyrinth (PE 2019).

Outlet Towers
The outlet tower is a vertical structure located within the reservoir used for capturing water and conveying it to a hydroelectric or water-treatment plant. The tower sits above an outlet tunnel or pipe used to transport the water out of the reservoir which is controlled by the opening and closing of valves or gates. The value controls are usually located in a room at the top of the outlet tower (BDS 2020).

Secondary Property Types
Unlike the primary property types discussed above, secondary property types are not necessarily vital to keeping the reservoir complex running. Although secondary property types range greatly in their design and function, they are frequently associated with dam and reservoir sites. Examples of secondary property types include Dam Keeper's houses, cisterns and water tanks, pumping stations, wells, vaults, and any other components the larger water system built to support the reservoir complex.

- Dam Keeper's House: a small purpose-built cottage constructed to house the dam's keeper who moderated water levels in response to drought and heavy rain
- Cistern and Water Tank: an artificial reservoir, tank, or container used for the storing or holding of water on a dam site
- Pumping Station: Building(s) of this type can vary in size, their function is to house machinery that transport water from one site to another.
- Well: An excavation or structure created by digging, driving, or drilling to access water underground

Significance Evaluation
The following presents an evaluation of the subject property in consideration of NRH and CRHR designation criteria. Because of the similarities in the criteria of these programs, they have been addressed together to avoid duplicative text.

The Santiago Dam appears to remain eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements.

NRHP Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history.

CRHR Criterion 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

Santiago Dam is directly associated with events that made significant contributions to the development of the citrus industry in Orange County in the late 19th and early 20th century with a period of significance of 1931, when the dam was built. The subject property was constructed by the Serrano Irrigation District, John T. Carpenter Water Company, and the Irvine Company. Prior to construction on the dam, farmers dug wells, built reservoirs, and laid pipelines to irrigate their crops. Water quality and water scarcity prompted a change in water distribution and the installation of wells. Water runoff and irrigation rights were a constant struggle between the Irvine, Carpenter, and Serrano Irrigation Districts. The dispute between the three districts was resolved when they came together to construct the Santiago Dam. The Dam provided water for domestic and agricultural uses and is directly related to the development of the citrus industry in Orange County during the late 19th and early 20th century.

The Santiago Dam, including the dam, outlet tower, spillway, and reservoir, is directly associated with the historical and current function of the Dam. Although the Dam Keeper's Residence and Garage appear to have been constructed around the same time as the Dam, their significantly altered appearance makes them unrecognizable from the period of significance of the Dam. The remaining features within the Dam complex such as the Storage Shed, Second Garage, Control Building and Valve Vault, Boat Dock, and OCWR Landfill Flare Facility are non-contributing features constructed outside the period of significance of the Dam.

Therefore, the Santiago Dam Complex is eligible under NRHP Criterion A and CRHR Criterion 1 for its important contributions to local water and agricultural history.

NRHP Criterion B. That are associated with the lives of persons significant in our past.

CRHR Criterion 2. Is associated with the lives of persons important in our past.

The subject property is a dam constructed by the John T. Carpenter Water Company, Serrano Irrigation District, and the Irvine Company. Review of local publications and newspaper articles failed to indicate that the subject property has any important associations with significant persons in regional history. Therefore, the subject property is not eligible under NRHP Criterion B or CRHR Criterion 2.

NRHP Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

CRHR Criterion 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

The Santiago Dam is an earthen and concrete structure constructed in 1931. Although Augustus Kempkey appears to have consulted on numerous water projects throughout California, he does not appear to have been a master engineer when considered among others in his field. Further, the Santiago Dam is an earthen embankment dam, the most common type of dam in the United States; they can be built from locally available materials that require minimal processing, saving money on the construction process. The Dam does not possess high artistic value or innovative engineering features. Therefore, the Santiago Dam is not eligible under NRHP Criterion C or CRHR Criterion 3.

NRHP Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRHR Criterion 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The subject property is not significant as a source, or likely source, of important historical

information nor does it appear likely to yield important information about historic construction methods, materials or technologies. Therefore, the subject property is not eligible under NRHP Criterion D or CRHR Criterion 4.

Integrity

Location: The subject property retains integrity of location as it remains in its current location.

Design: The subject property has integrity of design. Although there have been a few alterations, the design of the Dam remains relatively unchanged.

Setting: The subject property has integrity of setting. The Dam is still located in an undeveloped rural setting.

Materials: The subject property retains integrity of materials as the dam and spillway retain original materials.

Workmanship: The subject property retains integrity of workmanship as evidence of the original craftsmanship is present.

Feeling: The subject property retains integrity of feeling as the area remains undeveloped and rural.

Association: The subject property continues to be associated with the distribution of water for agricultural and domestic use.

The Santiago Dam is eligible for listing under NRHP and CRHR under Criterion A/1.

References

Association of State Dam Safety Officials. 2020. "Dams 101." Accessed June 12, 2020. https://www.damsafety.org/dams101#Return%20to%20Top.

Billington, David P., Donald C. Jackson, and Martin V. Melosi. 2005. "The History of Large Federal Dams: Planning, Design and Construction in the Era of Big Dams." Denver, Colorado: U.S. Department of the Interior, Bureau of Reclamation.Boden, Charles R. Dec. 1934. "Michael Maurice O'Shaughnessy Obituary." California Historical Society Quarterly. California: University of California Press. Vol. 13, No. 4 (Dec., 19, 1934), pp. 415-416. Accessed November 16, 2018. http://www.jstor.org/stable/25160549

British Dam Society. 2020. "Dam Information: Spillways and Outlets." Accessed June 12, 2020. https://britishdams.org/about-dams/dam-information/.

Brower, Martin A. 2013. The Irvine Ranch: A Time for People. Author House, Bloomington, Indiana

The Bulletin. "World's High Voltage Record Made by Edison Company Today." The Bulletin. May 10, 1923. Pg. 7. Accessed via newspapers.com: https://www.newspapers.com/image/622986146.

Bureau of Reclamation. 1987. Design of Small Dams, 3rd edition. Water Resources Technical Publication. Denver, Colorado: U.S. Department of the Interior, Bureau of Reclamation. Denver, Colorado. Accessed June 2018. https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/SmallDams.pdf.

Castells, Justin, M.A. 2021. "Historical Resource Assessment in Support of the Santiago Dam Outlet Tower Replacement Project, Orange County, California."Prepared for Irvine Ranch Water District by PaleoWest, LLC.

Orange County Grand Jury. 2018-2019. "Re-opening Irvine Lake: A Win-Win for Taxpayers and Outdoor Enthusiasts." Accessed online: https://www.ocgrandjury.org/pdfs/2018_2019_GJreport/2019-05-13_Irvine_Lake_GJ_Rep.pdf

Irvine Historical Society. N.D. "The Irvine Ranch History: From Mexican Land Grant to Great Irvine Ranch." Irvine Ranch Historical Society. Accessed online: https://irvinehistory.org/wp-content/uploads/2020/10/From-Mexican-Landgrant-to-Great-Irvine-Ranch.pdf

IRWD. 2021. Consolidations. Accessed February 9, 2021: https://www.irwd.com/about-us/consolidations.

IRWD. 2021. Liquid News. Accessed February 9, 2021: https://www.irwd.com/liquid-news/irwd-celebrates-60-years-of-value-2021.

Los Angeles Times (LAT) 1931. "Santiago Creek Dam Bids Below Estimate." Los Angeles Times. March 31, 1931. Accessed online: https://www.newspapers.com/clip/122764451/19310301latbids/

LAT. 1960. "Ranch Water District Proposal to be Aired." Los Angeles Times. November 27, 1960. Accessed online: https://www.newspapers.com/image/381346141/?terms=%22Coastal%20Municipal%20Water%20District%22&match=1LAT. 1961a. "County Oks Water District Boundaries." Los Angeles, California. Newspapers.com: The Los Angeles Times. December 4, 1960, pg. R-35.

LAT. 1961b. "Feeder line project OKd by Board." Los Angeles, California. Newspapers.com: The Los Angeles Times. September 3, 1961, pg. 52.

LAT. 1961c. "Water Agreements." September 14, 1961. Accessed online: https://www.newspapers.com/image/385580949/?terms=%22santiago%20lateral%22&match=1

LAT. 1963c. "Old Mutual Water Firms Drying Up." Los Angeles, California. Newspapers.com: The Los Angeles Times. November 18, 1963, pg. 2.

LAT. 1991. "Pioneer Recycler." Los Angeles, California. Newspapers.com: The Los Angeles Times. April 09, 1991, pg. A3.

The Mail. 1886. "The Death of a San Francisco Millionaire." Stockton, California. Newspapers.com: The Mail. March 15, 1886, pg. 2

Moeder, Jacob. 2023. Santiago Creek Dam: Dam Keeper's House Photo Album. July 13, 2023.

MWDOC (Municipal Water District of Orange County). 2017. "About MWDOC." Published 2017. Accessed Feb 8, 2021: https://www.mwdoc.com/about-us/about-mwdoc/

Murray, Samantha, Sarah Corder, Nicole Frank, Kate Kaiser, and Jessica Colston. City of San Diego Source Water System Historic Context Statement. Prepared for the City of San Diego Public Utilities Department in 2020. On file with the City of San Diego.

National Geographic. 2020. "Resource Library Encyclopedia Entry: Reservoir." Accessed June 12, 2020. https://www.nationalgeographic.org/encyclopedia/reservoir/.

Nelson, Carl R. 2009. "A History of Water Resource Development on the Irvine Ranch Orange County, CA." Accessed February 9, 2021. http://www.asceoc.org/images/uploads/A_History_of_Water_Resources_Development_on_the_Irvine_Ranch.pdf

NETR (Nationwide Environmental Title Research, LLC). *Historicaerials.com*. Historic aerial photographs of Orange County dating from years 1946, 1948, 1952, 1963, 1966, 1967, 1972, 1980, 1981, 1985, 1987, 1988, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2002, 2003, 2004, 2005, 2009, 2010, 2012, 2014, 2016, 2018, and 2020. Accessed April 10, 2023 online via: https://historicaerials.com/viewer.

Practical Engineering. 2019. "Spillways." May 28, 2019. Accessed June 12, 2020. https://practical.engineering/blog/2019/5/28/how-do-spillways-work.

Oakland Tribune. "Popular Course at the State University." Oakland Tribune July 15, 1902. Accessed online: https://www.newspapers.com/image/72436238/?terms=%22Kempkey%22%20engineer&match=1

Online Archive of California (OAC). "Serrano Irrigation District Records." Accessed online: https://oac.cdlib.org/findaid/ark:/13030/kt167nd04q/

OCHC (Orange County Historical Commission). 1983. Irvine Ranch. National Register of Historic Places. April 7, 1983.

OCWD (Orange County Water District). 2015. Orange County Water District Groundwater Management Plan: 2015 Update. June 7, 2015. Accessed February 11, 2021: https://www.ocwd.com/media/3503/groundwatermanagementplan2015update_20150624.pdf

The Pomona Progress. "New Power House." The Pomona Progress. March 16, 1922. Pg. 4. Accessed via newspapers.com: https://www.newspapers.com/image/623408426.

Practical Engineering. 2019. "Spillways." May 28, 2019. Accessed June 12, 2020. https://practical.engineering/blog/2019/5/28/how-do-spillways-work

Rogers, J. David. "The 1928 St .Francis Dam Failure and Its Impact on American Civil Engineering"n.d. Accessed online: https://web.mst.edu/~rogersda/st_francis_dam/St-Francis-Dam-for-ASCE-Press.pdf

Sacramento Bee. "Augustus Kempkey, 95, Retired Civil Engineer."May 24, 1975. Sacramento, California. Accessed online: https://www.newspapers.com/clip/123167075/19750524sacbeekempkey-obit/

The San Francisco Examiner 1886. "James Irvine: Another Pioneer Called to His Last Account." San Francisco, California. Newspapers.com: The San Francisco Examiner. March 16, 1886, pg. 2

Santa Ana Daily Register. "Residence of James Irvine." Newspapers.com: The Santa Ana Register Daily. August 13, 1915, pg. 8.

Santa Ana Register. "Dam Keeper Marooned by High Water." Newspapers.com: The Santa Ana Register. February 3, 1932, pg 7.

Serrano Irrigation District. "Serrano Irrigation District. Appendix A: Background Information on Serrano Irrigation District." No date. Accessed via Orange Public Library, Local History Room, Serrano Irrigation District vertical files.

Serrano Irrigation District. "Serrano Irrigation District." No date. Accessed via Orange Public Library, Local History Room, Serrano Irrigation District vertical files.

Serrano Water District. 2023 "History." Accessed online: https://serranowater.org/History.html

TCEQ (Texas Commission on Environmental Quality). 2018. "Guidelines for Operation and Maintenance of Dams in Texas." Accessed June 2018. https://www.tceq.texas.gov/publications/gi/gi_357.

UCSB (University of California, Santa Barbara). *FrameFinder Maps.* Historic aerial photographs of Orange County dating from years 1931, 1938, 1947, 1952, 1960, 1969, 1977, 1983, 1989, 2002, and 2007. Map & Imagery Laboratory (MIL) UCSB Library. Accessed April 10, 2023: https://mil.library.ucsb.edu/ap_indexes/FrameFinder/

Whittier News. 1931. "Local Firm at Work on Dam." Whittier News. November 14, 1931. Accessed online: https://www.newspapers.com/clip/122764812/19311114whittier-newswheatland/

Zhang, Limin, Ming Peng, Dongsheng Chang, and Yao Xu. 2016. "Dams and Their Components: Dam Failure Mechanisms and Risk Assessment." June 3, 2016. Accessed June 12, 2020. https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118558522.ch1.

The Santiago Dam (P-30-176757) was constructed in 1933 and was initially recorded and evaluated for historical significance in 2003 by Cary D. Cotterman of Chambers Group, Inc. Cotterman recommended that that the Santiago Dam was eligible for listing on the NRHP under Criterion A at the local, state, and national level due to its "strong association with the history of water resources development in Orange County, as well as with the entire citrus agriculture industry" (Cotterman 2003). Further, Cotterman found that the dam retains good integrity of location, design, materials, workmanship, and association.

PaleoWest, LLC revisited the property on January 27, 2021. Based on field observations, PaleoWest found no evidence to indicate that the historic integrity of the Santiago Dam has been compromised subsequent to its initial recordation in 2003. Therefore, PaleoWest, LLC concurs with the 2003 recommendation that the Santiago Dam is eligible for listing on the NRHP under Criterion A at the local, state, and national level and retains sufficient integrity to convey that historical significance.

***B12. References:**

Cotterman, Cary
2003 DPR 523 Series Forms for P-30-176757. On file at the SCCIC.

South elevation of Santiago Dam and view of Irvine Lake, facing north

South elevation of Santiago Dam, facing west

North elevation of Santiago Dam, facing east

View of concrete spillway, facing north

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #: 30-176757
HRI # :
Trinomial: 152819
NRHP Status Code: 3S
Other Listings:

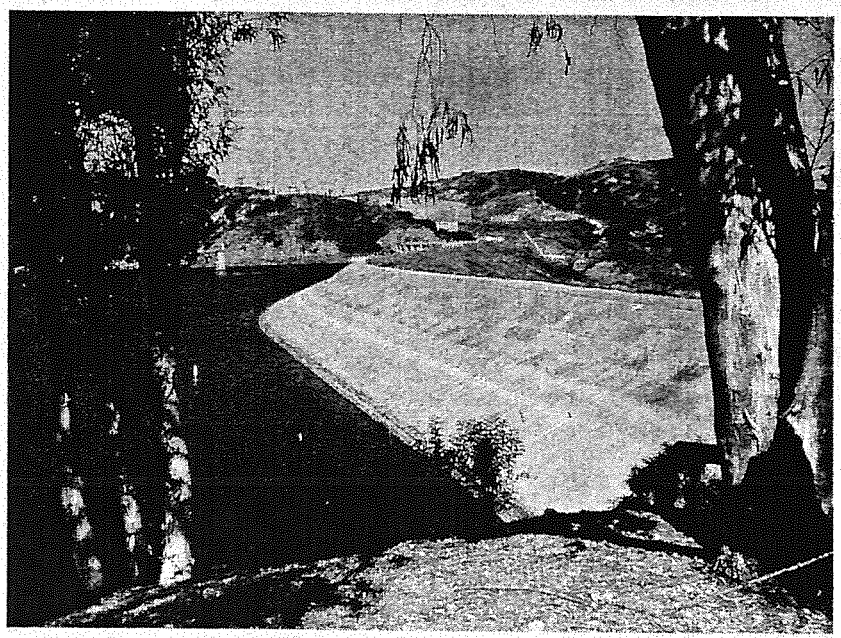
☐ Update or Supplement
Review Code: Reviewer:
Date:

*Resource Name or Number (Assigned by Recorder): Santiago Dam
P1. Other Identifier: California Department of Water Resources Dam No. 75-000

*P2. Location: ☒ Not for Publication ☐ Unrestricted *a. County: Orange
*b. USGS 7.5' Quad: Black Star Canyon, Calif. Date: 1988; T 4S R 8W NE ¼ of NW ¼ of Sec. 33 San Bernardino B.M.
c. Address: 3301 Santiago Rd. City: Orange
d. UTM: (Give more than one for large and/or linear resources) Zone: 11; 432680 mE 3738750 mN (NAD 83)
e. Other Locational Data (e.g., parcel #, directions to resource, elevation, etc., when appropriate: Santiago Dam is located at the north end of Irvine Lake (Santiago Reservoir) in the Santa Ana Mountains, approximately 7.0 miles east of downtown Orange. A paved road leads from Irvine Regional Park, through a locked gate, approximately 1.25 miles east, then southeast, to the dam.

*P3a. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries):
Santiago Dam is an earthen and concrete structure containing 1,100,000 cubic yards of clay, porous soil, and rock . The dam is 1,425 feet (0.27 mile) long at its crest, which rises 136 feet above the surrounding ground at its highest point. The reservoir created by the dam covers an area of 650 to 700 acres, depending on the surface level, and has a storage capacity of approximately 25,000 acre-feet of water. The south face of the dam, which holds back the reservoir, is filled with clay to prevent water penetration, and is faced with concrete slabs that are 6 inches thick and 6 feet square. The downstream portion of the dam is filled with earth, gravel, and rocks (Irvine Ranch Water District 2003; Compton et al. 2000; Serrano Irrigation District ca. 1959; University of California, Berkeley 2003). In plan view, the dam forms a gentle "S" curve, with a concrete spillway at its west end. A narrow gravel road runs along the crest of the dam from the east end to the spillway. Eight narrow concrete pylons support a 12-foot-wide concrete catwalk that extends over the spillway. Safety railings for the catwalk are provided by 4-foot-high concrete parapets.

*P3b. Resource Attributes (List Attributes and Codes): HP11 (Engineering Structure); HP21 (Dam)
*P4. Resources Present: ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other
P5b. Description of ☒ Photos ☐ Drawing (View, date, accession#): South face of dam; view toward west; 5/28/2003; photo no. 20.



*P6. Date Constructed/Age and Sources ☐ Prehistoric ☒ Historic ☐ Both : Dam built 1931

*P7. Owner and Address:
Serrano Water District
18021 E. Lincoln St.
Villa Park, CA 92861
and
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92619

P8. Recorded by (Name, affiliation, address):
Cary D. Cotterman
Chambers Group, Inc.
302 Brookside Avenue
Redlands, CA 92373

*P9. Date ☒ Recorded ☐Updated: 5/28/2003

*P10. Type of Study (Describe): Historic Resource Evaluation for Proposed Telecommunications Antenna Installation

*P11. Report Citation (Cite survey report and other sources, or enter "none."):
Cary D. Cotterman, Evelyn N. Chandler, and Roger M. Mason
2003 *Cultural Resources Records Search, Literature Review, and Field Survey Report for a Verizon Telecommunications Facility: Santiago Dam, Located at Irvine Lake (Santiago Reservoir), Orange County, California.* Prepared for Clayton Group Services, Costa Mesa, California. Prepared by Chambers Group, Inc., Redlands, California.

*Attachments: ☐ NONE ☒ Location Map ☐ Sketch Map ☒ Continuation Sheets ☒ Building, Structure, and Object Record ☐ Linear Feature Record ☐ Archaeological Site Record ☐ District Record ☐ Bedrock Grinding Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (List):

*Required Information

*Resource Name or Number (Assigned by Recorder): Santiago Dam

B1. Historic Name: Santiago Damn
B2. Common Name: Santiago Dam

B3. Original Use: Dam B4. Present Use: Dam

*B5. Architectural Style: Earthen Dam

*B6. Construction History (Construction date, alterations, and date of alterations):

Date of construction: Completed December, 1931

*B7. Moved? ☒ No ☐ Yes ☐ Unknown Date: N.A. Original Location: N.A.

*B8. Related Features: The dam restricts the flow of Santiago Creek, creating Irvine Lake (Santiago Reservoir). A dam keeper's residence and garage, constructed in 1934, is located approximately 100 meters east of the east end of the dam. A pump house, built in the 1980s, is located near the base of the west end of the dam, and a storage shed, also built in the 1980s, is located on top of the dam at its west end, near the spillway.

B9a. Architect: Design Engineer: A. Kempkey (San Francisco)
Assisted by Roy Browning (Irvine Co. Engineer)

B9b. Builder: On-site Engineer: Wess Albert
Contractor: R.G. Tourneau

*B10. Significance: Theme: 20th Century Water Resources Management/Citrus Industry Area: Orange County, California
Period of Significance: 1931-present Property Type: Dam Applicable Criteria: A
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

For most of the late 19th and early 20th centuries, the land around the present site of Santiago Dam was used for cattle and sheep grazing, as well as recreation. The Serrano Irrigation District (known today as the Serrano Water District) provided water for the earliest citrus groves in the Orange and Villa Park areas, beginning in 1876. By the late 1920s, the demand for irrigation water had increased to the point that a large storage reservoir was needed. In response to this demand, the Serrano Irrigation District and the John T. Carpenter Water Company of Villa Park undertook a joint project in 1930, selling bond issues worth $400,000 to finance half of the dam's construction. The Irvine Company, which owned the land, matched that amount, for a total of $800,000. By October of 1930, engineer A. Kempkey of San Francisco, assisted by Irvine Company engineer Roy Browning, was making exploratory drillings into the bedrock at the proposed dam site on Santiago Creek prior to drawing the construction blueprints. Santiago Dam was constructed, creating Santiago Reservoir (now called Irvine Lake), during 1931. Although the dam was designed by Kempkey, the on-site supervising engineer was Wess Albert, and the construction contractor was R.G. Tourneau. The dam was completed in December, 1931, and the reservoir was first completely filled, with water running over the spillway at its west end, in 1937. In 1934, a dam keeper's residence was constructed on a hillside overlooking the east end of the dam (Brigandi and Turnbull 2003; Genterra Consultants, Inc. 2003; Irvine Ranch Water District 2003; Orange City News 1930a, 1930b; Serrano Irrigation District n.d., 1959, 1967; Staub 2003). The water provided by the creation of the dam and reservoir contributed significantly to the early and mid 20th century development of the citrus industry in Orange County, one of the leading citrus-producing regions of the U.S. at that time. (See Continuation Sheet)

B11. Additional Resource Attributes (List attributes and codes): HP11 (Engineering Structure); HP21 (Dam)

*B12. References: (See Continuation Sheet.)

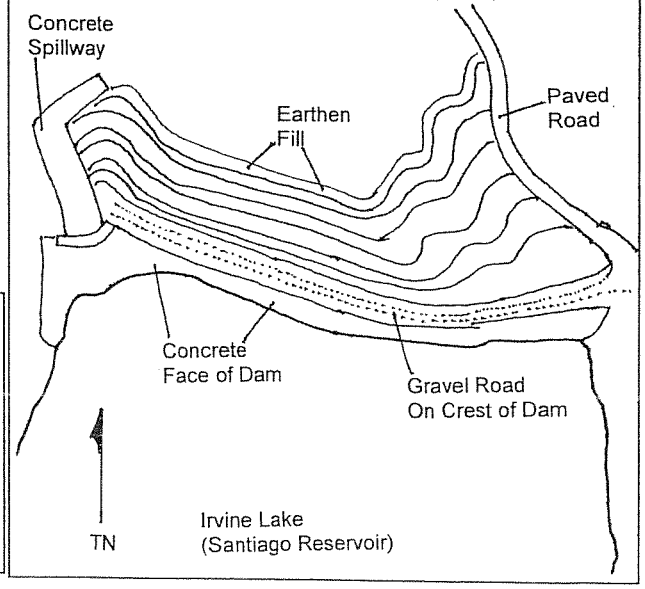
B13. Remarks:

*B14. Evaluator: Cary D. Cotterman
Chambers Group, Inc.
302 Brookside Avenue
Redlands, CA 92373

*Date of Evaluation: 5/28/2003

(This space reserved official comments.)

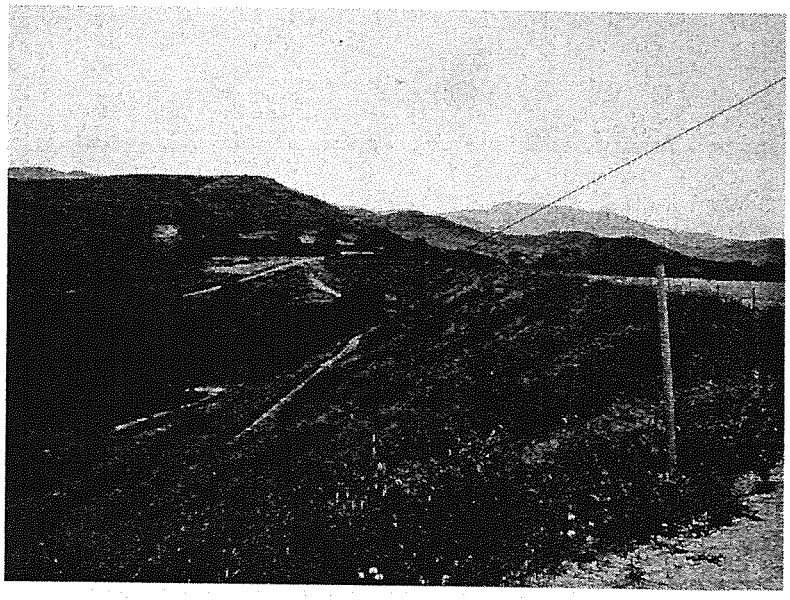
(Sketch Map with north arrow required.)



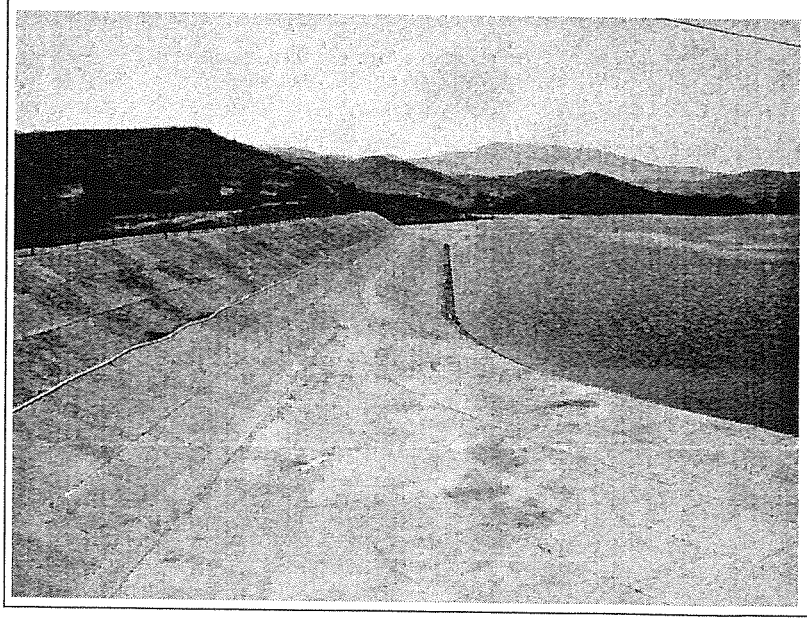
B10. Significance (continued from Building, Structure, and Object Record):

The facility was originally intended only for irrigation water storage, but was opened for recreational use in 1941. Today, the Irvine Ranch Water District still distributes untreated water from the reservoir for irrigation, while the Serrano Water District supplies treated drinking water to Villa Park and portions of Orange, and operates Irvine Lake's recreational concessions (Irvine Ranch Water District 2003; Compton et al. 2000; University of California, Berkeley 2003).

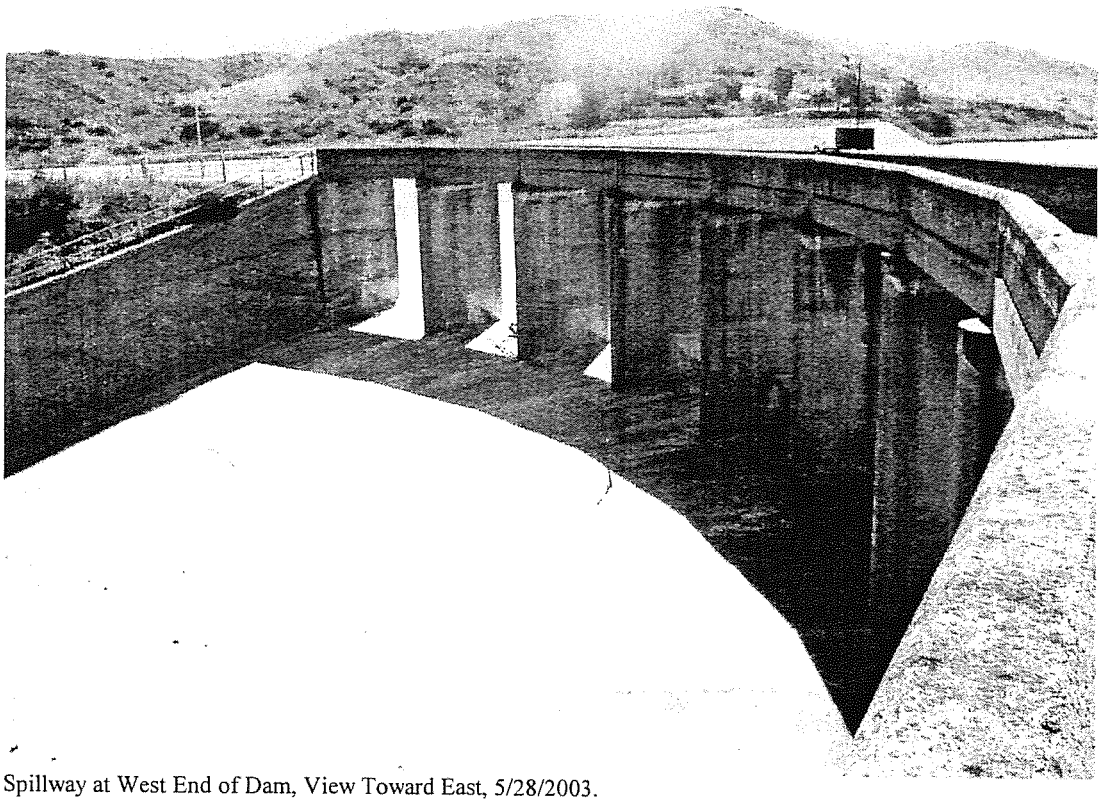
The water provided by the creation of Santiago Dam and Reservoir contributed significantly to the early and mid 20th century development of the citrus industry in Orange County, which was a leading supplier of oranges, lemons, and grapefruit to the entire nation at that time. Therefore, given its strong association with the history of water resources development in Orange County, as well as with the citrus agriculture industry on not only a regional but on a state and national level, the dam is recommended eligible for listing on the NRHP under Criterion A. Because the dam has undergone little modifications since its construction, it retains good integrity of location, design, materials, workmanship, and association.



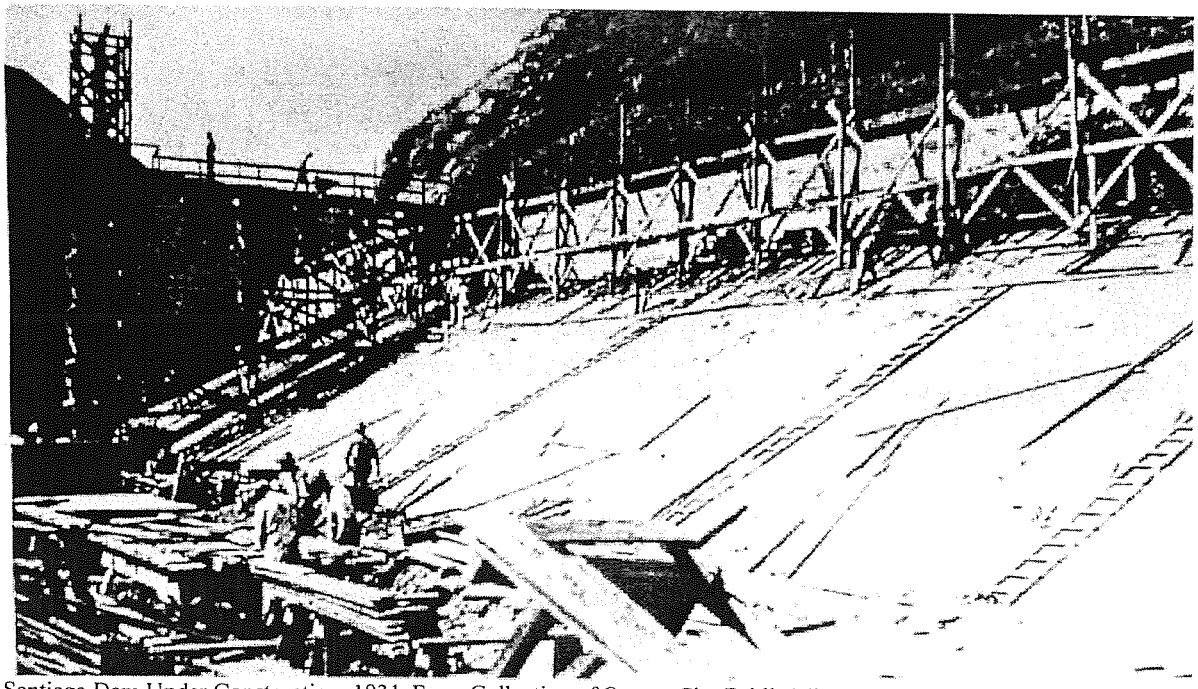
North Face of Dam, View Toward East, 5/28/2003



South Face of Dam, View Toward East, 5/28/2003



Spillway at West End of Dam, View Toward East, 5/28/2003.



Santiago Dam Under Construction, 1931. From Collection of Orange City Public Library.

B12. References (from Building, Structure, and Object Record):

Brigandi, Phil and Karen W. Turnbull
2003 "A Place Called Home – Orange's Architectural Legacy." www.oldtowneorange.net/aplacecalledhomec.htm.

Compton, Chris, Lane Waldner, Ward Allebach, Mel Newman, Bryan Pastor, and Cesar Sarmiento
2000 *Hydrological Data Report: 1999-2000*. Orange County Public Facilities and Resources Department.

Genterra Consultants, Inc.
2003 "Santiago Creek Dam." www.genterra.com/santiago_creek_dam.htm.

Irvine Ranch Water District
2003 "Irvine Lake Information." www.irwd.com/aboutirwd/lakeinfo.html.

Orange City News
1930a "Santiago Storage Dam Bonds Sold as Work Is Near on Project." October 15. On file in the local history collection, Orange City Public Library, Main Branch.

1930b "A Financial Achievement." October 15. On file in the local history collection, Orange City Public Library, Main Branch.

Serrano Irrigation District
n.d. *Serrano Irrigation District*. On file in the local history collection, Orange City Public Library, Main Branch.

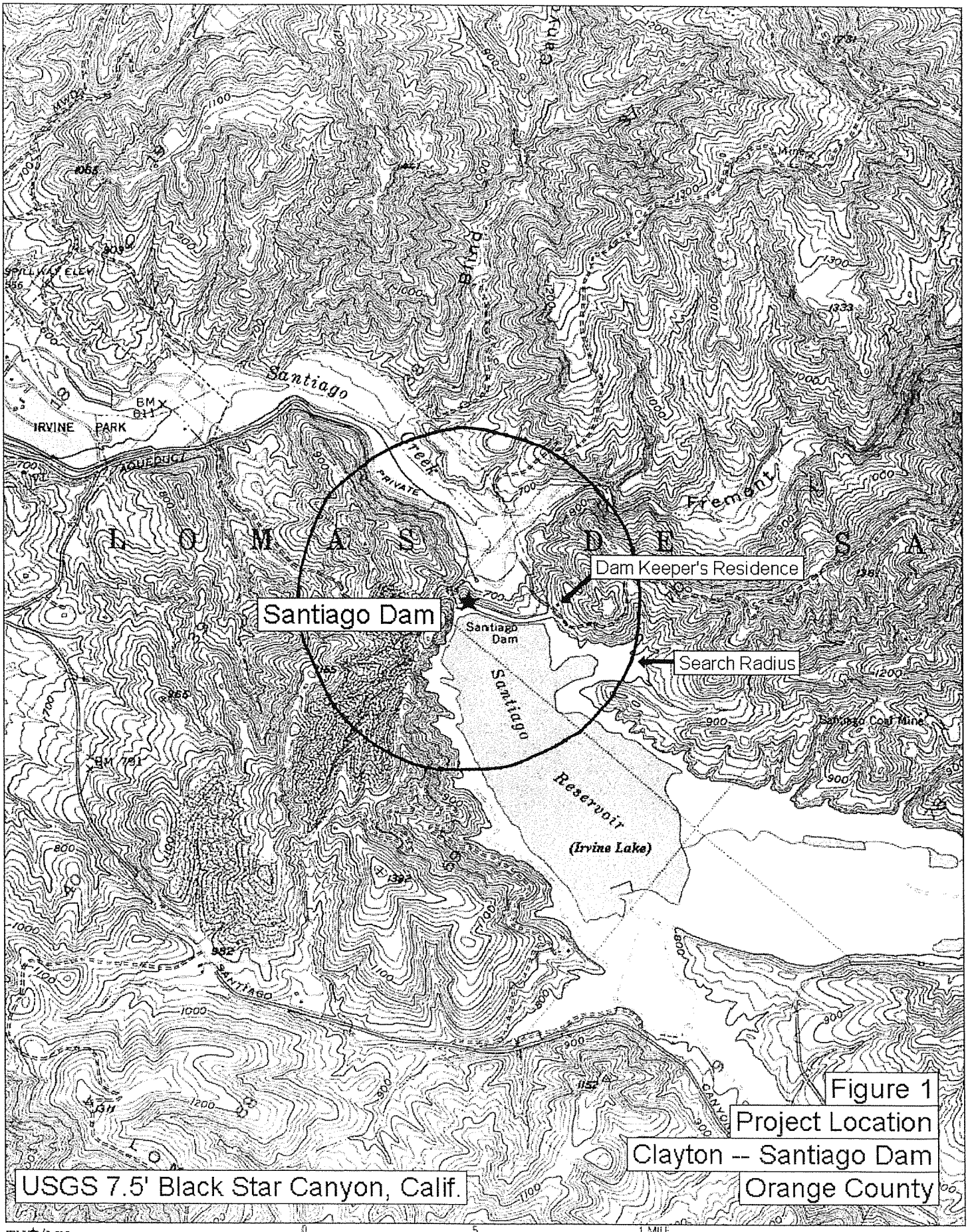
ca. 1959 *Facts About Santiago Dam (Irvine Lake)*. On file in the local history collection, Orange City Public Library, Main Branch.

1967 *Statement of the Serrano Irrigation District*. On file in the local history collection, Orange City Public Library, Main Branch.

Staub, Ron
2003 Reservoir and Dam Technician, Santiago Dam. Interview with Cary D. Cotterman, Chambers Group, Inc., May 28.

University of California, Berkeley
2003 "Santiago Creek." http://elib.cs.berkeley.edu/kopec/b17/html/75-000.html.

30-176757



Printed from TOPO! ©2001 National Geographic Holdings (www.topo.com)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code 6Z

Other Listings
Review Code _____ Reviewer _____ Date _____

Page 1 **of** 8 ***Resource Name or #:** Taiwan 12kV Overhead Distribution Line
P1. Other Identifier:
***P2. Location:** □ **Not for Publication** ■ **Unrestricted**
***a. County** Orange **and** (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.)
***b. USGS 7.5' Quad** Black Star Canyon **Date** 2023 **T** ; **R** ; □ **of** □ **of Sec** ; SB **B.M.**
c. Address n/a City n/a Zip n/a
d. UTM: Zone 11S, 432779.56 mE/ 3738819.80mN
e. Other Locational Data:

The Taiwan 12kV overhead distribution line runs as far north as the Windy Ridge Toll Plaza on State Road 241 (Eastern Transportation Toll Road); as far east as the intersection of Blackstar Canyon Road and State Spur Road; as far south as intersection of Black Star Canyon Road, Silverado Canyon Road, and Santiago Canyon Road; and as far west as East Chapman Avenue, just west of South Rancho Santiago Road. The line is mostly concentrated in a housing development bounded by East Chapman Avenue and Canyon View Avenue to the west, east Chapman Avenue to the north, Jamboree Road to the east, and Canyon View Avenue to the south. (see Location Map).

***P3a. Description:** The subject property includes the Taiwan 12kV overhead distribution line that was first energized in circa 1952(see Continuation Sheets).

***P3b. Resource Attributes:** HP11. Engineering Structure

***P4.Resources Present:** □ Building ■ Structure □ Object □ Site □ District □ Element of District □ Other (Isolates, etc.)
P5b. Description of Photo: Photograph 1. Overview of lines where they cross the project boundary, view northwest

***P6. Date Constructed/Age and Source:** ■ Historic □ Prehistoric □Both
c. 1952(SCE communication)

***P7. Owner and Address:**
Southern California Edison
2244 Walnut Grove Avenue
Rosemead, CA 91770

***P8. Recorded by:**
Laura Carias
South Environmental
2061 N Los Robles Ave. #205
Pasadena, CA 91104

***P9. Date Recorded:** 11/3/2023

***P10. Survey Type:**
Reconnaissance

***P11. Report Citation:**
Historic-Era Built Environment Survey Report Santiago Creek Dam Outlet Tower and Spillway Improvements Project (South Environmental 2023)

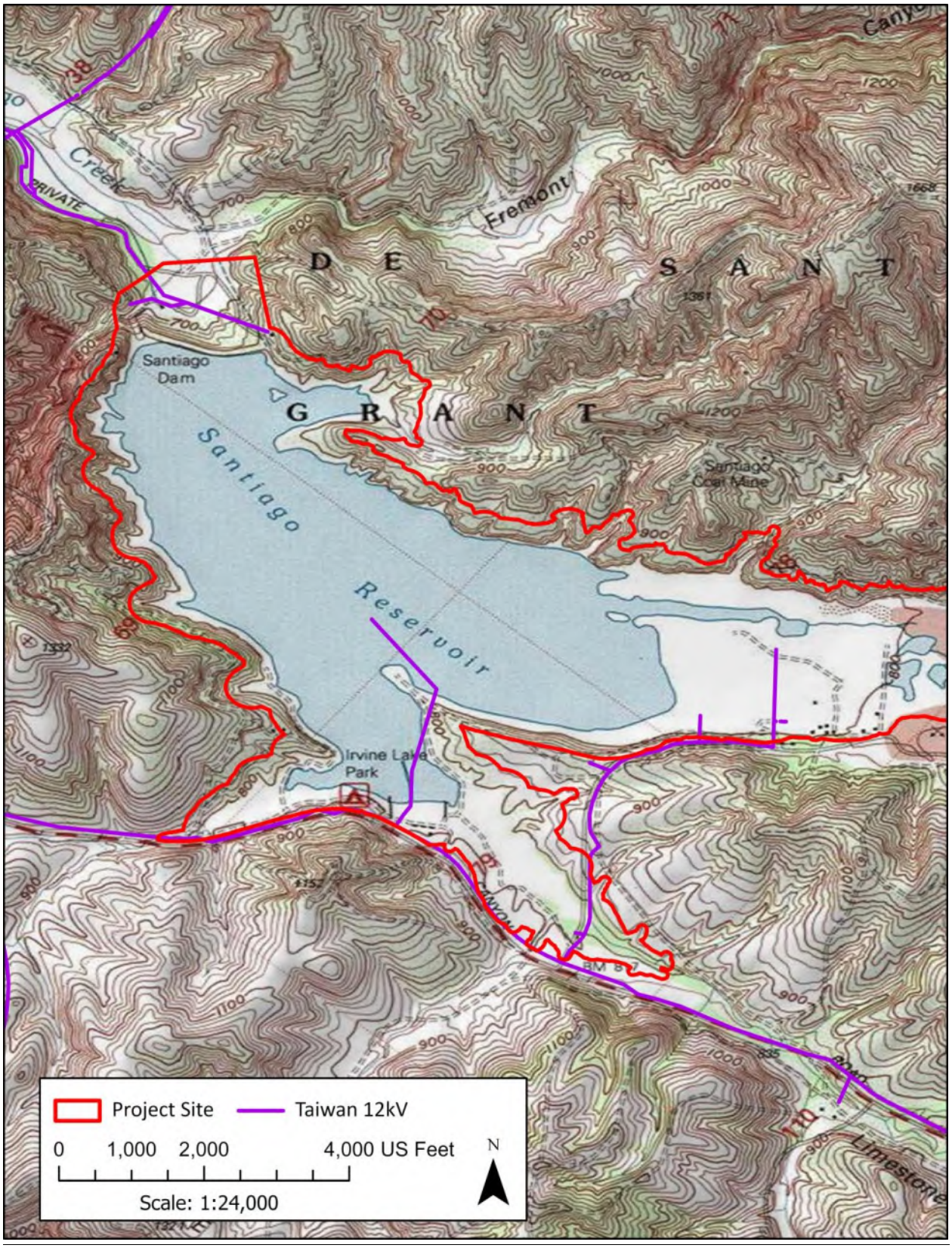
***Attachments:** □NONE ■Location Map ■Continuation Sheet ■Building, Structure, and Object Record □Archaeological Record □District Record □Linear Feature Record □Milling Station Record □Rock Art Record □Artifact Record □Photograph Record □ Other (List): ___

State of California Natural Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary #
HRI#
Trinomial

Page 2 **of** 8 ***Resource Name or #** (Assigned by recorder) _Taiwan 12kV Overhead Distribution Line
***Map Name:** Black Star Canyon, California ***Scale:** 1:24,000 ***Date of map:** _2023__



BUILDING, STRUCTURE, AND OBJECT RECORD

***Resource Name or #** Taiwan 12kV Overhead Distribution Line ***NRHP Status Code** 6Z

B1. Historic Name: unknown
B2. Common Name: Taiwan 12kV Overhead Distribution Line
B3. Original Use: Overhead distribution line B4. Present Use: Overhead distribution line
***B5. Architectural Style:** n/a
***B6. Construction History:**
SCE has no original drawings or other information pertaining to the line's construction but indicated that it was likely energized c. 1952 (SCE Communication).

***B7. Moved?** ■**No** □**Yes** □**Unknown** **Date:** **Original Location:**
***B8. Related Features:**
B9a. Architect: n/a b. Builder: unknown
***B10. Significance: Theme** n/a **Area** n/a **Period of Significance** n/a **Property Type** n/a **Applicable Criteria** n/a

The Taiwan 12kV overhead distribution line is not eligible for designation in the NRHP, CRHR, or local register due to a lack of significant historical associations and a lack of architectural/engineering merit (see Continuation Sheets).

B11. Additional Resource Attributes: (List attributes and codes)
***B12. References:** See Continuation Sheets

B13. Remarks:

B14. Evaluator: Laura Carias, South Environmental
***Date of Evaluation:** 11/3/2023

(Sketch Map with north arrow required.)

(This space reserved for official comments.)

***P3a. Description (Continued):**

The Taiwan 12kV line runs as far north as the Windy Ridge Toll Plaza on State Road 241 (Eastern Transportation Toll Road); as far east as the intersection of Blackstar Canyon Road and State Spur Road; as far south as intersection of Black Star Canyon Road, Silverado Canyon Road, and Santiago Canyon Road; and as far west as East Chapman Avenue, just west of South Rancho Santiago Road. The line is mostly concentrated in a housing development bounded by East Chapman Avenue and Canyon View Avenue to the west, east Chapman Avenue to the north, Jamboree Road to the east, and Canyon View Avenue to the south.

The Taiwan line interests the project boundary at the northern and southern borders. To the north, the line runs east to west from the spillway to the Dam Keeper's Residence and is located just north of the spillway. To the south, the line intersects the project boundary at three different points running north to south.

Exhibit 1: Taiwan 12kV Overhead Distribution Line, view north (Psomas 2023)

***B10. Significance (Continued):**

Historic Context

SCE's Historic-Era Electrical Infrastructure Management Program (HEIMP) requires examination of electrical infrastructure in consideration of three major themes: 1) association with SCE's organizational history; 2) association with SCE's construction and implementation campaigns or the established period of significance for 66kV, 220kV, and 500kV systems; and 3) association and embodiment of SCE's architectural programming and aesthetic ideology at SCE Substations (Tinsley Becker et al 2017). The following historic context examines relevant portions of these major themes in consideration of the types of SCE resources identified within the APE (see Section 6, Identified Resources), referencing information from the HEIMP and other relevant sources throughout.

Organizational History

The West Side Lighting Company was formed by a syndicate of businessmen from Los Angeles in 1896. One year later, the company merged with General Electric to become the new Edison Electric Company of Los Angeles. Soon after, the newly formed Edison Electric Company began to look for additional power supplies in Downtown Los Angeles and purchased the Southern California Power Company in 1898. Over the next few years, Edison merged with other electric lighting and power companies, expanding its footprint beyond Los Angeles to areas as far as Santa Barbara and Redlands. By 1909, the Edison Electrical Company provided service to over 600,000 customers across five counties. "To reflect this expanded presence, the company was reincorporated as the Southern California Edison Company (SCE)." (Williams et al 2016).

In the early part of the twentieth century, SCE continued to expand its service territory throughout Southern California, beginning construction of the Long Beach Steam Plant in 1910 and new 66kV steel tower transmission lines to upgrade the old 33kV network of wood poles. After successfully merging with Henry Huntington's Pacific Light and Power Company (PLPC) in 1916, SCE added 69 additional communities to its service territory. SCE then focused its efforts on expanding the existing 150kV Big Creek Hydroelectric System, upgrading it to 220kV in 1923. In the 1920s SCE undertook a massive building campaign which included "dams and reservoirs, building of powerhouses, rail lines, and tunnels, as well as support camps replete with food and housing for workers, recreation and entertainment offerings, medical facilities, and administrative offices." (Williams et al 2016)

In 1930, SCE contracted with the U.S. Department of the Interior to generate power for construction of the Hoover Dam. Similar contracts were established between the U.S. federal government and the City of Los Angeles and Southern Sierras Power Company (SSP) in order to pay for project costs over a 50-year period. Initially constructed for the purpose of powering construction of the Hoover Dam, the SSP Boulder Dam to San Bernardino Transmission line went into service in 1931. Upon completion of the dam, the line carried electricity to San Bernardino. This line was acquired by SCE as part of the 1964 Calectric merger (Tinsley Becker et al 2017).

Calectric and SCE had overlapping service territories from approximately 1917 until 1964 throughout the Los Angeles Basin and Inland Empire. In order to improve costs, Calectric was acquired by SCE in 1964. This was last major merger/change in the company's organizational history (Tinsley Becker et al 2017).

Transmission Lines

In the first part of the twentieth century, SCE was continuing to expand in response to a growing Southern California region. "By 1904 the common voltage capacity of transmission lines was reported to be 66,000 volts (66kV), which was considered the minimum voltage necessary for lighting plants in major United States cities." (Tinsley 2017). The earliest identified steel lattice towers within the existing SCE System were installed for the Kern River-Los Angeles Transmission Line in 1907. Shortly thereafter, SCE implemented additional all-steel lattice tower lines throughout its 66kV system. In 1910, SCE began construction of its Long Beach Steam Plant and implemented a new 66kV transmission line system to replace the old 33kV wooden pole lines that had been installed at the end of the 19th century. By 1912, double-circuit 66kV towers were widely used, coinciding with the completion of the Long Beach Steam Plant between 1910 and 1914 (Tinsley Becker et al 2017).

The SCE Big Creek Hydroelectric System East-West Transmission Line was put into service in 1912-

1913 to carry 150kV from the Big Creek Hydroelectric System in the Sierra National Forest northeast of Fresno to the Eagle Rock Substation in Los Angeles. The purpose of the 241-mile transmission line was to convey electricity from the powerhouses at Big Creek to Los Angeles for distribution to SCE service territories (Tinsley Becker et al 2012). The East and West lines were upgraded in 1922-1923 to carry 220kV, doubling the capacity of the lines (Pomona Progress 1922). In May 1923, the last span of the 241-mile 220kV transmission line was tied in, touted as being "the world's greatest achievement in long distance, high voltage transmission." (The Bulletin 1923). SCE continued to develop the Big Creek Hydroelectric System into the 1920s with the construction of dams, reservoirs, powerhouses, rail lines, and tunnels. Additionally, updates were made to the existing East and West Transmission Lines, with new lines installed to convey electricity between Big Creek and Los Angeles.

"By 1930 the backbone of SCE's 66kv and 220kV system was fully developed and included the use of 220kV double-circuit towers and 66kV multi-circuit towers ranging from 4 to 14 circuits." (Tinsley Becker et al 2017). SCE continued to develop new tower types for its 220kV system into the 1930s, creating larger single- and double-circuit towers inspired by old designs. These designs became standard, 'off the shelf' tower types by the 1940s.

The identified period of significance for 66kV and below transmission lines is 1907-1930, which includes the construction of the Kern River-Los Angeles Transmission Line in 1907 through completion of the 66kV system by 1930 (Tinsley Becker et al 2017).

Wooden Distribution Lines

The use of wood pole support structures for electrical transmission or distribution lines represents borrowed technology from the telegraph transmission system, and the technology itself has changed little over time. Wood poles carry the electrical wires (with voltages 33kV and below) on cross arms or via a connection to their insulators. Given this lack of change in technology and appearance over time, it is difficult for a wooden distribution line to convey a particular period of significance in electrical infrastructure history, and by extension, to any significant themes and associations (Tinsley Becker et al. 2017, Williams 2023).

> The "typical" life of a wood pole transmission or distribution line structure is 50 years, although some last longer and others deteriorate much sooner. Wood pole supported transmission or distribution lines over 50 years of age usually lack original integrity of materials despite substantially retaining the look and feel of the original wood-pole transmission or distribution line. Replacement wood-poles or hardware parts, therefore, can continue the utilitarian historic fabric representative of the original potentially historic transmission or distribution line structures because of the lack of any distinct engineering or architectural attributes. The common and indistinctive nature of wood-pole transmission or distribution line structures disqualify them as potentially National Register eligible. They are purely functional and utilitarian in use and common in appearance (Tinsley Becker et al. 2017:64).

Significance Evaluation

The Taiwan 12kV Overhead Distribution Line is not eligible for the NRHP, CRHR, and local landmark designation based on the following application of designation criteria and integrity requirements.

NRHP Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history.

CRHR Criterion 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

Guidance provided in Tinsley Becker et al. 2015 states that subtransmission lines and their associated infrastructure should be evaluated under two important themes, which are most appropriately examined below under Criteria A/1/2:

(1) An association with and representation of SCE's organizational history as evidence of key expansion periods that contributed to or served as the genesis of settlement or marked growth in community services by SCE.

The Taiwan 12kV Overhead Distribution line was energized c. 1952. Information regarding the construction of the line is limited. The design for distribution lines was borrowed from telegraph transmission technology and uses infrastructure that is found state-wide. The principles of the design of distribution systems is rudimentary with minor changes since its inception and is unable to reflect significance from the period from which they were constructed

(2) An association with SCE's original construction and implementation campaigns or the established period of significance for the company's 66kV, 220kV, and 500kV systems.

The Taiwan 12kV Overhead Distribution line is not associated with SCE's early construction and implementation campaigns, nor does it fall within the period of significance for either SCE's 66kV, 220kV, or 500kV systems.

For the reasons demonstrated above, the subject property is not eligible under NRHP Criterion A or CRHR Criterion 1,

NRHP Criterion B. That are associated with the lives of persons significant in our past.

CRHR Criterion 2. Is associated with the lives of persons important in our past.

The subject property is a transmission line that is not associated with any specific owners. Its only owners have been SCE. Review of local publications and newspaper articles failed to indicate that the subject property has any important associations with significant persons in regional or SCE history. Therefore, the subject property is not eligible under NRHP Criterion B, CRHR Criterion 2, or County Criterion 3.

NRHP Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

CRHR Criterion 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

The Taiwan 12kV Overhead Distribution Line does not serve as an important example of electrical infrastructure on SCE's system. Under this criterion, wood poles are considered ubiquitous and indistinctive utilitarian structures that are purely functional and do not exhibit any important construction methods or technologies. Further, the line is not an early example of electrical voltage or transmission technology and does not represent an innovation in engineering design or for construction material technology. Therefore, the subject line is not eligible under NRHP Criterion C or CRHR Criterion 3.

NRHP Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRHR Criterion 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The subject property is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials, or technologies. Therefore, the property is not eligible under NRHP Criterion D or CRHR Criterion 4.

Integrity

Location: The subject property retains integrity of location as it remains in its current location.

Design: The subject property has integrity of design. Although there have been a few alterations, the design of the dam and spillway remain unchanged.

Setting: The subject property has integrity of setting. The line continues to be located in an undeveloped rural setting.

Materials: The subject property appears to retain integrity of materials as they do not appear to have been replaced.

Workmanship: The subject property retains integrity of workmanship as evidence of the original craftsmanship is present.

Feeling: The subject property retains integrity of feeling as the presence of wood poles help it retain a circa 1952 feeling.

Association: The subject property has no important associations with any patterns of regional development or SCE organization history and falls outside the period of significance for 66kV electrical transmission.

The Taiwan 12kV Overhead Distribution line is not eligible for listing under NRHP and CRHR under any designation criteria.

References

The Bulletin. "World's High Voltage Record Made by Edison Company Today." The Bulletin. May 10, 1923. Pg. 7. Accessed via newspapers.com: https://www.newspapers.com/image/622986146.

The Pomona Progress. "New Power House." The Pomona Progress. March 16, 1922. Pg. 4. Accessed via newspapers.com: https://www.newspapers.com/image/623408426.

Tinsley Becker, Wendy L. and Heather Crane. Historic American Engineering Record: Big Creek Hydroelectric System East & West Transmission Line. HAER No, CA-167-N. Prepared by Urbana Preservation Planning, LLC, 2012. On file with the Library of Congress: http://lcweb2.loc.gov/master/pnp/habshaer/ca/ca3900/ca3976/data/ca3976data.pdf.

Tinsley Becker, Wendy L., Audry Williams, Thomas Jackson and Adam Sriro. Historic-Era Electrical Infrastructure Management Program. Prepared by Urbana Preservation & Planning, LLC and SCE, 2015 (updated 2017).

Williams, Audry and Wendy Tinsely Becker, Historical Resource Analysis Report / Historic Property Survey Report, Southern California Edison Company, Saugus-Santa Susana 66kV Transmission Line. Prepared for SCE, July 2016.

Appendix B:
Resumes

Email: lCarías@southenvironmental.com
Mobile: 310-809-4696

EDUCATION

M.A., Public History, California State University, Sacramento, 2006

B.A., History and Chicano Studies, California State University, Dominguez Hills, 2003

PROFESSIONAL AFFILIATIONS

California Preservation Foundation

Society of Architectural Historians

National Trust for Historic Preservation

Laura G. Carías, MA

SENIOR ARCHITECTURAL HISTORIAN

Laura Carías has over 17 years' experience in the field of historic and cultural resources evaluation, identification, documentation, and preservation. Ms. Carías specializes in historic resources assessments including historic significance evaluation in consideration of the California Register of Historical Resources (CRHR), and the National Register of Historic Places (NRHP), and local-level evaluation criteria. She also has experience in intensive-level field surveys, historic structure reports, design consultation, conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties, Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) documentation, local Mills Act contracts, and local, state, and national landmark designations.

Ms. Carías meets the Secretary of the Interior's Professional Qualification Standards for both Architectural History and History. She has experience preparing environmental compliance documentation in support of projects that fall under the California Environmental Quality Act (CEQA/National Environmental Quality Act (NEPA), and Section 106 of the National Historic Preservation Act (NHPA).

EXPERTISE

- CEQA, NEPA, and Section 106 of the NHPA compliance documentation in consideration of impacts to historical resources, and historic properties
- Historic resource significance evaluations in consideration of NRHP, CRHR, and local designation criteria
- Project design review for conformance with the Secretary of the Interior's Standards
- Preparation of archival documentation for HABS/HAER/HALS
- Historic Structure Reports
- Historic Preservation Certification Part 1 and 2 Tax Credit Applications

RECENT PROJECT EXPERIENCE

Historic-Era Built Environmental Survey Report for SCE Sespe Creek Pole Replacement Project and Overhead Modification Project, Ventura County (2023). South Environmental was retained to complete a Historic-Era Built Environment Survey Report for the Southern California Edison (SCE) Sespe Creek Pole Replacement Project (proposed project) located in Ventura County, California. The report included the results of an intensive-level pedestrian survey of all built environmental resources over 50 years old within the project's Area of Potential Effect (APE) by a qualified architectural historian; building development and archival research; and recordation and evaluation of the idle Saugus-Fillmore-Santa Clara-Wakefield 66kV subtransmission line, a Quonset hut, and a single-family residence for historical significance in consideration of federal, state, and local designation criteria and integrity requirements. The report was prepared in conformance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation Title 36 Code of Federal Regulations (CFR) Part 800, the California Environmental Quality Act (CEQA) Section 15064.5 for historical resources, and in consideration of all applicable local guidelines and regulations concerning cultural resources. In conclusion, no historic properties/historical resources were identified within the project APE. Therefore, with respect to historic built environment resources, the proposed project would have no adverse effect on historic properties under Section 106 of the NHPA and a less than significant impact on historical resources under CEQA. Ms. Carías performed the site visit and served as co-author of the report.

Historic Property Survey and Recordation for 1306 Alameda Padre Serra, City of Santa Barbara, California (2022). South Environmental was retained by a private property owner to survey and research a 1920 residential property within the City of Santa Barbara. This project included an intensive-level, pedestrian survey of the project site by a qualified architectural historian, building development and archival research; coordination with the City; and recordation of one residential property. As a result of this property significance evaluation, the property was found not eligible for designation at the local level.

Historic Built Environment Assessment for Fairfield Justice Campus Asset Protection and Resiliency Project (2022) South Environmental was retained to prepare an historic built environment assessment report in support of the Fairfield Justice Campus Asset Protection and Resiliency Project (project) located in the City of Fairfield, Solano County, California. The purpose of this report is to determine if the proposed project will result in impacts to historic built environment resources located within or adjacent to the project site. This report was prepared in conformance with the requirements of the CEQA Guidelines § 15064.5 for historical resources, and the City of Fairfield Chapter 25, Article XIII, Historic Preservation Ordinance. No historical resources were identified within the project site as a result of this study. Therefore, with respect to built environment resources, the proposed project will have a less than significant impact on historical resources under CEQA.Ms. Carías served as senior architectural historian and author for the report.

Historical Resource Assessment Report for the Civic Center Master Plan Project, Moorpark, California (2022) South Environmental was retained to complete a Historical Resource Assessment Report for the Civic Center Master Plan Project located in the City of Moorpark in Ventura County, California. This study includes the results of a literature review, pedestrian survey of the project site by a qualified architectural historian; building development and archival research; and an assessment of potential impacts to historic built environment resources under CEQA. One historical resource was identified directly adjacent to the project site as a result of the background research and pedestrian survey: the CRHR-listed Tanner Corner building located at 601 Moorpark Avenue. Although the project does not propose any changes or direct impacts to this resource that would impair its major character-defining features, the building's proximity to proposed demolition and construction activities is considered a potentially significant impact. Ms. Carías served as architectural historian and author of the report.

Email: smurray@southenvironmental.com
Mobile: 818-458-1162

Samantha Murray, MA

CULTURAL RESOURCES DIRECTOR

Samantha Murray is the cultural resources director at South Environmental and a principal architectural historian and archaeologist with over 17 years' experience in all elements of cultural resources management, including project management, archaeology and architectural history studies, and historical significance evaluations in consideration of the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), and local-level designation criteria. Ms. Murray has conducted thousands of historical resource evaluations and developed detailed historic context statements for a multitude of property types and architectural styles. She has also provided expertise on numerous projects requiring conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties.

Ms. Murray meets the Secretary of the Interior's Professional Qualification Standards for both Archaeology and History. She is experienced managing multidisciplinary projects in the lines of private development, transportation, transmission and generation, federal land management, land development, and state and local government. She is an expert in preparation of cultural resources compliance documentation for projects that fall under the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), and Sections 106 and 110 of the National Historic Preservation Act (NHPA). Ms. Murray has also served as an expert witness in legal proceedings concerning historical resources under CEQA and local ordinance protection.

EXPERTISE

- CEQA, NEPA, and Section 106 of the NHPA compliance documentation in consideration of impacts to historical, archaeological, and tribal cultural resources, and historic properties.
- Resource significance evaluations in consideration of NRHP, CRHR, and local designation criteria.
- Project design review for conformance with the Secretary of the Interior's Standards.
- Assistance with complex mitigation including HABS/HAER/HALS, salvage, and interpretive displays.
- Peer review.

EDUCATION

M.A., Anthropology, California State University, Los Angeles, 2013

B.A., Anthropology, California State University, Northridge, 2003

PROFESSIONAL AFFILIATIONS

California Preservation Foundation

National Trust for Historic Preservation

PROFESSIONAL CERTIFICATIONS

Registered Professional Archaeologist (Registrant I.D. 28686211)

RELEVANT PROJECT EXPERIENCE

Historical Resources Evaluation Report for the I-5 Improvement Project (San Diego County Line to Avenida Pico), City of San Clemente, Orange County, California (2022). South Environmental was retained to prepare a Historical Resource Evaluation Report in support of the I-5 Improvement Project in the City of San Clemente. South Environmental carried out a survey of the I-5 corridor from the San Diego County line to Avenida Pico in the City of San Clemente and identified six built environment resources over 45 years old. The resources were evaluated for historical significance in consideration of NRHP, CRHR and City designation criteria and integrity requirements and were found not eligible under all designation criteria and integrity requirements. The proposed project was found to have a less than significant impact on historical resources under CEQA. Ms. Murray served as the contract manager for this project and conducted quality assurance/quality control (QA/QC) of the final document.

Southern California Edison (SCE) Subconsultant Agreement for Capital Projects (2021-ongoing). South Environmental is a subconsultant on SCE's Environmental Clearance and Capital Projects contract and provides cultural resources services throughout SCE's service territory in Southern California. Ms. Murray functions as an Architectural History and Archaeological Principal Investigator and oversees both historic built environment and archaeological components of large-scale utility projects subcontracted to South Environmental, including NRHP/CRHR significance evaluations for a variety of electrical substations and transmission lines and large-scale archaeological field work and testing requiring multiple field technicians. Technical reports recently completed by South Environmental include the following:

- Historic-Era Built Environment Survey Report for the Del Valle Substation Project in Los Angeles and Ventura Counties
- Historic-Era Built Environment Survey Report for the Cal City 115 kv Upgrade Project in Los Angeles and Kern Counties

City of San Diego Source Water System Historic Context Statement, City of San Diego, California (2020). While working for her previous firm, Ms. Murray served as principal architectural historian, managed the task order, co-authored the report, and conducted QA/QC on the final document. The City of San Diego requested preparation of a detailed historic context statement built on extensive archival research on the City of San Diego Public Utilities Department's source water system, with particular focus on 11 major pieces of water infrastructure: Morena, Lower Otay, Upper Otay, Murray, Lake Hodges, Barrett, El Capitan, San Vicente, Sutherland, and Miramar Reservoir Complexes, and the Dulzura Conduit. These elements were subject to intensive-level survey and focused research by qualified architectural historians to facilitate preparation of a historical significance evaluation of the City of San Diego Source Water System and its contributing resources, as well as consideration of each resource's individual significance. The research and analysis conducted as part of this study will provide the City and its consultants with the foundation for assessing the historical significance of infrastructure identified throughout the City of San Diego Source Water System as part of future CEQA and NEPA projects. The project also included development of a pamphlet highlighting the history of the City's water system and a timeline of milestone events.

Los Angeles Department of Water and Power (LADWP) As-Needed Environmental Compliance Services (2016-2021). While working for her previous firm, Ms. Murray served as the cultural resources principal investigator, co-authored all technical reports, and provided quality assurance/quality control of numerous technical documents for a variety of projects. Ms. Murray prepared both CEQA and CEQA Plus cultural resources documentation for a wide range of water and electrical infrastructure projects throughout LADWP's service territory. When LADWP project funding sources included the State Water Resources Control Board's (SWRCB) Drinking Water State Revolving Fund, applications for funding must include proof of CEQA compliance and of compliance with federal requirements. CEQA Plus documentation typically includes development of an area of potential effects, completion of a CHRIS records search, Native American coordination, intensive pedestrian survey, identification of historical resources/historic properties, and an assessment of project-related impacts/effects to both archaeological and historic built environment resources.

Energy Use Summary

Construction Phase (gallons/construction period	Gasoline	Diesel
Construction Vehicles	30,569	362,201
Worker Trips	38,413	95
Vendor Trips	6,815	70
Haul Trucks	110	111,822
Total	**75,906**	**474,188**

Operations Phase (gallons/year)		Gasoline	Diesel	Natural Gas (kBTU/yr)	Electricity (kWh/yr)
Dam		0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
All Land Uses		**0**	**0**	**0**	**0**

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Part 1 Site Demolition (Excludes S	Excavators	Diesel	Average	1	10	425	0.38	300
Part 1 Site Demolition (Excludes S	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Part 2 Site Demolition (Excludes S	Excavators	Diesel	Average	1	10	425	0.38	300
Part 2 Site Demolition (Excludes S	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Spillway Demolition: Existing Spill	Concrete/Industrial Saws	Diesel	Average	4	10	33	0.73	25
Spillway Demolition: Existing Spill	Cranes	Diesel	Average	1	10	367	0.29	300
Spillway Demolition: Existing Spill	Crushing/Proc. Equipment	Gasoline	Average	2	10	12	0.85	25
Spillway Demolition: Existing Spill	Excavators	Diesel	Average	2	10	36	0.38	300
Spillway Demolition: Existing Spill	Off-Highway Trucks	Diesel	Average	1	10	376	0.38	300
Spillway Demolition: Existing Spill	Welders	Diesel	Average	1	10	46	0.45	50
Spillway Demolition: Existing Spill	Air Compressors	Diesel	Average	3	10	37	0.48	50
Spillway Demolition: Crush Concr	Crushing/Proc. Equipment	Gasoline	Average	1	10	12	0.85	25
Spillway Demolition: Crush Concr	Excavators	Diesel	Average	1	10	425	0.38	300
Spillway Demolition: Crush Concr	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Spillway Demolition: Crush Concr	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Spillway Demolition: Bridge Pier a	Concrete/Industrial Saws	Diesel	Average	4	10	33	0.73	25
Spillway Demolition: Bridge Pier a	Cranes	Diesel	Average	1	10	367	0.29	300
Spillway Demolition: Bridge Pier a	Crushing/Proc. Equipment	Gasoline	Average	2	10	12	0.85	25
Spillway Demolition: Bridge Pier a	Excavators	Diesel	Average	2	10	36	0.38	300
Spillway Demolition: Bridge Pier a	Off-Highway Trucks	Diesel	Average	1	10	376	0.38	300
Spillway Demolition: Bridge Pier a	Welders	Diesel	Average	1	10	46	0.45	50
Spillway Demolition: Bridge Pier a	Air Compressors	Diesel	Average	3	10	37	0.48	50
Temporary Flood Control Berm	Excavators	Diesel	Average	1	10	425	0.38	300
Temporary Flood Control Berm	Off-Highway Trucks	Diesel	Average	4	10	464	0.38	300
Temporary Flood Control Berm	Rubber Tired Dozers	Diesel	Average	1	10	474	0.4	100
Temporary Flood Control Berm	Rollers	Diesel	Average	1	10	117	0.38	100
Mobilization	Forklifts	Diesel	Average	1	10	142	0.2	175
Mobilization	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Mobilization	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Mobilization	Graders	Diesel	Average	1	10	180	0.41	175
Mobilization	Excavators	Diesel	Average	1	10	425	0.38	300
Mobilization	Skid Steer Loaders	Diesel	Average	2	10	107	0.37	50
Mobilization	Cranes	Diesel	Average	1	10	367	0.29	300
Demobilization	Forklifts	Diesel	Average	1	10	142	0.2	175
Demobilization	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Demobilization	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Demobilization	Graders	Diesel	Average	1	10	180	0.41	175
Demobilization	Excavators	Diesel	Average	1	10	425	0.38	300
Demobilization	Skid Steer Loaders	Diesel	Average	2	10	107	0.37	50
Demobilization	Cranes	Diesel	Average	1	10	367	0.29	300
Cleanup	Scrapers	Diesel	Average	2	10	515	0.48	600
Cleanup	Rubber Tired Dozers	Diesel	Average	3	10	354	0.4	100
Cleanup	Graders	Diesel	Average	1	10	290	0.41	175
Cleanup	Tractors/Loaders/Backhoes	Diesel	Average	1	10	313	0.37	300
Allowance for Piping Install	Excavators	Diesel	Average	1	10	300	0.38	300
Allowance for Piping Install	Tractors/Loaders/Backhoes	Diesel	Average	1	10	241	0.37	300
Allowance for Piping Install	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Bypass Pumping Diversion Beam	Generator Sets	Diesel	Average	1	24	14	0.74	25
Inclined Inlet Structure: Steel Pipe	Rollers	Diesel	Average	1	10	36	0.38	100
Inclined Inlet Structure: Steel Pipe	Excavators	Diesel	Average	2	20	36	0.38	300
Inclined Inlet Structure: Steel Pipe	Tractors/Loaders/Backhoes	Diesel	Average	1	10	84	0.37	300
Inclined Inlet Structure: Steel Pipe	Welders	Diesel	Average	1	10	46	0.45	50
Inclined Inlet Structure: Steel Pipe	Cranes	Diesel	Average	1	10	367	0.29	300

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Inclined Inlet Structure: Reinforce	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Inclined Inlet Structure: Reinforce	Pumps	Diesel	Average	1	10	11	0.74	25
Inclined Inlet Structure: Reinforce	Cranes	Diesel	Average	2	10	367	0.29	300
Inclined Inlet Structure: Reinforce	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Inclined Inlet Structure: Reinforce	Generator Sets	Diesel	Average	2	10	14	0.74	25
Inclined Inlet Structure: Reinforce	Cement and Mortar Mixers	Diesel	Average	3	10	10	0.56	25
Inclined Inlet Structure: Drilled Fo	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Inclined Inlet Structure: Drilled Fo	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	100
Inclined Inlet Structure: Drilled Fo	Forklifts	Diesel	Average	1	10	142	0.2	175
Inclined Inlet Structure: Excavatio	Excavators	Diesel	Average	1	10	425	0.38	300
Inclined Inlet Structure: Excavatio	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Inclined Inlet Structure: Stainless	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Inclined Inlet Structure: Stainless	Forklifts	Diesel	Average	1	10	142	0.2	175
Inclined Inlet Structure: Stainless	Cranes	Diesel	Average	1	10	367	0.29	300
Inclined Inlet Structure: Pneumati	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Inclined Inlet Structure: Pneumati	Forklifts	Diesel	Average	1	10	142	0.2	175
Inclined Inlet Structure: Pneumati	Cranes	Diesel	Average	1	10	367	0.29	300
Cofferdam Installation and Remo	Cranes	Diesel	Average	2	10	367	0.29	300
Cofferdam Installation and Remo	Rough Terrain Forklifts	Diesel	Average	1	10	96	0.4	100
Cofferdam Installation and Remo	Aerial Lifts	Diesel	Average	2	10	46	0.31	50
Cofferdam Installation and Remo	Generator Sets	Diesel	Average	2	24	14	0.74	25
Cofferdam Installation and Remo	Cranes	Diesel	Average	2	10	367	0.29	300
Cofferdam Installation and Remo	Rough Terrain Forklifts	Diesel	Average	1	10	96	0.4	100
Cofferdam Installation and Remo	Aerial Lifts	Diesel	Average	2	10	46	0.31	50
Access Road, Crest Ramp, and E	Graders	Diesel	Average	1	10	290	0.41	175
Access Road, Crest Ramp, and E	Scrapers	Diesel	Average	3	10	515	0.48	600
Access Road, Crest Ramp, and E	Rubber Tired Dozers	Diesel	Average	1	10	265	0.4	100
Access Road, Crest Ramp, and E	Off-Highway Trucks	Diesel	Average	1	10	464	0.38	300
Access Road, Crest Ramp, and E	Rubber Tired Dozers	Diesel	Average	1	10	474	0.4	100
Access Road, Crest Ramp, and E	Rollers	Diesel	Average	1	10	405	0.38	100
Access Road, Crest Ramp, and E	Graders	Diesel	Average	1	10	238	0.41	175
Access Road, Crest Ramp, and E	Tractors/Loaders/Backhoes	Diesel	Average	1	10	241	0.37	300
Access Road, Crest Ramp, and E	Rollers	Diesel	Average	1	10	112	0.38	100
Access Road, Crest Ramp, and E	Excavators	Diesel	Average	1	10	300	0.38	300
Access Road, Crest Ramp, and E	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Access Road, Crest Ramp, and E	Rubber Tired Dozers	Diesel	Average	1	5	170	0.4	100
Access Road, Crest Ramp, and E	Forklifts	Diesel	Average	1	10	142	0.2	175
Access Road, Crest Ramp, and E	Tractors/Loaders/Backhoes	Diesel	Average	1	5	241	0.37	300
Access Road, Crest Ramp, and E	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Access Road, Crest Ramp, and E	Skid Steer Loaders	Diesel	Average	1	10	106	0.37	50
Access Road, Crest Ramp, and E	Forklifts	Diesel	Average	1	10	142	0.2	175
Access Road, Crest Ramp, and E	Forklifts	Diesel	Average	1	10	142	0.2	175
Access Road, Crest Ramp, and E	Generator Sets	Diesel	Average	1	10	14	0.74	25
Access Road, Crest Ramp, and E	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Access Road, Crest Ramp, and E	Pumps	Diesel	Average	1	10	11	0.74	25
Access Road, Crest Ramp, and E	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Access Road, Crest Ramp, and E	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Access Road, Crest Ramp, and E	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Access Road, Crest Ramp, and E	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Dam Control Building: Pt 1 CMU (	Forklifts	Diesel	Average	1	5	142	0.2	175
Dam Control Building: Pt 1 CMU (	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	100
Dam Control Building: Pt 1 CMU (	Excavators	Diesel	Average	1	5	74	0.38	75
Dam Control Building: Pt 2 CMU (	Forklifts	Diesel	Average	1	5	142	0.2	175

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Dam Control Building: Pt 2 CMU (	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	100
Dam Control Building: Pt 2 CMU (	Excavators	Diesel	Average	1	5	74	0.38	75
Dam Control Building: Reinforced	Forklifts	Diesel	Average	1	5	142	0.2	175
Dam Control Building: Reinforced	Generator Sets	Diesel	Average	1	10	14	0.74	25
Dam Control Building: Reinforced	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	100
Dam Control Building: Reinforced	Pumps	Diesel	Average	1	10	11	0.74	25
Dam Control Building: Reinforced	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Dam Control Building: Reinforced	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Dam Control Building: Reinforced	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	100
Dam Control Building: Reinforced	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Dam Control Building: Metal Fran	Forklifts	Diesel	Average	1	5	142	0.2	175
Dam Control Building: Metal Fran	Cranes	Diesel	Average	1	10	367	0.29	300
Dam Control Building: Ancillary F	Forklifts	Diesel	Average	1	5	142	0.2	175
Dam Control Building: Ancillary F	Cranes	Diesel	Average	1	5	367	0.29	300
Downstream Outlet Works Piping	Excavators	Diesel	Average	1	10	300	0.38	300
Downstream Outlet Works Piping	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Downstream Outlet Works Piping	Rubber Tired Dozers	Diesel	Average	1	10	170	0.4	175
Downstream Outlet Works Piping	Excavators	Diesel	Average	1	10	300	0.38	300
Downstream Outlet Works Piping	Tractors/Loaders/Backhoes	Diesel	Average	1	10	241	0.37	300
Downstream Outlet Works Piping	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Downstream Outlet Works Piping	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Downstream Outlet Works Piping	Cranes	Diesel	Average	1	5	367	0.29	300
Downstream Outlet Works Piping	Forklifts	Diesel	Average	1	5	142	0.2	175
Downstream Outlet Works Piping	Generator Sets	Diesel	Average	1	10	14	0.74	25
Downstream Outlet Works Piping	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Downstream Outlet Works Piping	Pumps	Diesel	Average	1	10	11	0.74	25
Downstream Outlet Works Piping	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Downstream Outlet Works Piping	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Downstream Outlet Works Piping	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Downstream Outlet Works Piping	Cement and Mortar Mixers	Diesel	Average	3	10	10	0.56	25
Downstream Outlet Works Piping	Rollers	Diesel	Average	1	10	36	0.38	100
Downstream Outlet Works Piping	Excavators	Diesel	Average	3	10	36	0.38	300
Downstream Outlet Works Piping	Tractors/Loaders/Backhoes	Diesel	Average	1	10	84	0.37	300
Downstream Outlet Works Piping	Welders	Diesel	Average	1	10	46	0.45	50
Downstream Outlet Works Piping	Rollers	Diesel	Average	1	10	36	0.38	100
Downstream Outlet Works Piping	Excavators	Diesel	Average	3	10	36	0.38	300
Downstream Outlet Works Piping	Tractors/Loaders/Backhoes	Diesel	Average	1	10	84	0.37	300
Downstream Outlet Works Piping	Welders	Diesel	Average	1	10	46	0.45	50
Downstream Outlet Works Piping	Forklifts	Diesel	Average	1	5	142	0.2	175
Downstream Outlet Works Piping	Cranes	Diesel	Average	1	5	367	0.29	300
Downstream Outlet Works Piping	Excavators	Diesel	Average	1	8	300	0.38	300
Downstream Outlet Works Piping	Tractors/Loaders/Backhoes	Diesel	Average	1	5	241	0.37	300
Downstream Outlet Works Piping	Plate Compactors	Diesel	Average	1	5	8	0.43	25
Downstream Outlet Works Piping	Generator Sets	Diesel	Average	1	24	14	0.74	25
Downstream Outlet Works Piping	Excavators	Diesel	Average	1	5	300	0.38	300
Downstream Outlet Works Piping	Tractors/Loaders/Backhoes	Diesel	Average	1	5	241	0.37	300
Downstream Outlet Works Piping	Plate Compactors	Diesel	Average	1	5	8	0.43	25
Pedestrian Access Walkway, Stai	Excavators	Diesel	Average	1	10	300	0.38	300
Pedestrian Access Walkway, Stai	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Pedestrian Access Walkway, Stai	Cranes	Diesel	Average	1	5	367	0.29	300
Pedestrian Access Walkway, Stai	Forklifts	Diesel	Average	1	5	142	0.2	175
Pedestrian Access Walkway, Stai	Generator Sets	Diesel	Average	1	10	14	0.74	25
Pedestrian Access Walkway, Stai	Skid Steer Loaders	Diesel	Average	1	8	107	0.37	50

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Pedestrian Access Walkway, Stai	Pumps	Diesel	Average	1	5	11	0.74	25
Pedestrian Access Walkway, Stai	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Pedestrian Access Walkway, Stai	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Pedestrian Access Walkway, Stai	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Pedestrian Access Walkway, Stai	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Pedestrian Access Walkway, Stai	Cranes	Diesel	Average	2	10	367	0.29	300
Pedestrian Access Walkway, Stai	Forklifts	Diesel	Average	1	10	142	0.2	175
Pedestrian Access Walkway, Stai	Generator Sets	Diesel	Average	1	10	14	0.74	25
Pedestrian Access Walkway, Stai	Forklifts	Diesel	Average	1	10	142	0.2	175
Pedestrian Access Walkway, Stai	Cranes	Diesel	Average	1	10	367	0.29	300
Pedestrian Access Walkway, Stai	Graders	Diesel	Average	1	10	290	0.41	175
Pedestrian Access Walkway, Stai	Scrapers	Diesel	Average	3	10	515	0.48	600
Pedestrian Access Walkway, Stai	Rubber Tired Dozers	Diesel	Average	1	10	265	0.4	100
Pedestrian Access Walkway, Stai	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Pedestrian Access Walkway, Stai	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Pedestrian Access Walkway, Stai	Forklifts	Diesel	Average	1	10	142	0.2	175
Pedestrian Access Walkway, Stai	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Pedestrian Access Walkway, Stai	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	100
Pedestrian Access Walkway, Stai	Forklifts	Diesel	Average	1	10	142	0.2	175
Pedestrian Access Walkway, Stai	Excavators	Diesel	Average	1	10	201	0.38	300
Pedestrian Access Walkway, Stai	Pumps	Diesel	Average	1	10	11	0.74	25
Pedestrian Access Walkway, Stai	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Pedestrian Access Walkway, Stai	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Pedestrian Access Walkway, Stai	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Pedestrian Access Walkway, Stai	Air Compressors	Diesel	Average	1	10	37	0.48	50
Spillway Site Excavations	Excavators	Diesel	Average	1	10	485	0.38	300
Spillway Site Excavations	Excavators	Diesel	Average	1	10	425	0.38	300
Spillway Site Excavations	Off-Highway Trucks	Diesel	Average	4	10	464	0.38	300
Spillway Site Excavations	Rubber Tired Dozers	Diesel	Average	1	10	474	0.4	100
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Rock Slope Stabilization	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Rock Slope Stabilization	Forklifts	Diesel	Average	1	10	142	0.2	175
Rock Slope Stabilization	Excavators	Diesel	Average	1	10	201	0.38	300
Rock Slope Stabilization	Pumps	Diesel	Average	1	10	11	0.74	25
Rock Slope Stabilization	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Rock Slope Stabilization	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Rock Slope Stabilization	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Rock Slope Stabilization	Air Compressors	Diesel	Average	1	10	37	0.48	50
RCC Weir Support Block	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
RCC Weir Support Block	Pumps	Diesel	Average	3	10	11	0.74	25
RCC Weir Support Block	Plate Compactors	Diesel	Average	1	10	8	0.43	25
RCC Weir Support Block	Cranes	Diesel	Average	1	10	367	0.29	300
RCC Weir Support Block	Generator Sets	Diesel	Average	4	10	14	0.74	25
RCC Weir Support Block	Tractors/Loaders/Backhoes	Diesel	Average	3	10	84	0.37	300
RCC Weir Support Block	Pumps	Diesel	Average	3	10	11	0.74	25
RCC Weir Support Block	Rollers	Diesel	Average	3	10	36	0.38	100
RCC Weir Support Block	Rubber Tired Dozers	Diesel	Average	3	10	367	0.4	100
RCC Weir Support Block	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Side Channel Control Structure (2	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Side Channel Control Structure (2	Pumps	Diesel	Average	3	10	11	0.74	25
Side Channel Control Structure (2	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Side Channel Control Structure (2	Generator Sets	Diesel	Average	4	10	14	0.74	25
Side Channel Control Structure (2	Tractors/Loaders/Backhoes	Diesel	Average	3	10	84	0.37	100

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Side Channel Control Structure (2	Pumps	Diesel	Average	3	10	11	0.74	25
Side Channel Control Structure (2	Rollers	Diesel	Average	3	10	36	0.38	50
Side Channel Control Structure (2	Rubber Tired Dozers	Diesel	Average	3	10	367	0.4	300
Side Channel Control Structure (2	Cranes	Diesel	Average	1	10	367	0.29	300
Side Channel Control Structure (2	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Side Channel Control Structure (2	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Side Channel Control Structure (2	Pumps	Diesel	Average	1	10	11	0.74	25
Side Channel Control Structure (2	Cranes	Diesel	Average	2	10	367	0.29	300
Side Channel Control Structure (2	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Side Channel Control Structure (2	Generator Sets	Diesel	Average	2	10	14	0.74	25
Side Channel Control Structure (2	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Side Channel Control Structure (2	Cement and Mortar Mixers	Diesel	Average	2	5	10	0.56	25
Side Channel Control Structure (2	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Side Channel Control Structure (2	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Side Channel Control Structure (2	Pumps	Diesel	Average	1	10	11	0.74	25
Side Channel Control Structure (2	Cranes	Diesel	Average	2	10	367	0.29	300
Side Channel Control Structure (2	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Side Channel Control Structure (2	Generator Sets	Diesel	Average	2	10	14	0.74	25
Side Channel Control Structure (2	Bore/Drill Rigs	Diesel	Average	2	10	173	0.5	175
Side Channel Control Structure (2	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Wall Type 1 Tieback Wall Left (0+	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 1 Tieback Wall Left (0+	Pumps	Diesel	Average	1	10	11	0.74	25
Wall Type 1 Tieback Wall Left (0+	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 1 Tieback Wall Left (0+	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Wall Type 1 Tieback Wall Left (0+	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 1 Tieback Wall Left (0+	Excavators	Diesel	Average	2	10	425	0.38	300
Wall Type 1 Tieback Wall Left (0+	Off-Highway Trucks	Diesel	Average	3	10	464	0.38	300
Wall Type 1 Tieback Wall Left (0+	Rubber Tired Dozers	Diesel	Average	1	10	354	0.4	100
Wall Type 1 Tieback Wall Left (0+	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Wall Type 1 Tieback Wall Left (0+	Pumps	Diesel	Average	1	10	11	0.74	25
Wall Type 1 Tieback Wall Left (0+	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	100
Wall Type 1 Tieback Wall Left (0+	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 1 Tieback Wall Left (0+	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 1 Tieback Wall Left (0+	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 1 Tieback Wall Left (0+	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 1 Tieback Wall Left (0+	Air Compressors	Diesel	Average	1	10	37	0.48	50
Wall Type 1 Tieback Wall Left (0+	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 1 Tieback Wall Left (0+	Pumps	Diesel	Average	1	10	11	0.74	25
Wall Type 1 Tieback Wall Left (0+	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 1 Tieback Wall Left (0+	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 1 Tieback Wall Left (0+	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 1 Tieback Wall Left (0+	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 1 Tieback Wall Left (0+	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 1 Tieback Wall Left (0+	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 1 Tieback Wall Left (0+	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 1 Tieback Wall Left (0+	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Wall Type 1 Tieback Wall Left (0+	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 1 Tieback Wall Left (0+	Forklifts	Diesel	Average	1	10	142	0.2	175
Wall Type 1 Tieback Wall Left (0+	Excavators	Diesel	Average	1	10	201	0.38	300
Wall Type 1 Tieback Wall Right (	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 1 Tieback Wall Right (	Pumps	Diesel	Average	1	10	11	0.74	25
Wall Type 1 Tieback Wall Right (	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 1 Tieback Wall Right (	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Wall Type 1 Tieback Wall Right ((	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 1 Tieback Wall Right ((	Cement and Mortar Mixers	Diesel	Average	4	10	10	0.56	25
Wall Type 1 Tieback Wall Right ((	Excavators	Diesel	Average	2	10	425	0.38	300
Wall Type 1 Tieback Wall Right ((	Off-Highway Trucks	Diesel	Average	3	10	464	0.38	300
Wall Type 1 Tieback Wall Right ((	Rubber Tired Dozers	Diesel	Average	1	10	354	0.4	100
Wall Type 1 Tieback Wall Right ((	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Wall Type 1 Tieback Wall Right ((	Pumps	Diesel	Average	1	10	11	0.74	25
Wall Type 1 Tieback Wall Right ((	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 1 Tieback Wall Right ((	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Wall Type 1 Tieback Wall Right ((	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Wall Type 1 Tieback Wall Right ((	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 1 Tieback Wall Right ((	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 1 Tieback Wall Right ((	Air Compressors	Diesel	Average	1	10	37	0.48	50
Wall Type 1 Tieback Wall Right ((	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 1 Tieback Wall Right ((	Pumps	Diesel	Average	1	10	11	0.74	25
Wall Type 1 Tieback Wall Right ((	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 1 Tieback Wall Right ((	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 1 Tieback Wall Right ((	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 1 Tieback Wall Right ((	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 1 Tieback Wall Right ((	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 1 Tieback Wall Right ((	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 1 Tieback Wall Right ((	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 1 Tieback Wall Right ((	Bore/Drill Rigs	Diesel	Average	2	10	83	0.5	100
Wall Type 1 Tieback Wall Right ((	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 1 Tieback Wall Right ((	Forklifts	Diesel	Average	1	10	142	0.2	175
Wall Type 1 Tieback Wall Right ((	Excavators	Diesel	Average	1	10	201	0.38	300
Wall Transitions: Left Secant Pile	Excavators	Diesel	Average	1	10	425	0.38	300
Wall Transitions: Left Secant Pile	Cranes	Diesel	Average	1	5	367	0.29	300
Wall Transitions: Left Secant Pile	Excavators	Diesel	Average	1	10	425	0.38	300
Wall Transitions: Left Secant Pile	Forklifts	Diesel	Average	1	10	142	0.2	175
Wall Transitions: Left Secant Pile	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Transitions: Left Secant Pile	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Transitions: Left Secant Pile	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Transitions: Left Secant Pile	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Transitions: Left Secant Pile	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Wall Transitions: Right Secant Pil	Excavators	Diesel	Average	2	10	425	0.38	300
Wall Transitions: Right Secant Pil	Cranes	Diesel	Average	1	5	367	0.29	300
Wall Transitions: Right Secant Pil	Forklifts	Diesel	Average	1	10	142	0.2	175
Wall Transitions: Right Secant Pil	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Transitions: Right Secant Pil	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Transitions: Right Secant Pil	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Transitions: Right Secant Pil	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Transitions: Right Secant Pil	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Right Closure Wall: Work Platform	Excavators	Diesel	Average	1	10	425	0.38	300
Right Closure Wall: Work Platform	Off-Highway Trucks	Diesel	Average	2	10	464	0.38	300
Right Closure Wall: Work Platform	Rubber Tired Dozers	Diesel	Average	1	10	354	0.4	100
Right Closure Wall: Work Platform	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Right Closure Wall: Secant Pile W	Excavators	Diesel	Average	1	10	425	0.38	300
Right Closure Wall: Secant Pile W	Cranes	Diesel	Average	1	10	367	0.29	300
Right Closure Wall: Secant Pile W	Excavators	Diesel	Average	1	10	425	0.38	300
Right Closure Wall: Secant Pile W	Forklifts	Diesel	Average	1	10	142	0.2	175
Right Closure Wall: Secant Pile W	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Right Closure Wall: Secant Pile W	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Right Closure Wall: Secant Pile W	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Right Closure Wall: Secant Pile W	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Right Closure Wall: Secant Pile W	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Right Closure Wall: Backfill Conc	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Right Closure Wall: Backfill Conc	Pumps	Diesel	Average	1	5	11	0.74	50
Right Closure Wall: Backfill Conc	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Right Closure Wall: Backfill Conc	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Right Closure Wall: Backfill Conc	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Right Closure Wall: Backfill Conc	Cement and Mortar Mixers	Diesel	Average	3	10	10	0.56	25
Wall Type 2 - Left: Leveling Conc	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 2 - Left: Leveling Conc	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Left: Leveling Conc	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Left: Leveling Conc	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Wall Type 2 - Left: Leveling Conc	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Left: 1 Inch Concret	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Left: 1 Inch Concret	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Left: 1 Inch Concret	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Left: 1 Inch Concret	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Left: 1 Inch Concret	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 2 - Left: 1 Inch Concret	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Left: 1 Inch Concret	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Left: 1 Inch Concret	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Left: 1 Inch Concret	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Left: 2.5 Inch Concr	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Left: 2.5 Inch Concr	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Left: 2.5 Inch Concr	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Left: 2.5 Inch Concr	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Left: 2.5 Inch Concr	Generator Sets	Diesel	Average	1	10	14	0.74	25
Wall Type 2 - Left: 2.5 Inch Concr	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Left: 2.5 Inch Concr	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Left: 2.5 Inch Concr	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Left: 2.5 Inch Concr	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Left: Concrete Footi	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Left: Concrete Footi	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Left: Concrete Footi	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Left: Concrete Footi	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Left: Concrete Footi	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 2 - Left: Concrete Footi	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Left: Concrete Footi	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Left: Concrete Footi	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Left: Concrete Footi	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Left: Backfill	Graders	Diesel	Average	1	10	215	0.41	175
Wall Type 2 - Left: Backfill	Excavators	Diesel	Average	1	10	36	0.38	300
Wall Type 2 - Left: Backfill	Rollers	Diesel	Average	2	10	36	0.38	100
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Wall Type 2 - Left: Backfill	Off-Highway Trucks	Diesel	Average	1	10	376	0.38	300
Wall Type 2 - Left: Reinforced Co	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Left: Reinforced Co	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Left: Reinforced Co	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Left: Reinforced Co	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Left: Reinforced Co	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 2 - Left: Reinforced Co	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Left: Reinforced Co	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Wall Type 2 - Left: Reinforced Co	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Left: Reinforced Co	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Left: Footing Rock A	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Wall Type 2 - Left: Footing Rock A	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Wall Type 2 - Left: Footing Rock A	Forklifts	Diesel	Average	1	10	142	0.2	175
Wall Type 2 - Left: Footing Rock A	Graders	Diesel	Average	1	10	215	0.41	175
Wall Type 2 - Left: Footing Rock A	Excavators	Diesel	Average	1	10	36	0.38	50
Wall Type 2 - Left: Footing Rock A	Rollers	Diesel	Average	2	10	36	0.38	50
Wall Type 2 - Left: Footing Rock A	Off-Highway Trucks	Diesel	Average	6	10	376	0.38	300
Wall Type 2 - Wall Right: Levelinç	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Wall Right: Levelinç	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Wall Right: Levelinç	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Wall Right: Levelinç	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Wall Right: Levelinç	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 2 - Wall Right: Levelinç	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Wall Right: Levelinç	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Wall Right: Levelinç	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Wall Right: Levelinç	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Wall Right: 1 Inch V	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Wall Right: 1 Inch V	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Wall Right: 1 Inch V	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Wall Right: 1 Inch V	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Wall Right: 1 Inch V	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 2 - Wall Right: 1 Inch V	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Wall Right: 1 Inch V	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Wall Right: 1 Inch V	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Wall Right: 1 Inch V	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Wall Right: 2.5 Inch	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Wall Right: 2.5 Inch	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Wall Right: 2.5 Inch	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Wall Right: 2.5 Inch	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Wall Right: 2.5 Inch	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 2 - Wall Right: 2.5 Inch	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Wall Right: 2.5 Inch	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Wall Right: 2.5 Inch	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Wall Type 2 - Wall Right: 2.5 Inch	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Wall Right: Concret	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 2 - Wall Right: Concret	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 2 - Wall Right: Concret	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 2 - Wall Right: Concret	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 2 - Wall Right: Concret	Generator Sets	Diesel	Average	2	10	14	0.74	50
Wall Type 2 - Wall Right: Concret	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 2 - Wall Right: Concret	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 2 - Wall Right: Concret	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	100
Wall Type 2 - Wall Right: Concret	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Wall Type 2 - Wall Right: Backfill	Graders	Diesel	Average	1	10	215	0.41	175
Wall Type 2 - Wall Right: Backfill	Excavators	Diesel	Average	1	10	36	0.38	50
Wall Type 2 - Wall Right: Backfill	Rollers	Diesel	Average	2	10	36	0.38	50
Wall Type 2 - Wall Right: Backfill	Off-Highway Trucks	Diesel	Average	6	10	376	0.38	300
Wall Type 3 - Left: Roller Compac	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Wall Type 3 - Left: Roller Compac	Pumps	Diesel	Average	3	10	11	0.74	50
Wall Type 3 - Left: Roller Compac	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Wall Type 3 - Left: Roller Compac	Cranes	Diesel	Average	1	10	367	0.29	300

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Wall Type 3 - Left: Roller Compac	Generator Sets	Diesel	Average	4	10	14	0.74	25
Wall Type 3 - Left: Roller Compac	Tractors/Loaders/Backhoes	Diesel	Average	3	10	84	0.37	300
Wall Type 3 - Left: Roller Compac	Pumps	Diesel	Average	3	10	11	0.74	50
Wall Type 3 - Left: Roller Compac	Rollers	Diesel	Average	3	10	36	0.38	50
Wall Type 3 - Left: Roller Compac	Rubber Tired Dozers	Diesel	Average	3	10	367	0.4	300
Wall Type 3 - Left: Roller Compac	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Wall Type 3 - Left: CVC Facing	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 3 - Left: CVC Facing	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 3 - Left: CVC Facing	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 3 - Left: CVC Facing	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 3 - Left: CVC Facing	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 3 - Left: CVC Facing	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 3 - Left: CVC Facing	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 3 - Left: CVC Facing	Skid Steer Loaders	Diesel	Average	5	5	71	0.37	50
Wall Type 3 - Left: CVC Facing	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Wall Type 3 - Right: Roller Compa	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Wall Type 3 - Right: Roller Compa	Pumps	Diesel	Average	3	10	11	0.74	50
Wall Type 3 - Right: Roller Compa	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Wall Type 3 - Right: Roller Compa	Cranes	Diesel	Average	1	10	367	0.29	300
Wall Type 3 - Right: Roller Compa	Generator Sets	Diesel	Average	4	10	14	0.74	25
Wall Type 3 - Right: Roller Compa	Tractors/Loaders/Backhoes	Diesel	Average	3	10	84	0.37	100
Wall Type 3 - Right: Roller Compa	Pumps	Diesel	Average	3	10	11	0.74	50
Wall Type 3 - Right: Roller Compa	Rollers	Diesel	Average	3	10	36	0.38	50
Wall Type 3 - Right: Roller Compa	Rubber Tired Dozers	Diesel	Average	3	10	367	0.4	300
Wall Type 3 - Right: Roller Compa	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Wall Type 3 - Right: CVC Facing	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Wall Type 3 - Right: CVC Facing	Pumps	Diesel	Average	1	10	11	0.74	50
Wall Type 3 - Right: CVC Facing	Cranes	Diesel	Average	2	10	367	0.29	300
Wall Type 3 - Right: CVC Facing	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Wall Type 3 - Right: CVC Facing	Generator Sets	Diesel	Average	2	10	14	0.74	25
Wall Type 3 - Right: CVC Facing	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Wall Type 3 - Right: CVC Facing	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Wall Type 3 - Right: CVC Facing	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	100
Wall Type 3 - Right: CVC Facing	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Wall Type 3 - Right: Backfill	Graders	Diesel	Average	1	10	215	0.41	175
Wall Type 3 - Right: Backfill	Excavators	Diesel	Average	1	10	36	0.38	50
Wall Type 3 - Right: Backfill	Rollers	Diesel	Average	2	10	36	0.38	50
Wall Type 3 - Right: Backfill	Off-Highway Trucks	Diesel	Average	6	10	376	0.38	300
Stilling Basin: RCC	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Stilling Basin: RCC	Pumps	Diesel	Average	3	10	11	0.74	50
Stilling Basin: RCC	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Stilling Basin: RCC	Cranes	Diesel	Average	1	10	367	0.29	300
Stilling Basin: RCC	Generator Sets	Diesel	Average	4	10	14	0.74	25
Stilling Basin: RCC	Tractors/Loaders/Backhoes	Diesel	Average	3	10	84	0.37	300
Stilling Basin: RCC	Pumps	Diesel	Average	3	10	11	0.74	50
Stilling Basin: RCC	Rollers	Diesel	Average	3	10	36	0.38	50
Stilling Basin: RCC	Rubber Tired Dozers	Diesel	Average	3	10	367	0.4	300
Stilling Basin: RCC	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Stilling Basin: Upstream/Downstre	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Stilling Basin: Upstream/Downstre	Pumps	Diesel	Average	1	10	11	0.74	50
Stilling Basin: Upstream/Downstre	Cranes	Diesel	Average	2	10	367	0.29	300
Stilling Basin: Upstream/Downstre	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Stilling Basin: Upstream/Downstre	Generator Sets	Diesel	Average	2	10	14	0.74	25

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Stilling Basin: Upstream/Downstre	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Stilling Basin: Upstream/Downstre	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Stilling Basin: Upstream/Downstre	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	100
Stilling Basin: Upstream/Downstre	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Stilling Basin: Basin Steps	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Stilling Basin: Basin Steps	Pumps	Diesel	Average	1	10	11	0.74	50
Stilling Basin: Basin Steps	Cranes	Diesel	Average	2	10	367	0.29	300
Stilling Basin: Basin Steps	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Stilling Basin: Basin Steps	Generator Sets	Diesel	Average	2	10	14	0.74	25
Stilling Basin: Basin Steps	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Stilling Basin: Basin Steps	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Stilling Basin: Basin Steps	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Stilling Basin: Basin Steps	Cement and Mortar Mixers	Diesel	Average	2	10	10	0.56	25
Stilling Basin: Chute Blocks	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Stilling Basin: Chute Blocks	Pumps	Diesel	Average	1	10	11	0.74	50
Stilling Basin: Chute Blocks	Cranes	Diesel	Average	2	8	367	0.29	300
Stilling Basin: Chute Blocks	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Stilling Basin: Chute Blocks	Generator Sets	Diesel	Average	2	10	14	0.74	25
Stilling Basin: Chute Blocks	Bore/Drill Rigs	Diesel	Average	1	2	173	0.5	175
Stilling Basin: Chute Blocks	Tractors/Loaders/Backhoes	Diesel	Average	1	2	286	0.37	300
Stilling Basin: Chute Blocks	Skid Steer Loaders	Diesel	Average	1	2	107	0.37	50
Stilling Basin: Chute Blocks	Cement and Mortar Mixers	Diesel	Average	2	2	10	0.56	25
Stilling Basin: Dentated Sill	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Stilling Basin: Dentated Sill	Pumps	Diesel	Average	1	10	11	0.74	50
Stilling Basin: Dentated Sill	Cranes	Diesel	Average	2	10	367	0.29	300
Stilling Basin: Dentated Sill	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Stilling Basin: Dentated Sill	Generator Sets	Diesel	Average	2	10	14	0.74	25
Stilling Basin: Dentated Sill	Bore/Drill Rigs	Diesel	Average	1	2	173	0.5	175

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Stilling Basin: Dentated Sill	Tractors/Loaders/Backhoes	Diesel	Average	1	2	286	0.37	300
Stilling Basin: Dentated Sill	Skid Steer Loaders	Diesel	Average	1	2	107	0.37	50
Stilling Basin: Dentated Sill	Cement and Mortar Mixers	Diesel	Average	2	2	10	0.56	25
Spillway Slab Construction: RCC	Bore/Drill Rigs	Diesel	Average	1	10	173	0.5	175
Spillway Slab Construction: RCC	Pumps	Diesel	Average	6	10	11	0.74	50
Spillway Slab Construction: RCC	Plate Compactors	Diesel	Average	1	10	8	0.43	25
Spillway Slab Construction: RCC	Cranes	Diesel	Average	1	10	367	0.29	300
Spillway Slab Construction: RCC	Generator Sets	Diesel	Average	4	10	14	0.74	25
Spillway Slab Construction: RCC	Tractors/Loaders/Backhoes	Diesel	Average	3	10	84	0.37	100
Spillway Slab Construction: RCC	Rollers	Diesel	Average	3	10	36	0.38	50
Spillway Slab Construction: RCC	Rubber Tired Dozers	Diesel	Average	3	10	367	0.4	300
Spillway Slab Construction: RCC	Off-Highway Trucks	Diesel	Average	5	10	376	0.38	300
Spillway Slab Construction: Spillw	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Spillway Slab Construction: Spillw	Pumps	Diesel	Average	1	10	11	0.74	50
Spillway Slab Construction: Spillw	Cranes	Diesel	Average	2	10	367	0.29	300
Spillway Slab Construction: Spillw	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Spillway Slab Construction: Spillw	Generator Sets	Diesel	Average	2	10	14	0.74	25
Spillway Slab Construction: Spillw	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Spillway Slab Construction: Spillw	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Spillway Slab Construction: Spillw	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Spillway Slab Construction: Spillw	Cement and Mortar Mixers	Diesel	Average	3	10	10	0.56	25
Spillway Slab Construction: Stillir	Surfacing Equipment	Diesel	Average	2	10	399	0.3	300
Spillway Slab Construction: Stillir	Pumps	Diesel	Average	1	10	11	0.74	50
Spillway Slab Construction: Stillir	Cranes	Diesel	Average	2	10	367	0.29	300
Spillway Slab Construction: Stillir	Rough Terrain Forklifts	Diesel	Average	2	10	96	0.4	100
Spillway Slab Construction: Stillir	Generator Sets	Diesel	Average	2	10	14	0.74	25
Spillway Slab Construction: Stillir	Bore/Drill Rigs	Diesel	Average	1	5	173	0.5	175
Spillway Slab Construction: Stillir	Tractors/Loaders/Backhoes	Diesel	Average	1	5	286	0.37	300
Spillway Slab Construction: Stillir	Skid Steer Loaders	Diesel	Average	1	5	107	0.37	50
Spillway Slab Construction: Stillir	Cement and Mortar Mixers	Diesel	Average	3	10	10	0.56	25
Spillway Slab Construction: Zone	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Spillway Slab Construction: Zone	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Spillway Slab Construction: Zone	Forklifts	Diesel	Average	1	10	142	0.2	175
Spillway Slab Construction: Zone	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Spillway Slab Construction: Zone	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Spillway Slab Construction: Zone	Forklifts	Diesel	Average	1	10	142	0.2	175
Spillway Drains and Cleanouts: W	Excavators	Diesel	Average	1	10	74	0.38	300
Spillway Drains and Cleanouts: W	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Spillway Drains and Cleanouts: Lo	Excavators	Diesel	Average	1	10	74	0.38	300
Spillway Drains and Cleanouts: Lo	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Spillway Drains and Cleanouts: Tı	Excavators	Diesel	Average	1	10	74	0.38	300
Spillway Drains and Cleanouts: Tı	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Spillway Drains and Cleanouts: Dı	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Spillway Drains and Cleanouts: Dı	Rubber Tired Dozers	Diesel	Average	1	10	170	0.4	100
Spillway Drains and Cleanouts: Dı	Off-Highway Trucks	Diesel	Average	1	10	376	0.38	300
Spillway Drains and Cleanouts: Fi	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Spillway Drains and Cleanouts: Fi	Rubber Tired Dozers	Diesel	Average	1	10	170	0.4	100
Spillway Drains and Cleanouts: Fi	Off-Highway Trucks	Diesel	Average	1	10	376	0.38	300
Surface Ditch from Landfill: Excav	Excavators	Diesel	Average	1	10	74	0.38	300
Surface Ditch from Landfill: Excav	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Surface Ditch from Landfill: Drop S	Excavators	Diesel	Average	1	10	74	0.38	300
Surface Ditch from Landfill: Drop S	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Surface Ditch from Landfill: Ditch	Excavators	Diesel	Average	1	10	300	0.38	300

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category
Surface Ditch from Landfill: Ditch	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Surface Ditch from Landfill: Ditch	Cranes	Diesel	Average	1	10	367	0.29	300
Surface Ditch from Landfill: Ditch	Tractors/Loaders/Backhoes	Diesel	Average	1	10	241	0.37	300
Surface Ditch from Landfill: Ditch	Forklifts	Diesel	Average	1	10	142	0.2	175
Downstream Apron: Concrete Apı	Forklifts	Diesel	Average	1	10	142	0.2	175
Downstream Apron: Concrete Apı	Generator Sets	Diesel	Average	1	10	14	0.74	25
Downstream Apron: Concrete Apı	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Downstream Apron: Concrete Apı	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Downstream Apron: Concrete Apı	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Downstream Apron: Concrete Apı	Cement and Mortar Mixers	Diesel	Average	1	10	10	0.56	25
Downstream Apron: Concrete Apı	Cranes	Diesel	Average	1	10	367	0.29	300
Downstream Apron: Concrete Apı	Pumps	Diesel	Average	1	10	11	0.74	50
Downstream Apron: Concrete Apı	Bore/Drill Rigs	Diesel	Average	1	10	385	0.5	300
Downstream Apron: Zone C	Bore/Drill Rigs	Diesel	Average	2	10	385	0.5	300
Downstream Apron: Zone C	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Downstream Apron: Zone C	Forklifts	Diesel	Average	1	10	142	0.2	175
Downstream Apron: Riprap Apron	Excavators	Diesel	Average	1	10	300	0.38	300
Downstream Apron: Riprap Apron	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Downstream Apron: Riprap Apron	Dumpers/Tenders	Diesel	Average	2	10	16	0.38	25
Downstream Apron: Riprap Beddi	Excavators	Diesel	Average	1	10	300	0.38	300
Downstream Apron: Riprap Beddi	Tractors/Loaders/Backhoes	Diesel	Average	1	10	286	0.37	300
Downstream Apron: Riprap Beddi	Dumpers/Tenders	Diesel	Average	2	10	16	0.38	25
Furnish and Install Electrical / Cor	Forklifts	Diesel	Average	1	10	142	0.2	175
Furnish and Install Electrical / Cor	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Furnish and Install Electrical / Cor	Excavators	Diesel	Average	1	10	74	0.38	300
Furnish and Install Aeration Syste	Forklifts	Diesel	Average	1	10	142	0.2	175
Furnish and Install Aeration Syste	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Furnish and Install Aeration Syste	Excavators	Diesel	Average	1	10	74	0.38	300
Part 1 Furnish and Install Erosion	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Part 1 Furnish and Install Erosion	Excavators	Diesel	Average	1	10	74	0.38	300
Part 2 Furnish and Install Erosion	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Part 2 Furnish and Install Erosion	Excavators	Diesel	Average	1	10	74	0.38	300
Part 3 Furnish and Install Erosion	Skid Steer Loaders	Diesel	Average	1	10	107	0.37	50
Part 3 Furnish and Install Erosion	Excavators	Diesel	Average	1	10	74	0.38	300
Embankment Mitigation	Rubber Tired Dozers	Diesel	Average	4	10	367	0.4	100
Embankment Mitigation	Excavators	Diesel	Average	2	10	36	0.38	300
Embankment Mitigation	Graders	Diesel	Average	2	10	148	0.41	175
Embankment Mitigation	Tractors/Loaders/Backhoes	Diesel	Average	2	10	84	0.37	300
Embankment Mitigation	Dumpers/Tenders	Diesel	Average	4	10	16	0.38	25
Embankment Mitigation	Plate Compactors	Diesel	Average	3	10	8	0.43	25

Offroad Construc

Phase Name	Num Days	Year	Fuel Consumption Rate (gal/hour)	Fuel Type	Total Fuel Consumption (gal/construction period)
Part 1 Site Demolition (Excludes S	22	2024	4.3	Diesel	361
Part 1 Site Demolition (Excludes S	22	2024	3.9	Diesel	321
Part 2 Site Demolition (Excludes S	22	2024	4.3	Diesel	361
Part 2 Site Demolition (Excludes S	22	2024	3.9	Diesel	321
Spillway Demolition: Existing Spill	22	2024	0.8	Gasoline	512
Spillway Demolition: Existing Spill	22	2024	3.3	Diesel	209
Spillway Demolition: Existing Spill	22	2024	1.0	Gasoline	369
Spillway Demolition: Existing Spill	22	2024	4.3	Diesel	723
Spillway Demolition: Existing Spill	22	2024	4.1	Diesel	346
Spillway Demolition: Existing Spill	22	2024	2.4	Gasoline	239
Spillway Demolition: Existing Spill	22	2024	0.9	Diesel	277
Spillway Demolition: Crush Concr	22	2024	1.0	Gasoline	185
Spillway Demolition: Crush Concr	22	2024	4.3	Diesel	361
Spillway Demolition: Crush Concr	22	2024	3.9	Diesel	321
Spillway Demolition: Crush Concr	22	2024	4.1	Diesel	693
Spillway Demolition: Bridge Pier a	22	2024	0.8	Gasoline	512
Spillway Demolition: Bridge Pier a	22	2024	3.3	Diesel	209
Spillway Demolition: Bridge Pier a	22	2024	1.0	Gasoline	369
Spillway Demolition: Bridge Pier a	22	2024	4.3	Diesel	723
Spillway Demolition: Bridge Pier a	22	2024	4.1	Diesel	346
Spillway Demolition: Bridge Pier a	22	2024	2.4	Gasoline	239
Spillway Demolition: Bridge Pier a	22	2024	0.9	Diesel	277
Temporary Flood Control Berm	22	2024	4.3	Diesel	361
Temporary Flood Control Berm	22	2024	4.1	Diesel	1,385
Temporary Flood Control Berm	22	2024	1.7	Diesel	152
Temporary Flood Control Berm	22	2024	1.7	Diesel	142
Mobilization	22	2024	2.6	Diesel	116
Mobilization	22	2024	3.9	Diesel	321
Mobilization	22	2024	4.1	Diesel	693
Mobilization	22	2024	3.2	Diesel	285
Mobilization	22	2024	4.3	Diesel	361
Mobilization	22	2024	0.9	Diesel	151
Mobilization	22	2024	3.3	Diesel	209
Demobilization	22	2024	2.6	Diesel	116
Demobilization	22	2024	3.9	Diesel	321
Demobilization	22	2024	4.1	Diesel	693
Demobilization	22	2024	3.2	Diesel	285
Demobilization	22	2024	4.3	Diesel	361
Demobilization	22	2024	0.9	Diesel	151
Demobilization	22	2024	3.3	Diesel	209
Cleanup	22	2024	10.6	Diesel	2,230
Cleanup	22	2024	1.7	Diesel	456
Cleanup	22	2024	3.2	Diesel	285
Cleanup	22	2024	3.9	Diesel	321
Allowance for Piping Install	22	2024	4.3	Diesel	361
Allowance for Piping Install	22	2024	3.9	Diesel	321
Allowance for Piping Install	22	2024	0.9	Diesel	75
Bypass Pumping Diversion Beam	78	2024	0.7	Gasoline	975
Inclined Inlet Structure: Steel Pipe	67	2024	1.7	Diesel	431
Inclined Inlet Structure: Steel Pipe	67	2024	4.3	Diesel	4,403
Inclined Inlet Structure: Steel Pipe	67	2024	3.9	Diesel	979
Inclined Inlet Structure: Steel Pipe	67	2024	2.4	Gasoline	727
Inclined Inlet Structure: Steel Pipe	67	2024	3.3	Diesel	635

Onroad Construction Energy Use

Year 2024

Vehicle Types	MPG by Fuel Type					Population by Fuel Type					
	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	Total
LDA	29.3	41.2	0.4	0.000	28.2	5,451,205	15,009	284,963	0	152,679	5,903,856
LDT1	24.4	23.4	0.4	0.000	28.0	505,255	186	1,243	0	739	507,423
LDT2	23.9	31.9	0.4	0.000	27.9	2,551,917	8,409	16,572	0	21,729	2,598,626
LHDT1	13.6	20.5	0.6	0.000	0.0	205,772	107,344	793	0	0	313,909
LHDT2	11.9	17.3	0.6	0.000	0.0	32,210	47,494	205	0	0	79,909
MCY	41.5	0.0	0.0	0.000	0.0	248,270	0	0	0	0	248,270
MDV	19.5	23.7	0.4	0.000	27.6	1,622,854	20,420	18,088	0	13,081	1,674,443
MH	4.9	10.1	0.0	0.000	0.0	30,227	12,282	0	0	0	42,510
MHDT	5.2	8.9	1.0	8.3	0.0	25,496	117,140	365	1,526	0	144,526
HHDT	4.0	6.1	1.8	6.0	0.0	66	101,735	317	10,386	0	112,504
OBUS	5.1	7.0	1.1	8.8	0.0	5,427	3,049	12	487	0	8,975
SBUS	8.9	7.3	1.2	4.2	0.0	2,859	3,436	23	3,247	0	9,564
UBUS	7.0	6.6	2.1	3.2	0.0	894	14	132	5,035	0	6,076
						10,682,454	436,518	322,712	20,681	188,228	11,650,593

Daily Trips

Phase Name	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Gasoline Consumption			Diesel Consumption		
							Worker	Vendor	Haul	Worker	Vendor	Haul
Part 1 Site Demolition (Excludes Spillway)	5	0	0	18.5	10.2	20						
Part 2 Site Demolition (Excludes Spillway)	5	0	0	18.5	10.2	20						
Spillway Demolition: Existing Spillway Demo	35	0	24	18.5	10.2	12.1						
Spillway Demolition: Crush Concrete Demo	13	0	0	18.5	10.2	20						
Spillway Demolition: Bridge Pier and Facing Demo	35	0	0	18.5	10.2	20						
Temporary Flood Control Berm	18	0	0	18.5	10.2	20						
Mobilization	23	0	14	18.5	10.2	12.1						
Demobilization	23	0	12	18.5	10.2	12.1						
Cleanup	18	0	4	18.5	10.2	12.1						
Allowance for Piping Install	8	0	0	18.5	10.2	20						
Bypass Pumping Diversion Beam	3	0	128	18.5	10.2	20						
Inclined Inlet Structure: Steel Pipe and Appurtenances	7	3	0	18.5	10.2	20						
Inclined Inlet Structure: Reinforced Concrete	7	3	83	18.5	10.2	12.1						
Inclined Inlet Structure: Drilled Foundation Anchors	7	3	0	18.5	10.2	20						
Inclined Inlet Structure: Excavation	7	3	0	18.5	10.2	20						
Inclined Inlet Structure: Stainless Steel Platform	7	3	0	18.5	10.2	20						
Inclined Inlet Structure: Pneumatic Actuation Control System	7	3	0	18.5	10.2	20						
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	7	3	0	18.5	10.2	20						
Cofferdam Installation and Removal: Dewatering	7	3	0	18.5	10.2	20						
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	7	3	0	18.5	10.2	20						
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	7	3	0	18.5	10.2	20						
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	7	3	0	18.5	10.2	20						
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	7	3	0	18.5	10.2	20						
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	7	3	0	18.5	10.2	20						
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	7	3	0	18.5	10.2	20						
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	7	3	0	18.5	10.2	20						
Dam Control Building: Pt 1 CMU Control Building	7	3	8	18.5	10.2	20						
Dam Control Building: Pt 2 CMU Control Building	7	3	0	18.5	10.2	20						
Dam Control Building: Reinforced Concrete Foundation	7	3	0	18.5	10.2	20						
Dam Control Building: Metal Frame Roofing	7	3	0	18.5	10.2	20						
Dam Control Building: Ancillary Features	7	3	9	18.5	10.2	12.1						
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Structure Bkfl	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Piping and Valves	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Steel Casing	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Ladders and Platforms	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: Dewatering	7	3	0	18.5	10.2	20						
Downstream Outlet Works Piping and Vault: ARVs and Valves	7	3	88	18.5	10.2	12.1						
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	7	3	0	18.5	10.2	20						
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	7	3	0	18.5	10.2	20						
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	7	3	0	18.5	10.2	20						
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	7	3	17	18.5	10.2	20						
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	7	3	0	18.5	10.2	20						
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	7	3	0	18.5	10.2	20						
Spillway Site Excavations	7	3	18	18.5	10.2	12.1						
Rock Slope Stabilization	7	3	0	18.5	10.2	20						
RCC Weir Support Block	7	3	0	18.5	10.2	20						
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	7	3	0	18.5	10.2	20						
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	7	3	0	18.5	10.2	20						
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	7	3	0	18.5	10.2	20						
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	7	3	0	18.5	10.2	20						
Wall Transitions: Left Secant Pile Walls	7	3	0	18.5	10.2	20						
Wall Transitions: Right Secant Pile Wall	7	3	0	18.5	10.2	20						
Right Closure Wall: Work Platform Construction	7	3	0	18.5	10.2	20						
Right Closure Wall: Secant Pile Wall	7	3	0	18.5	10.2	20						
Right Closure Wall: Backfill Concrete	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: Leveling Concrete	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: 1 Inch Concrete Wall	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: 2.5 Inch Concrete Wall	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: Concrete Footing	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: Backfill	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: Reinforced Concrete Wall	7	3	0	18.5	10.2	20						
Wall Type 2 - Left: Footing Rock Anchors and Backfill	7	3	0	18.5	10.2	20						
Wall Type 2 - Wall Right: Leveling Concrete	7	3	0	18.5	10.2	20						
Wall Type 2 - Wall Right: 1 Inch Wall	7	3	0	18.5	10.2	20						

Wall Type 2 - Wall Right: 2.5 Inch Wall	7	3	0	18.5	10.2	20							
Wall Type 2 - Wall Right: Concrete Footing	7	3	0	18.5	10.2	20							
Wall Type 2 - Wall Right: Backfill	7	3	31	18.5	10.2	12.1							
Wall Type 3 - Left: Roller Compacted Concrete	7	3	0	18.5	10.2	20							
Wall Type 3 - Left: CVC Facing	7	3	0	18.5	10.2	20							
Wall Type 3 - Right: Roller Compacted Concrete	7	3	0	18.5	10.2	20							
Wall Type 3 - Right: CVC Facing	7	3	0	18.5	10.2	20							
Wall Type 3 - Right: Backfill	7	3	0	18.5	10.2	20							
Stilling Basin: RCC	7	3	0	18.5	10.2	20							
Stilling Basin: Upstream/Downstream CVC Facing	7	3	0	18.5	10.2	20							
Stilling Basin: Basin Steps	7	3	0	18.5	10.2	20							
Stilling Basin: Chute Blocks	7	3	0	18.5	10.2	20							
Stilling Basin: Dentated Sill	7	3	0	18.5	10.2	20							
Spillway Slab Construction: RCC Foundation Support Block	7	3	0	18.5	10.2	20							
Spillway Slab Construction: Spillway Chute Slab	7	3	0	18.5	10.2	20							
Spillway Slab Construction: Stilling Basin Slab	7	3	0	18.5	10.2	20							
Spillway Slab Construction: Zone B	7	3	0	18.5	10.2	20							
Spillway Slab Construction: Zone C	7	3	0	18.5	10.2	20							
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	7	3	0	18.5	10.2	20							
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	7	3	0	18.5	10.2	20							
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	7	3	0	18.5	10.2	20							
Spillway Drains and Cleanouts: Drain Gravel	7	3	0	18.5	10.2	20							
Spillway Drains and Cleanouts: Filter Sand	7	3	0	18.5	10.2	20							
Surface Ditch from Landfill: Excavation	7	3	0	18.5	10.2	20							
Surface Ditch from Landfill: Drop Structures	7	3	0	18.5	10.2	20							
Surface Ditch from Landfill: Ditch Lining	7	3	0	18.5	10.2	20							
Downstream Apron: Concrete Apron	7	3	0	18.5	10.2	20							
Downstream Apron: Zone C	7	3	0	18.5	10.2	20							
Downstream Apron: Riprap Apron	7	3	59	18.5	10.2	12.1							
Downstream Apron: Riprap Bedding	7	3	77	18.5	10.2	20							
Furnish and Install Electrical / Controls and Instrumentation	7	3	34	18.5	10.2	12.1							
Furnish and Install Aeration System	7	3	0	18.5	10.2	20							
Part 1 Furnish and Install Erosion Control Measures	7	3	0	18.5	10.2	20							
Part 2 Furnish and Install Erosion Control Measures	7	3	0	18.5	10.2	20							
Part 3 Furnish and Install Erosion Control Measures	7	3	0	18.5	10.2	20							
Embankment Mitigation	43	0	43	18.5	10.2	20							
Total Trips													
Part 1 Site Demolition (Excludes Spillway)	110	0	0	18.5	10.2	20	83	0	0	0	0	0	
Part 2 Site Demolition (Excludes Spillway)	110	0	0	18.5	10.2	20	83	0	0	0	0	0	
Spillway Demolition: Existing Spillway Demo	770	0	528	18.5	10.2	12.1	584	0	1	1	0	954	
Spillway Demolition: Crush Concrete Demo	286	0	0	18.5	10.2	20	217	0	0	1	0	0	
Spillway Demolition: Bridge Pier and Facing Demo	770	0	0	18.5	10.2	20	584	0	0	1	0	0	
Temporary Flood Control Berm	396	0	0	18.5	10.2	20	300	0	0	1	0	0	
Mobilization	506	0	308	18.5	10.2	12.1	384	0	1	1	0	557	
Demobilization	506	0	264	18.5	10.2	12.1	384	0	0	1	0	477	
Cleanup	396	0	88	18.5	10.2	12.1	300	0	0	1	0	159	
Allowance for Piping Install	176	0	0	18.5	10.2	20	134	0	0	0	0	0	
Bypass Pumping Diversion Beam	234	0	9984	18.5	10.2	20	178	0	29	0	0	29,826	
Inclined Inlet Structure: Steel Pipe and Appurtenances	469	201	0	18.5	10.2	20	356	102	0	1	1	0	
Inclined Inlet Structure: Reinforced Concrete	308	132	3652	18.5	10.2	12.1	234	67	7	1	1	6,600	
Inclined Inlet Structure: Drilled Foundation Anchors	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Inclined Inlet Structure: Excavation	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Inclined Inlet Structure: Stainless Steel Platform	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Inclined Inlet Structure: Pneumatic Actuation Control System	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	462	198	0	18.5	10.2	20	351	101	0	1	1	0	
Cofferdam Installation and Removal: Dewatering	308	132	0	18.5	10.2	20	234	67	0	1	1	0	
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Dam Control Building: Pt 1 CMU Control Building	469	201	536	18.5	10.2	20	356	102	2	1	1	1,601	
Dam Control Building: Pt 2 CMU Control Building	322	138	0	18.5	10.2	20	244	70	0	1	1	0	
Dam Control Building: Reinforced Concrete Foundation	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Dam Control Building: Metal Frame Roofing	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Dam Control Building: Ancillary Features	154	66	198	18.5	10.2	12.1	117	34	0	0	0	358	
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Downstream Outlet Works Piping and Vault: Structure Bkfl	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	616	264	0	18.5	10.2	20	467	134	0	1	1	0	
Downstream Outlet Works Piping and Vault: Piping and Valves	462	198	0	18.5	10.2	20	351	101	0	1	1	0	
Downstream Outlet Works Piping and Vault: Steel Casing	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Downstream Outlet Works Piping and Vault: Ladders and Platforms	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Downstream Outlet Works Piping and Vault: Dewatering	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Downstream Outlet Works Piping and Vault: ARVs and Valves	154	66	1936	18.5	10.2	12.1	117	34	3	0	0	3,499	
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	154	66	374	18.5	10.2	20	117	34	1	0	0	1,117	
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Spillway Site Excavations	777	333	1998	18.5	10.2	12.1	590	169	4	1	2	3,611	
Rock Slope Stabilization	763	327	0	18.5	10.2	20	579	166	0	1	2	0	
RCC Weir Support Block	308	132	0	18.5	10.2	20	234	67	0	1	1	0	
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	462	198	0	18.5	10.2	20	351	101	0	1	1	0	
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	924	396	0	18.5	10.2	20	701	201	0	2	2	0	
Wall Transitions: Left Secant Pile Walls	154	66	0	18.5	10.2	20	117	34	0	0	0	0	
Wall Transitions: Right Secant Pile Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0	

Right Closure Wall: Work Platform Construction	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Right Closure Wall: Secant Pile Wall	469	201	0	18.5	10.2	20	356	102	0	1	1	0
Right Closure Wall: Backfill Concrete	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Left: Leveling Concrete	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Left: 1 Inch Concrete Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Left: 2.5 Inch Concrete Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Left: Concrete Footing	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Left: Backfill	308	132	0	18.5	10.2	20	234	67	0	1	1	0
Wall Type 2 - Left: Reinforced Concrete Wall	469	201	0	18.5	10.2	20	356	102	0	1	1	0
Wall Type 2 - Left: Footing Rock Anchors and Backfill	308	132	0	18.5	10.2	20	234	67	0	1	1	0
Wall Type 2 - Wall Right: Leveling Concrete	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Wall Right: 1 Inch Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Wall Right: 2.5 Inch Wall	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Wall Right: Concrete Footing	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 2 - Wall Right: Backfill	154	66	682	18.5	10.2	12.1	117	34	1	0	0	1,233
Wall Type 3 - Left: Roller Compacted Concrete	308	132	0	18.5	10.2	20	234	67	0	1	1	0
Wall Type 3 - Left: CVC Facing	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 3 - Right: Roller Compacted Concrete	315	135	0	18.5	10.2	20	239	69	0	1	1	0
Wall Type 3 - Right: CVC Facing	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Wall Type 3 - Right: Backfill	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Stilling Basin: RCC	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Stilling Basin: Upstream/Downstream CVC Facing	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Stilling Basin: Basin Steps	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Stilling Basin: Chute Blocks	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Stilling Basin: Dentated Sill	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Slab Construction: RCC Foundation Support Block	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Slab Construction: Spillway Chute Slab	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Slab Construction: Stilling Basin Slab	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Slab Construction: Zone B	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Slab Construction: Zone C	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Drains and Cleanouts: Drain Gravel	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Spillway Drains and Cleanouts: Filter Sand	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Surface Ditch from Landfill: Excavation	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Surface Ditch from Landfill: Drop Structures	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Surface Ditch from Landfill: Ditch Lining	308	132	0	18.5	10.2	20	234	67	0	1	1	0
Downstream Apron: Concrete Apron	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Downstream Apron: Zone C	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Downstream Apron: Riprap Apron	154	66	1298	18.5	10.2	12.1	117	34	2	0	0	2,346
Downstream Apron: Riprap Bedding	154	66	1694	18.5	10.2	20	117	34	5	0	0	5,061
Furnish and Install Electrical / Controls and Instrumentation	1078	462	5236	18.5	10.2	12.1	818	235	9	2	2	9,463
Furnish and Install Aeration System	154	66	0	18.5	10.2	20	117	34	0	0	0	0
Part 1 Furnish and Install Erosion Control Measures	308	132	0	18.5	10.2	20	234	67	0	1	1	0
Part 2 Furnish and Install Erosion Control Measures	1078	462	0	18.5	10.2	20	818	235	0	2	2	0
Part 3 Furnish and Install Erosion Control Measures	1078	462	0	18.5	10.2	20	818	235	0	2	2	0
Embankment Mitigation	15050	0	15050	18.5	10.2	20	11,420	0	44	28	0	44,960
Total							**38,413**	**6,815**	**110**	**95**	**70**	**111,822**

Santiago Creek Dam Improvement
Silverado
Anaheim, CA 92808

Inquiry Number: 6196088.2s
September 17, 2020

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	9
Orphan Summary	10
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-14
Physical Setting Source Map Findings	A-16
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2020 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

SILVERADO
ANAHEIM, CA 92808

COORDINATES

Latitude (North):	33.7861000 - 33° 47' 9.96''
Longitude (West):	117.7253000 - 117° 43' 31.08''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	432850.5
UTM Y (Meters):	3738482.2
Elevation:	795 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5636465 BLACK STAR CANYON, CA
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140603
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
SILVERADO
ANAHEIM, CA 92862

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-VSQG ---------- RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System

US ENG CONTROLS..... Engineering Controls Sites List
US INST CONTROLS..... Institutional Controls Sites List

Federal ERNS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE..... State Response Sites

State- and tribal - equivalent CERCLIS

ENVIROSTOR..... EnviroStor Database

State and tribal landfill and/or solid waste disposal site lists

SWF/LF..... Solid Waste Information System

State and tribal leaking storage tank lists

LUST..... Geotracker's Leaking Underground Fuel Tank Report
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land
CPS-SLIC..... Statewide SLIC Cases

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
UST..... Active UST Facilities
AST..... Aboveground Petroleum Storage Tank Facilities
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

VCP..... Voluntary Cleanup Program Properties
INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Considered Brownfieds Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT..... Waste Management Unit Database
SWRCY..... Recycler Database
HAULERS..... Registered Waste Tire Haulers Listing
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

ODI ---------- Open Dump Inventory
IHS OPEN DUMPS ---------- Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---------- Delisted National Clandestine Laboratory Register
HIST Cal-Sites ---------- Historical Calsites Database
SCH ---------- School Property Evaluation Program
CDL ---------- Clandestine Drug Labs
CERS HAZ WASTE ---------- CERS HAZ WASTE
Toxic Pits ---------- Toxic Pits Cleanup Act Sites
US CDL ---------- National Clandestine Laboratory Register
PFAS ---------- PFAS Contamination Site Location Listing

Local Lists of Registered Storage Tanks

SWEEPS UST ---------- SWEEPS UST Listing
HIST UST ---------- Hazardous Substance Storage Container Database
CERS TANKS ---------- California Environmental Reporting System (CERS) Tanks
CA FID UST ---------- Facility Inventory Database

Local Land Records

LIENS ---------- Environmental Liens Listing
LIENS 2 ---------- CERCLA Lien Information
DEED ---------- Deed Restriction Listing

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
CHMIRS ---------- California Hazardous Material Incident Report System
LDS ---------- Land Disposal Sites Listing
MCS ---------- Military Cleanup Sites Listing
Orange Co. Industrial Site ---------- List of Industrial Site Cleanups
SPILLS 90 ---------- SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR ---------- RCRA - Non Generators / No Longer Regulated
FUDS ---------- Formerly Used Defense Sites
DOD ---------- Department of Defense Sites
SCRD DRYCLEANERS ---------- State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ---------- Financial Assurance Information
EPA WATCH LIST ---------- EPA WATCH LIST
2020 COR ACTION ---------- 2020 Corrective Action Program List
TSCA ---------- Toxic Substances Control Act
TRIS ---------- Toxic Chemical Release Inventory System
SSTS ---------- Section 7 Tracking Systems
ROD ---------- Records Of Decision
RMP ---------- Risk Management Plans
RAATS ---------- RCRA Administrative Action Tracking System
PRP ---------- Potentially Responsible Parties
PADS ---------- PCB Activity Database System
ICIS ---------- Integrated Compliance Information System
FTTS ---------- FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

EXECUTIVE SUMMARY

MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
FINDS	Facility Index System/Facility Registry System
DOCKET HWC	Hazardous Waste Compliance Docket Listing
ECHO	Enforcement & Compliance History Information
UXO	Unexploded Ordnance Sites
FUELS PROGRAM	EPA Fuels Program Registered Listing
CA BOND EXP. PLAN	Bond Expenditure Plan
Cortese	"Cortese" Hazardous Waste & Substances Sites List
CUPA Listings	CUPA Resources List
DRYCLEANERS	Cleaner Facilities
EMI	Emissions Inventory Data
ENF	Enforcement Action Listing
Financial Assurance	Financial Assurance Information Listing
HAZNET	Facility and Manifest Data
ICE	ICE
HIST CORTESE	Hazardous Waste & Substance Site List
HWP	EnviroStor Permitted Facilities Listing
HWT	Registered Hazardous Waste Transporter Database
MINES	Mines Site Location Listing
MWMP	Medical Waste Management Program Listing
NPDES	NPDES Permits Listing
PEST LIC	Pesticide Regulation Licenses Listing
PROC	Certified Processors Database
Notify 65	Proposition 65 Records
UIC	UIC Listing
UIC GEO	UIC GEO (GEOTRACKER)
WASTEWATER PITS	Oil Wastewater Pits Listing
WDS	Waste Discharge System
WIP	Well Investigation Program Case List
MILITARY PRIV SITES	MILITARY PRIV SITES (GEOTRACKER)
PROJECT	PROJECT (GEOTRACKER)
WDR	Waste Discharge Requirements Listing
CIWQS	California Integrated Water Quality System
CERS	CERS
NON-CASE INFO	NON-CASE INFO (GEOTRACKER)
OTHER OIL GAS	OTHER OIL & GAS (GEOTRACKER)
PROD WATER PONDS	PROD WATER PONDS (GEOTRACKER)
SAMPLING POINT	SAMPLING POINT (GEOTRACKER)
WELL STIM PROJ	Well Stimulation Project (GEOTRACKER)
MINES MRDS	Mineral Resources Data System
HWTS	Hazardous Waste Tracking System

EXECUTIVE SUMMARY

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP---------- EDR Proprietary Manufactured Gas Plants
EDR Hist Auto---------- EDR Exclusive Historical Auto Stations
EDR Hist Cleaner---------- EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF---------- Recovered Government Archive Solid Waste Facilities List
RGA LUST---------- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

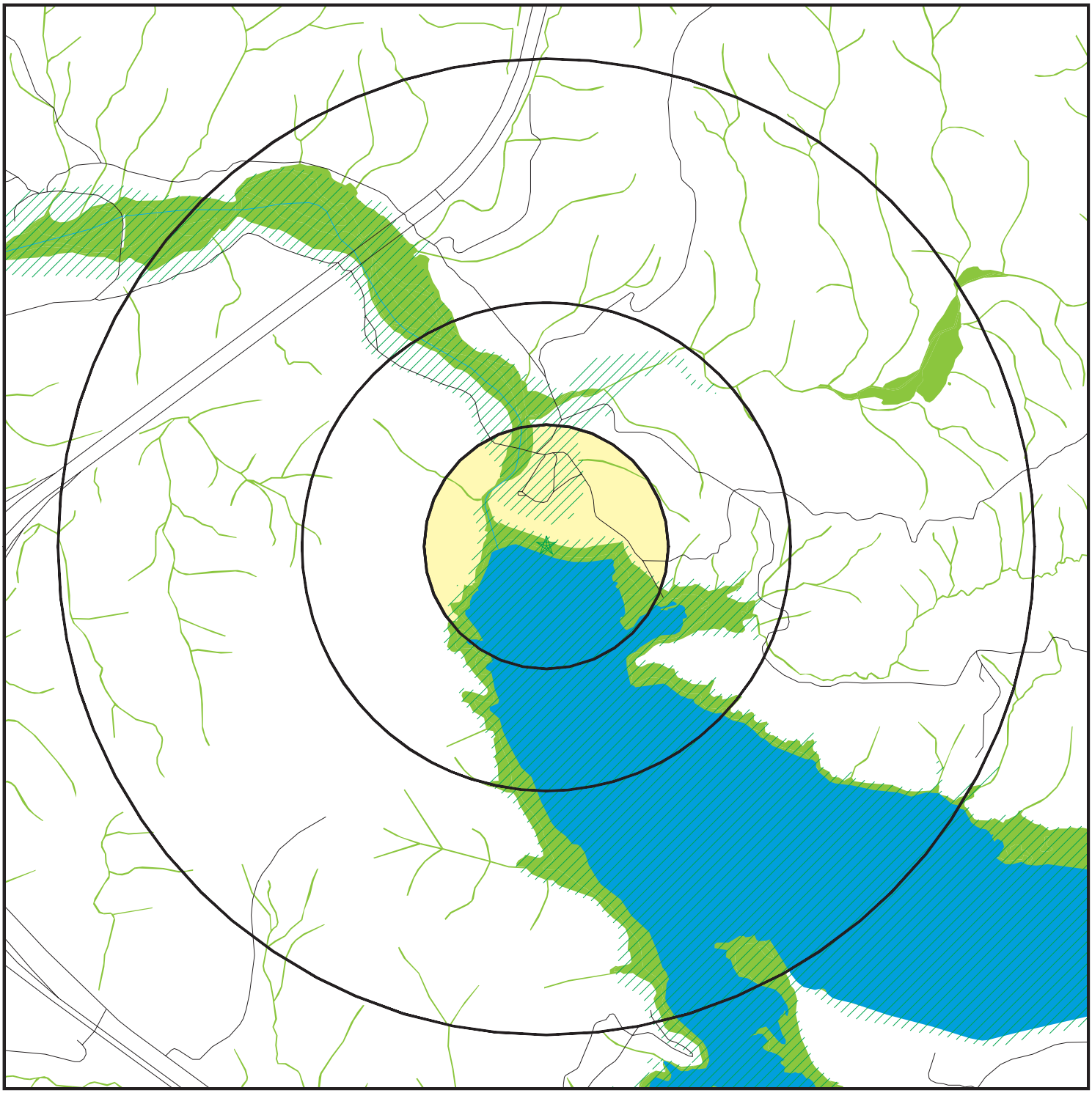
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 6196088.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites

0 1/4 1/2 1 Miles

- Indian Reservations BIA
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands
- Areas of Concern

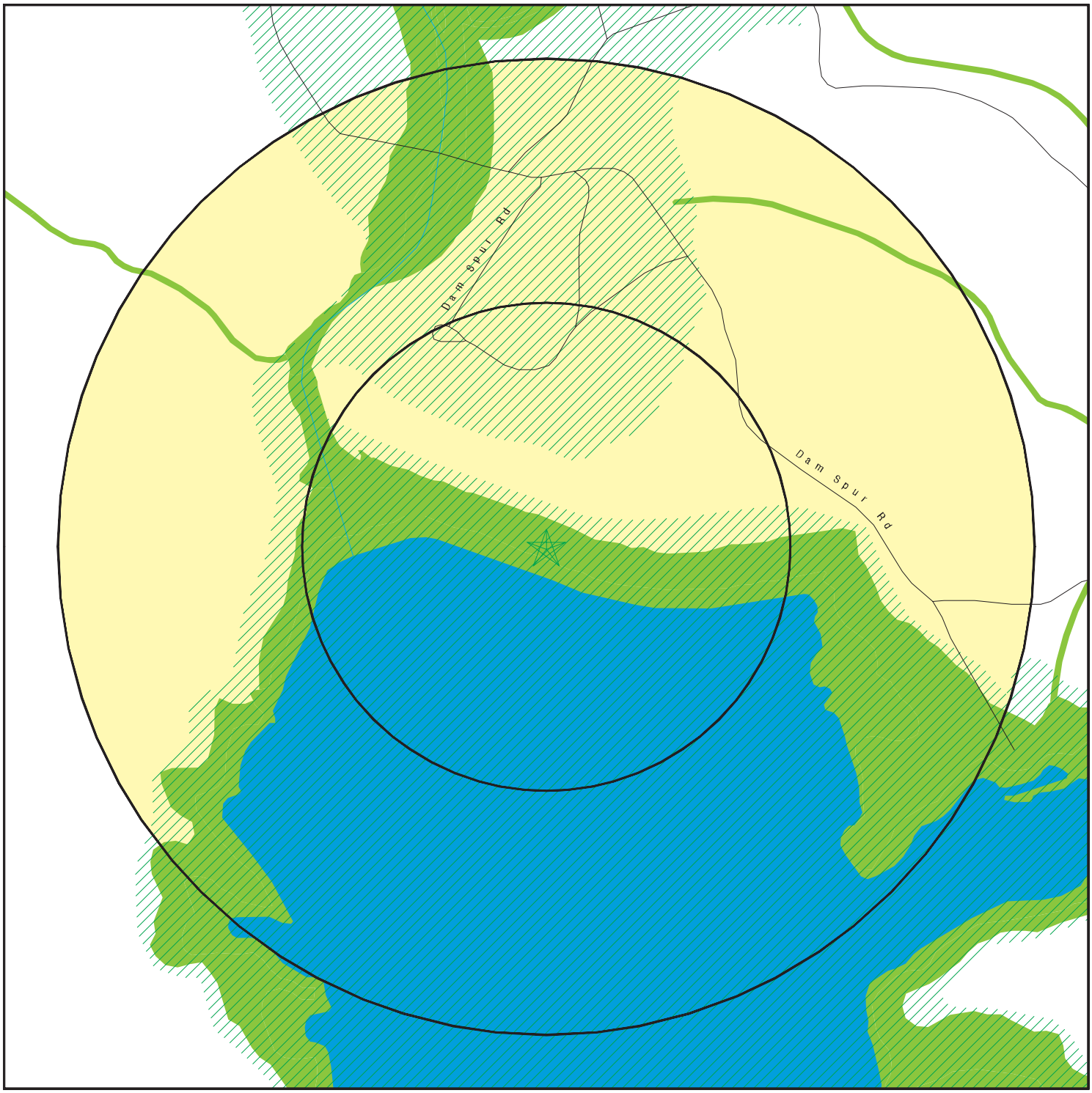
N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Santiago Creek Dam Improvement	CLIENT:	Psomas
ADDRESS:	Silverado Anaheim CA 92808	CONTACT:	Megan Larum
LAT/LONG:	33.7861 / 117.7253	INQUIRY #:	6196088.2s
		DATE:	September 17, 2020 7:23 pm

Copyright © 2020 EDR, Inc. © 2015 TomTom Rel. 2015.

DETAIL MAP - 6196088.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands
- Areas of Concern

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Santiago Creek Dam Improvement	CLIENT:	Psomas
ADDRESS:	Silverado Anaheim CA 92808	CONTACT:	Megan Larum
		INQUIRY #:	6196088.2s
LAT/LONG:	33.7861 / 117.7253	DATE:	September 17, 2020 7:24 pm

Copyright © 2020 EDR, Inc. © 2015 TomTom Rel. 2015.

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
CPS-SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
CERS HAZ WASTE	0.250		0	0	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
PFAS	0.500		0	0	0	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
CERS TANKS	0.250		0	0	NR	NR	NR	0
CA FID UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LIENS 2	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0
MCS	TP		NR	NR	NR	NR	NR	0
Orange Co. Industrial Site	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CUPA Listings	0.250		0	0	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0
ICE	TP		NR	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
PEST LIC	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
UIC GEO	TP		NR	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
MILITARY PRIV SITES	TP		NR	NR	NR	NR	NR	0
PROJECT	TP		NR	NR	NR	NR	NR	0
WDR	TP		NR	NR	NR	NR	NR	0
CIWQS	TP		NR	NR	NR	NR	NR	0
CERS	TP		NR	NR	NR	NR	NR	0
NON-CASE INFO	TP		NR	NR	NR	NR	NR	0
OTHER OIL GAS	TP		NR	NR	NR	NR	NR	0
PROD WATER PONDS	TP		NR	NR	NR	NR	NR	0
SAMPLING POINT	TP		NR	NR	NR	NR	NR	0
WELL STIM PROJ	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
HWTS	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number

NO SITES FOUND

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: N/A
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: N/A
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: N/A
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 04/03/2019
Date Data Arrived at EDR: 04/05/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 07/02/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/23/2020
Date Data Arrived at EDR: 03/25/2020
Date Made Active in Reports: 05/21/2020
Number of Days to Update: 57

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/23/2020
Date Data Arrived at EDR: 03/25/2020
Date Made Active in Reports: 05/21/2020
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/23/2020
Date Data Arrived at EDR: 03/25/2020
Date Made Active in Reports: 05/21/2020
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/23/2020
Date Data Arrived at EDR: 03/25/2020
Date Made Active in Reports: 05/21/2020
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/23/2020
Date Data Arrived at EDR: 03/25/2020
Date Made Active in Reports: 05/21/2020
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/15/2020
Date Data Arrived at EDR: 05/19/2020
Date Made Active in Reports: 06/18/2020
Number of Days to Update: 30

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/04/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/13/2020
Date Data Arrived at EDR: 02/20/2020
Date Made Active in Reports: 05/15/2020
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/24/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/13/2020
Date Data Arrived at EDR: 02/20/2020
Date Made Active in Reports: 05/15/2020
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/24/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/22/2020
Date Data Arrived at EDR: 03/24/2020
Date Made Active in Reports: 06/18/2020
Number of Days to Update: 86

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 04/28/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 07/27/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 04/28/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 07/27/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/11/2020
Date Data Arrived at EDR: 05/12/2020
Date Made Active in Reports: 07/27/2020
Number of Days to Update: 76

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 08/10/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: No Update Planned

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST: Leaking Underground Fuel Tank Report (GEOTRACKER)

Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 1: Active Toxic Site Investigation
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 78

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/15/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

CPS-SLIC: Statewide SLIC Cases (GEOTRACKER)
Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: No Update Planned

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35
Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: No Update Planned

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 02/01/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/06/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Varies

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/20/2020
Number of Days to Update: 72
Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Semi-Annually

MILITARY UST SITES: Military UST Sites (GEOTRACKER)
Military ust sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

UST CLOSURE: Proposed Closure of Underground Storage Tank (UST) Cases
UST cases that are being considered for closure by either the State Water Resources Control Board or the Executive Director have been posted for a 60-day public comment period. UST Case Closures being proposed for consideration by the State Water Resources Control Board. These are primarily UST cases that meet closure criteria under the decisional framework in State Water Board Resolution No. 92-49 and other Board orders. UST Case Closures proposed for consideration by the Executive Director pursuant to State Water Board Resolution No. 2012-0061. These are cases that meet the criteria of the Low-Threat UST Case Closure Policy. UST Case Closure Review Denials and Approved Orders.

Date of Government Version: 05/26/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/20/2020
Number of Days to Update: 72

Source: State Water Resources Control Board
Telephone: 916-327-7844
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 07/06/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 09/19/2016
Number of Days to Update: 69

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 09/15/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 78

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/03/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/23/2020
Next Scheduled EDR Contact: 11/01/2020
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 85

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Cleanup Program Properties

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 04/28/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 07/27/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Quarterly

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 06/22/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/04/2020
Number of Days to Update: 74

Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 06/01/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/15/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 05/28/2020
Date Data Arrived at EDR: 05/29/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 75

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 08/04/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 07/31/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 03/18/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 04/28/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 07/27/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2019
Date Data Arrived at EDR: 05/28/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Varies

CERS HAZ WASTE: CERS HAZ WASTE

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Hazardous Chemical Management, Hazardous Waste Onsite Treatment, Household Hazardous Waste Collection, Hazardous Waste Generator, and RCRA LQ HW Generator programs.

Date of Government Version: 04/20/2020
Date Data Arrived at EDR: 04/21/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 83

Source: CalEPA
Telephone: 916-323-2514
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Quarterly

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 03/18/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Quarterly

PFAS: PFAS Contamination Site Location Listing

A listing of PFAS contaminated sites included in the GeoTracker database.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 05/20/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/06/2020
Number of Days to Update: 78

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 08/17/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SAN FRANCISCO AST: Aboveground Storage Tank Site Listing
Aboveground storage tank sites

Date of Government Version: 05/04/2020
Date Data Arrived at EDR: 05/06/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 72

Source: San Francisco County Department of Public Health
Telephone: 415-252-3896
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

CERS TANKS: California Environmental Reporting System (CERS) Tanks
List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Aboveground Petroleum Storage and Underground Storage Tank regulatory programs.

Date of Government Version: 04/20/2020
Date Data Arrived at EDR: 04/21/2020
Date Made Active in Reports: 07/09/2020
Number of Days to Update: 79

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Quarterly

CA FID UST: Facility Inventory Database
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Land Records

LIENS: Environmental Liens Listing
A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 05/28/2020
Date Data Arrived at EDR: 05/29/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 75

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Semi-Annually

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 06/01/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 08/14/2020
Number of Days to Update: 73

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 02/27/2020
Date Data Arrived at EDR: 03/24/2020
Date Made Active in Reports: 06/18/2020
Number of Days to Update: 86

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/23/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 03/31/2020
Date Data Arrived at EDR: 04/21/2020
Date Made Active in Reports: 07/09/2020
Number of Days to Update: 79

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Semi-Annually

LDS: Land Disposal Sites Listing (GEOTRACKER)

Land Disposal sites (Landfills) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing (GEOTRACKER)

Military sites (consisting of: Military UST sites; Military Privatized sites; and Military Cleanup sites [formerly known as DoD non UST]) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/23/2020
Date Data Arrived at EDR: 03/25/2020
Date Made Active in Reports: 05/21/2020
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 05/13/2020
Date Data Arrived at EDR: 05/18/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 86

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 08/13/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/06/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 08/05/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 07/31/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 08/06/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/17/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/17/2020
Next Scheduled EDR Contact: 09/28/2020
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 04/24/2020
Number of Days to Update: 79

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/14/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 03/01/2020
Date Data Arrived at EDR: 04/21/2020
Date Made Active in Reports: 07/15/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 01/31/2020
Date Data Arrived at EDR: 05/13/2020
Date Made Active in Reports: 08/03/2020
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/15/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 05/06/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 34

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 10/09/2019
Date Data Arrived at EDR: 10/11/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 70

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/13/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 06/30/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/25/2019
Date Data Arrived at EDR: 10/25/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 82

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 07/20/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 42
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 09/04/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 08/06/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 06/24/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 07/27/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 06/30/2020
Date Data Arrived at EDR: 07/15/2020
Date Made Active in Reports: 07/21/2020
Number of Days to Update: 6

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/06/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/07/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 08/08/2017
Date Data Arrived at EDR: 09/11/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 3

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/21/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 07/29/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 08/25/2020
Number of Days to Update: 22

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 09/03/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/01/2020
Date Data Arrived at EDR: 05/21/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 84

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Semi-Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 05/28/2020
Date Data Arrived at EDR: 05/28/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 77

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 09/10/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 08/28/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 08/28/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 06/22/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 80

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/03/2020
Date Data Arrived at EDR: 03/03/2020
Date Made Active in Reports: 05/28/2020
Number of Days to Update: 86

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 09/15/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 04/04/2020
Date Data Arrived at EDR: 04/07/2020
Date Made Active in Reports: 06/26/2020
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 07/02/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites
A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 01/17/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 74
Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Varies

DOCKET HWC: Hazardous Waste Compliance Docket Listing
A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 07/26/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 71
Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 05/18/2020
Date Data Arrived at EDR: 05/19/2020
Date Made Active in Reports: 08/03/2020
Number of Days to Update: 76
Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 08/17/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6
Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 06/22/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/04/2020
Number of Days to Update: 74
Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 06/22/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Quarterly

CUPA SAN FRANCISCO CO: CUPA Facility Listing
Cupa facilities

Date of Government Version: 05/04/2020
Date Data Arrived at EDR: 05/06/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 72
Source: San Francisco County Department of Environmental Health
Telephone: 415-252-3896
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

CUPA LIVERMORE-PLEASANTON: CUPA Facility Listing
list of facilities associated with the various CUPA programs in Livermore-Pleasanton

Date of Government Version: 05/01/2019
Date Data Arrived at EDR: 05/14/2019
Date Made Active in Reports: 07/17/2019
Number of Days to Update: 64

Source: Livermore-Pleasanton Fire Department
Telephone: 925-454-2361
Last EDR Contact: 08/14/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Varies

DRYCLEAN AVAQMD: Antelope Valley Air Quality Management District Drycleaner Listing
A listing of dry cleaners in the Antelope Valley Air Quality Management District.

Date of Government Version: 05/28/2020
Date Data Arrived at EDR: 05/29/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 75

Source: Antelope Valley Air Quality Management District
Telephone: 661-723-8070
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Varies

DRYCLEANERS: Cleaner Facilities
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 06/04/2020
Date Data Arrived at EDR: 06/05/2020
Date Made Active in Reports: 08/17/2020
Number of Days to Update: 73

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 08/24/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Annually

DRYCLEAN SOUTH COAST: South Coast Air Quality Management District Drycleaner Listing
A listing of dry cleaners in the South Coast Air Quality Management District

Date of Government Version: 08/19/2020
Date Data Arrived at EDR: 08/21/2020
Date Made Active in Reports: 09/04/2020
Number of Days to Update: 14

Source: South Coast Air Quality Management District
Telephone: 909-396-3211
Last EDR Contact: 08/17/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

EMI: Emissions Inventory Data
Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 06/16/2020
Date Made Active in Reports: 08/28/2020
Number of Days to Update: 73

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/16/2020
Next Scheduled EDR Contact: 09/28/2020
Data Release Frequency: Varies

ENF: Enforcement Action Listing
A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 04/03/2020
Date Data Arrived at EDR: 04/07/2020
Date Made Active in Reports: 04/15/2020
Number of Days to Update: 8

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
Financial Assurance information

Date of Government Version: 04/09/2020
Date Data Arrived at EDR: 04/10/2020
Date Made Active in Reports: 07/01/2020
Number of Days to Update: 82

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/14/2020
Date Data Arrived at EDR: 05/15/2020
Date Made Active in Reports: 07/27/2020
Number of Days to Update: 73

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 08/04/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 04/15/2020
Date Made Active in Reports: 07/02/2020
Number of Days to Update: 78

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 07/06/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 05/18/2020
Date Data Arrived at EDR: 05/19/2020
Date Made Active in Reports: 07/31/2020
Number of Days to Update: 73

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 08/17/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 05/18/2020
Date Data Arrived at EDR: 05/18/2020
Date Made Active in Reports: 07/31/2020
Number of Days to Update: 74

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/17/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 04/06/2020
Date Data Arrived at EDR: 04/08/2020
Date Made Active in Reports: 06/26/2020
Number of Days to Update: 79

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 07/07/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing
A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71
Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing
The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 05/28/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 08/14/2020
Number of Days to Update: 73
Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 05/12/2020
Date Data Arrived at EDR: 05/12/2020
Date Made Active in Reports: 07/28/2020
Number of Days to Update: 77
Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 08/10/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing
A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 06/01/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 08/14/2020
Number of Days to Update: 73
Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 08/21/2020
Date Data Arrived at EDR: 08/21/2020
Date Made Active in Reports: 08/27/2020
Number of Days to Update: 6
Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 08/20/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: No Update Planned

UIC: UIC Listing
A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 06/06/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/20/2020
Number of Days to Update: 72
Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

UIC GEO: Underground Injection Control Sites (GEOTRACKER)
Underground control injection sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71
Source: State Water Resource Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water boards review found that more than one-third of the region's active disposal pits are operating without permission.

Date of Government Version: 11/19/2019
Date Data Arrived at EDR: 01/07/2020
Date Made Active in Reports: 03/09/2020
Number of Days to Update: 62
Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9
Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: No Update Planned

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13
Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: No Update Planned

MILITARY PRIV SITES: Military Privatized Sites (GEOTRACKER)
Military privatized sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

PROJECT: Project Sites (GEOTRACKER)
Projects sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

WDR: Waste Discharge Requirements Listing

In general, the Waste Discharge Requirements (WDRs) Program (sometimes also referred to as the "Non Chapter 15 (Non 15) Program") regulates point discharges that are exempt pursuant to Subsection 20090 of Title 27 and not subject to the Federal Water Pollution Control Act. Exemptions from Title 27 may be granted for nine categories of discharges (e.g., sewage, wastewater, etc.) that meet, and continue to meet, the preconditions listed for each specific exemption. The scope of the WDRs Program also includes the discharge of wastes classified as inert, pursuant to section 20230 of Title 27.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/20/2020
Number of Days to Update: 72

Source: State Water Resources Control Board
Telephone: 916-341-5810
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

CIWQS: California Integrated Water Quality System

The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities.

Date of Government Version: 06/01/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 08/14/2020
Number of Days to Update: 73

Source: State Water Resources Control Board
Telephone: 866-794-4977
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Varies

CERS: CalEPA Regulated Site Portal Data

The CalEPA Regulated Site Portal database combines data about environmentally regulated sites and facilities in California into a single database. It combines data from a variety of state and federal databases, and provides an overview of regulated activities across the spectrum of environmental programs for any given location in California. These activities include hazardous materials and waste, state and federal cleanups, impacted ground and surface waters, and toxic materials

Date of Government Version: 04/20/2020
Date Data Arrived at EDR: 04/21/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 83

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

NON-CASE INFO: Non-Case Information Sites (GEOTRACKER)

Non-Case Information sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

OTHER OIL GAS: Other Oil & Gas Projects Sites (GEOTRACKER)

Other Oil & Gas Projects sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

PROD WATER PONDS: Produced Water Ponds Sites (GEOTRACKER)
Produced water ponds sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

SAMPLING POINT: Sampling Point ? Public Sites (GEOTRACKER)
Sampling point - public sites

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

WELL STIM PROJ: Well Stimulation Project (GEOTRACKER)
Includes areas of groundwater monitoring plans, a depiction of the monitoring network, and the facilities, boundaries, and subsurface characteristics of the oilfield and the features (oil and gas wells, produced water ponds, UIC wells, water supply wells, etc?) being monitored

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Varies

HWTS: Hazardous Waste Tracking System
DTSC maintains the Hazardous Waste Tracking System that stores ID number information since the early 1980s and manifest data since 1993. The system collects both manifest copies from the generator and destination facility.

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 04/09/2020
Date Made Active in Reports: 07/01/2020
Number of Days to Update: 83

Source: Department of Toxic Substances Control
Telephone: 916-324-2444
Last EDR Contact: 08/02/2020
Next Scheduled EDR Contact: 10/18/2020
Data Release Frequency: Varies

PCS ENF: Enforcement data
No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 07/01/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Varies

PCS: Permit Compliance System
PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 09/11/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Semi-Annually

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 08/28/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

PCS INACTIVE: Listing of Inactive PCS Permits
An inactive permit is a facility that has shut down or is no longer discharging.

Date of Government Version: 11/05/2014
Date Data Arrived at EDR: 01/06/2015
Date Made Active in Reports: 05/06/2015
Number of Days to Update: 120

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Semi-Annually

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners
EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

CS ALAMEDA: Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 01/09/2019
Date Data Arrived at EDR: 01/11/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 53

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 06/30/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Semi-Annually

UST ALAMEDA: Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 06/30/2020
Date Data Arrived at EDR: 07/01/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 16

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 06/30/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA AMADOR: CUPA Facility List
Cupa Facility List

Date of Government Version: 05/18/2020
Date Data Arrived at EDR: 05/19/2020
Date Made Active in Reports: 06/01/2020
Number of Days to Update: 13

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA BUTTE: CUPA Facility Listing
Cupa facility list.

Date of Government Version: 04/21/2017
Date Data Arrived at EDR: 04/25/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 106

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 06/30/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA CALVERAS: CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 06/17/2020
Date Data Arrived at EDR: 06/18/2020
Date Made Active in Reports: 09/02/2020
Number of Days to Update: 76

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA COLUSA: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/06/2020
Date Data Arrived at EDR: 04/23/2020
Date Made Active in Reports: 07/10/2020
Number of Days to Update: 78

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

SL CONTRA COSTA: Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 04/01/2020
Date Data Arrived at EDR: 04/20/2020
Date Made Active in Reports: 07/06/2020
Number of Days to Update: 77

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA DEL NORTE: CUPA Facility List
Cupa Facility list

Date of Government Version: 04/16/2020
Date Data Arrived at EDR: 04/20/2020
Date Made Active in Reports: 07/08/2020
Number of Days to Update: 79

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 08/13/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA EL DORADO: CUPA Facility List
CUPA facility list.

Date of Government Version: 05/07/2020
Date Data Arrived at EDR: 05/07/2020
Date Made Active in Reports: 07/23/2020
Number of Days to Update: 77

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 08/13/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA FRESNO: CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 01/10/2020
Date Data Arrived at EDR: 03/31/2020
Date Made Active in Reports: 06/15/2020
Number of Days to Update: 76

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 06/30/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Semi-Annually

GLENN COUNTY:

CUPA GLENN: CUPA Facility List
Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Glenn County Air Pollution Control District
Telephone: 830-934-6500
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: No Update Planned

HUMBOLDT COUNTY:

CUPA HUMBOLDT: CUPA Facility List
CUPA facility list.

Date of Government Version: 05/19/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 06/15/2020
Number of Days to Update: 26

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA IMPERIAL: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/09/2020
Date Data Arrived at EDR: 04/10/2020
Date Made Active in Reports: 07/01/2020
Number of Days to Update: 82

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

INYO COUNTY:

CUPA INYO: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 72

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

KERN COUNTY:

CUPA KERN: CUPA Facility List
A listing of sites included in the Kern County Hazardous Material Business Plan.

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/05/2020
Date Made Active in Reports: 08/26/2020
Number of Days to Update: 113

Source: Kern County Public Health
Telephone: 661-321-3000
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

UST KERN: Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/05/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 73

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA KINGS: CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 05/11/2020
Date Data Arrived at EDR: 05/12/2020
Date Made Active in Reports: 07/27/2020
Number of Days to Update: 76

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 08/21/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

LAKE COUNTY:

CUPA LAKE: CUPA Facility List
Cupa facility list

Date of Government Version: 04/20/2020
Date Data Arrived at EDR: 04/28/2020
Date Made Active in Reports: 07/14/2020
Number of Days to Update: 77

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 07/08/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA LASSEN: CUPA Facility List
Cupa facility list

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 01/31/2020
Date Made Active in Reports: 04/09/2020
Number of Days to Update: 69

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

LOS ANGELES COUNTY:

AOCONCERN: Key Areas of Concerns in Los Angeles County
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office. Date of Government Version: 3/30/2009 Exide Site area is a cleanup plan of lead-impacted soil surrounding the former Exide Facility as designated by the DTSC. Date of Government Version: 7/17/2017

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: N/A
Telephone: N/A
Last EDR Contact: 09/10/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: No Update Planned

HMS LOS ANGELES: HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 03/26/2020
Date Data Arrived at EDR: 03/26/2020
Date Made Active in Reports: 06/15/2020
Number of Days to Update: 81

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 06/30/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Semi-Annually

LF LOS ANGELES: List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/13/2020
Date Data Arrived at EDR: 04/14/2020
Date Made Active in Reports: 07/01/2020
Number of Days to Update: 78

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 07/13/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Varies

LF LOS ANGELES CITY: City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 01/15/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 51

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 07/08/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Varies

LOS ANGELES AST: Active & Inactive AST Inventory
A listing of active & inactive above ground petroleum storage tank site locations, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58
Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 06/25/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Varies

LOS ANGELES CO LF METHANE: Methane Producing Landfills
This data was created on April 30, 2012 to represent known disposal sites in Los Angeles County that may produce and emanate methane gas. The shapefile contains disposal sites within Los Angeles County that once accepted degradable refuse material. Information used to create this data was extracted from a landfill survey performed by County Engineers (Major Waste System Map, 1973) as well as historical records from CalRecycle, Regional Water Quality Control Board, and Los Angeles County Department of Public Health

Date of Government Version: 04/30/2012
Date Data Arrived at EDR: 04/17/2019
Date Made Active in Reports: 05/29/2019
Number of Days to Update: 42
Source: Los Angeles County Department of Public Works
Telephone: 626-458-6973
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: No Update Planned

LOS ANGELES HM: Active & Inactive Hazardous Materials Inventory
A listing of active & inactive hazardous materials facility locations, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58
Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 06/25/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Varies

LOS ANGELES UST: Active & Inactive UST Inventory
A listing of active & inactive underground storage tank site locations and underground storage tank historical sites, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58
Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 06/25/2020
Next Scheduled EDR Contact: 10/05/2020
Data Release Frequency: Varies

SITE MIT LOS ANGELES: Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 03/25/2020
Date Data Arrived at EDR: 04/14/2020
Date Made Active in Reports: 07/01/2020
Number of Days to Update: 78
Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 07/17/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Annually

UST EL SEGUNDO: City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/10/2017
Number of Days to Update: 21
Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 07/08/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: No Update Planned

UST LONG BEACH: City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 04/22/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 06/27/2019
Number of Days to Update: 65

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

UST TORRANCE: City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 06/27/2019
Date Data Arrived at EDR: 07/30/2019
Date Made Active in Reports: 10/02/2019
Number of Days to Update: 64

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA MADERA: CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 02/24/2020
Date Data Arrived at EDR: 02/25/2020
Date Made Active in Reports: 05/07/2020
Number of Days to Update: 72

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 08/04/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

MARIN COUNTY:

UST MARIN: Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 09/26/2018
Date Data Arrived at EDR: 10/04/2018
Date Made Active in Reports: 11/02/2018
Number of Days to Update: 29

Source: Public Works Department Waste Management
Telephone: 415-473-6647
Last EDR Contact: 06/24/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA MERCED: CUPA Facility List
CUPA facility list.

Date of Government Version: 07/28/2020
Date Data Arrived at EDR: 07/30/2020
Date Made Active in Reports: 07/31/2020
Number of Days to Update: 1

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 07/24/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

MONO COUNTY:

CUPA MONO: CUPA Facility List
CUPA Facility List

Date of Government Version: 05/15/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 08/14/2020
Number of Days to Update: 73

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA MONTEREY: CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 07/13/2020
Date Data Arrived at EDR: 07/15/2020
Date Made Active in Reports: 07/31/2020
Number of Days to Update: 16

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 07/08/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Varies

NAPA COUNTY:

LUST NAPA: Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 01/09/2017
Date Data Arrived at EDR: 01/11/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 50

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: No Update Planned

UST NAPA: Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 09/05/2019
Date Data Arrived at EDR: 09/09/2019
Date Made Active in Reports: 10/31/2019
Number of Days to Update: 52

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA NEVADA: CUPA Facility List
CUPA facility list.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/07/2020
Date Made Active in Reports: 07/24/2020
Number of Days to Update: 78

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Varies

ORANGE COUNTY:

IND_SITE ORANGE: List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 05/01/2020
Date Data Arrived at EDR: 05/08/2020
Date Made Active in Reports: 07/24/2020
Number of Days to Update: 77

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 07/31/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Annually

LUST ORANGE: List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 05/01/2020
Date Data Arrived at EDR: 05/08/2020
Date Made Active in Reports: 07/24/2020
Number of Days to Update: 77

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 07/31/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

UST ORANGE: List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 05/01/2020
Date Data Arrived at EDR: 05/05/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 73

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/03/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

PLACER COUNTY:

MS PLACER: Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 06/08/2020
Date Data Arrived at EDR: 06/10/2020
Date Made Active in Reports: 08/24/2020
Number of Days to Update: 75

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA PLUMAS: CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 03/31/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 06/26/2019
Number of Days to Update: 64

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

RIVERSIDE COUNTY:

LUST RIVERSIDE: Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 03/10/2020
Date Data Arrived at EDR: 03/11/2020
Date Made Active in Reports: 05/20/2020
Number of Days to Update: 70

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 09/15/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Quarterly

UST RIVERSIDE: Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 03/10/2020
Date Data Arrived at EDR: 03/11/2020
Date Made Active in Reports: 05/20/2020
Number of Days to Update: 70
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 09/10/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

CS SACRAMENTO: Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 02/18/2020
Date Data Arrived at EDR: 03/31/2020
Date Made Active in Reports: 06/15/2020
Number of Days to Update: 76
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/02/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Quarterly

ML SACRAMENTO: Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/24/2020
Date Data Arrived at EDR: 03/31/2020
Date Made Active in Reports: 06/17/2020
Number of Days to Update: 78
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/02/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA SAN BENITO: CUPA Facility List
Cupa facility list

Date of Government Version: 04/24/2020
Date Data Arrived at EDR: 04/28/2020
Date Made Active in Reports: 07/13/2020
Number of Days to Update: 76
Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

SAN BERNARDINO COUNTY:

PERMITS SAN BERNARDINO: Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 02/25/2020
Date Data Arrived at EDR: 02/26/2020
Date Made Active in Reports: 05/07/2020
Number of Days to Update: 71
Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

HMMD SAN DIEGO: Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 06/01/2020
Date Data Arrived at EDR: 06/02/2020
Date Made Active in Reports: 08/14/2020
Number of Days to Update: 73

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 08/31/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

LF SAN DIEGO: Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 56

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

SAN DIEGO CO LOP: Local Oversight Program Listing

A listing of all LOP release sites that are or were under the County of San Diego's jurisdiction. Included are closed or transferred cases, open cases, and cases that did not have a case type indicated. The cases without a case type are mostly complaints; however, some of them could be LOP cases.

Date of Government Version: 04/09/2020
Date Data Arrived at EDR: 04/10/2020
Date Made Active in Reports: 06/26/2020
Number of Days to Update: 77

Source: Department of Environmental Health
Telephone: 858-505-6874
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

SAN DIEGO CO SAM: Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

LUST SAN FRANCISCO: Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: No Update Planned

UST SAN FRANCISCO: Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

Date of Government Version: 05/04/2020
Date Data Arrived at EDR: 05/06/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 72

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

UST SAN JOAQUIN: San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 06/22/2018
Date Data Arrived at EDR: 06/26/2018
Date Made Active in Reports: 07/11/2018
Number of Days to Update: 15

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 09/10/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA SAN LUIS OBISPO: CUPA Facility List
Cupa Facility List.

Date of Government Version: 05/08/2020
Date Data Arrived at EDR: 05/08/2020
Date Made Active in Reports: 08/03/2020
Number of Days to Update: 87

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

SAN MATEO COUNTY:

BI SAN MATEO: Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 02/20/2020
Date Data Arrived at EDR: 02/20/2020
Date Made Active in Reports: 04/24/2020
Number of Days to Update: 64

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 09/11/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Annually

LUST SAN MATEO: Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/29/2019
Date Data Arrived at EDR: 03/29/2019
Date Made Active in Reports: 05/29/2019
Number of Days to Update: 61

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 09/01/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA SANTA BARBARA: CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: No Update Planned

SANTA CLARA COUNTY:

CUPA SANTA CLARA: Cupa Facility List
Cupa facility list

Date of Government Version: 05/08/2020
Date Data Arrived at EDR: 05/12/2020
Date Made Active in Reports: 07/27/2020
Number of Days to Update: 76

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

HIST LUST SANTA CLARA: HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LUST SANTA CLARA: LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 08/19/2020
Next Scheduled EDR Contact: 12/07/2020
Data Release Frequency: No Update Planned

SAN JOSE HAZMAT: Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 04/22/2020
Date Data Arrived at EDR: 04/24/2020
Date Made Active in Reports: 05/07/2020
Number of Days to Update: 13

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 07/28/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA SANTA CRUZ: CUPA Facility List
CUPA facility listing.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/23/2017
Number of Days to Update: 90

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA SHASTA: CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 51

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Varies

SOLANO COUNTY:

LUST SOLANO: Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 06/04/2019
Date Data Arrived at EDR: 06/06/2019
Date Made Active in Reports: 08/13/2019
Number of Days to Update: 68

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

UST SOLANO: Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 08/25/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 09/16/2020
Number of Days to Update: 21

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Quarterly

SONOMA COUNTY:

CUPA SONOMA: Cupa Facility List
Cupa Facility list

Date of Government Version: 02/25/2020
Date Data Arrived at EDR: 02/26/2020
Date Made Active in Reports: 03/11/2020
Number of Days to Update: 14

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Varies

LUST SONOMA: Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/03/2020
Date Data Arrived at EDR: 04/08/2020
Date Made Active in Reports: 06/26/2020
Number of Days to Update: 79

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA STANISLAUS: CUPA Facility List
Cupa facility list

Date of Government Version: 02/04/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 04/15/2020
Number of Days to Update: 70

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 07/06/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Varies

SUTTER COUNTY:

UST SUTTER: Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 05/26/2020
Date Data Arrived at EDR: 05/28/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 77

Source: Sutter County Environmental Health Services
Telephone: 530-822-7500
Last EDR Contact: 08/25/2020
Next Scheduled EDR Contact: 12/14/2020
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA TEHAMA: CUPA Facility List
Cupa facilities

Date of Government Version: 05/18/2020
Date Data Arrived at EDR: 05/19/2020
Date Made Active in Reports: 07/31/2020
Number of Days to Update: 73

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA TRINITY: CUPA Facility List
Cupa facility list

Date of Government Version: 04/09/2020
Date Data Arrived at EDR: 04/10/2020
Date Made Active in Reports: 07/01/2020
Number of Days to Update: 82

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

TULARE COUNTY:

CUPA TULARE: CUPA Facility List
Cupa program facilities

Date of Government Version: 05/14/2020
Date Data Arrived at EDR: 05/15/2020
Date Made Active in Reports: 07/27/2020
Number of Days to Update: 73

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 08/06/2020
Next Scheduled EDR Contact: 11/16/2020
Data Release Frequency: Varies

TUOLUMNE COUNTY:

CUPA TUOLUMNE: CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 07/14/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Varies

VENTURA COUNTY:

BWT VENTURA: Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 03/26/2020
Date Data Arrived at EDR: 04/23/2020
Date Made Active in Reports: 07/09/2020
Number of Days to Update: 77

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 07/20/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Quarterly

LF VENTURA: Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/24/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: No Update Planned

LUST VENTURA: Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 08/04/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: No Update Planned

MED WASTE VENTURA: Medical Waste Program List
To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 03/26/2020
Date Data Arrived at EDR: 04/23/2020
Date Made Active in Reports: 07/09/2020
Number of Days to Update: 77

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 07/20/2020
Next Scheduled EDR Contact: 11/02/2020
Data Release Frequency: Quarterly

UST VENTURA: Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 05/26/2020
Date Data Arrived at EDR: 06/09/2020
Date Made Active in Reports: 08/20/2020
Number of Days to Update: 72

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 09/08/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Quarterly

YOLO COUNTY:

UST YOLO: Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 06/23/2020
Date Data Arrived at EDR: 06/29/2020
Date Made Active in Reports: 09/15/2020
Number of Days to Update: 78

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 06/24/2020
Next Scheduled EDR Contact: 10/12/2020
Data Release Frequency: Annually

YUBA COUNTY:

CUPA YUBA: CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 04/29/2020
Date Made Active in Reports: 07/17/2020
Number of Days to Update: 79

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 08/04/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 05/12/2020
Date Data Arrived at EDR: 05/12/2020
Date Made Active in Reports: 07/27/2020
Number of Days to Update: 76

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 08/10/2020
Next Scheduled EDR Contact: 11/23/2020
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/19/2020
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 04/29/2020
Date Made Active in Reports: 07/10/2020
Number of Days to Update: 72

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 07/31/2020
Next Scheduled EDR Contact: 11/09/2020
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/09/2020
Next Scheduled EDR Contact: 10/26/2020
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 10/02/2019
Date Made Active in Reports: 12/10/2019
Number of Days to Update: 69

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 08/11/2020
Next Scheduled EDR Contact: 11/30/2020
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/02/2020
Next Scheduled EDR Contact: 12/21/2020
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish and Wildlife
Telephone: 916-445-0411

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

SANTIAGO CREEK DAM IMPROVEMENT
SILVERADO
ANAHEIM, CA 92808

TARGET PROPERTY COORDINATES

Latitude (North):	33.7861 - 33° 47' 9.96''
Longitude (West):	117.7253 - 117° 43' 31.08''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	432850.5
UTM Y (Meters):	3738482.2
Elevation:	795 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5636465 BLACK STAR CANYON, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

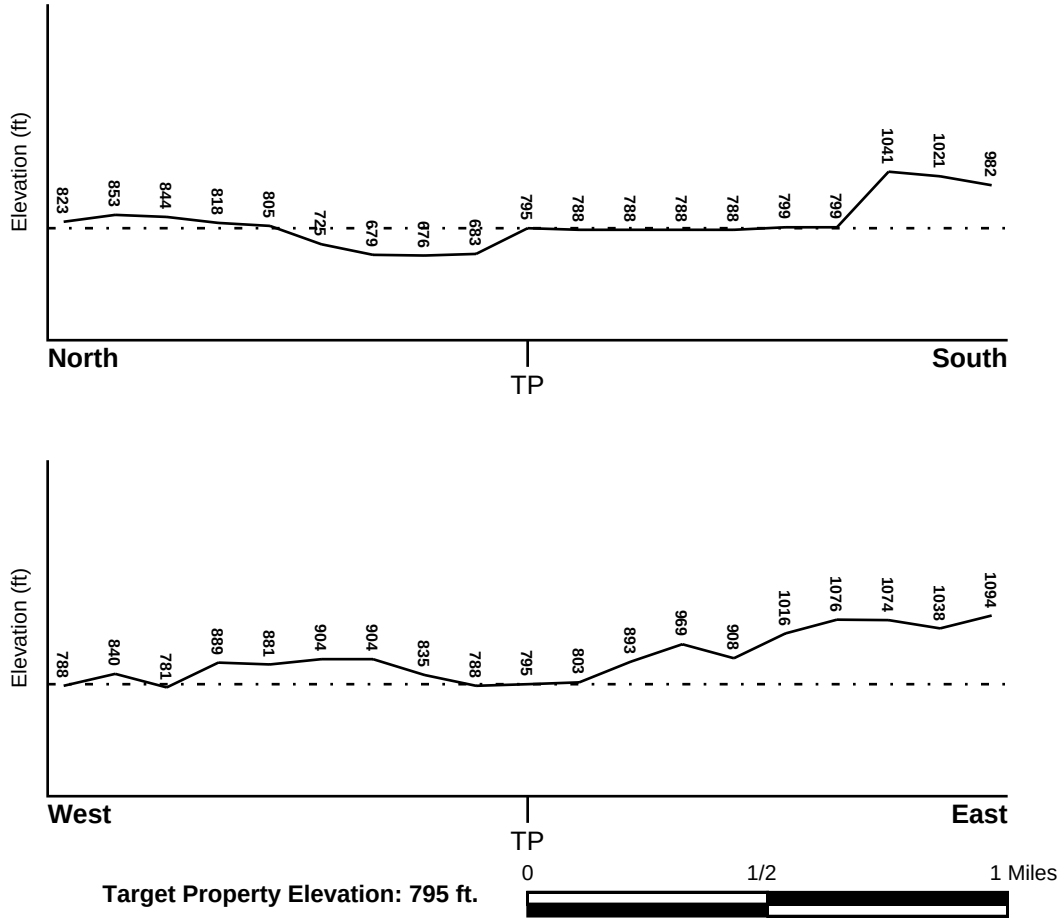
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General WNW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Target Property Elevation: 795 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
06059C0190J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
Not Reported	

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
NOT AVAILABLE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

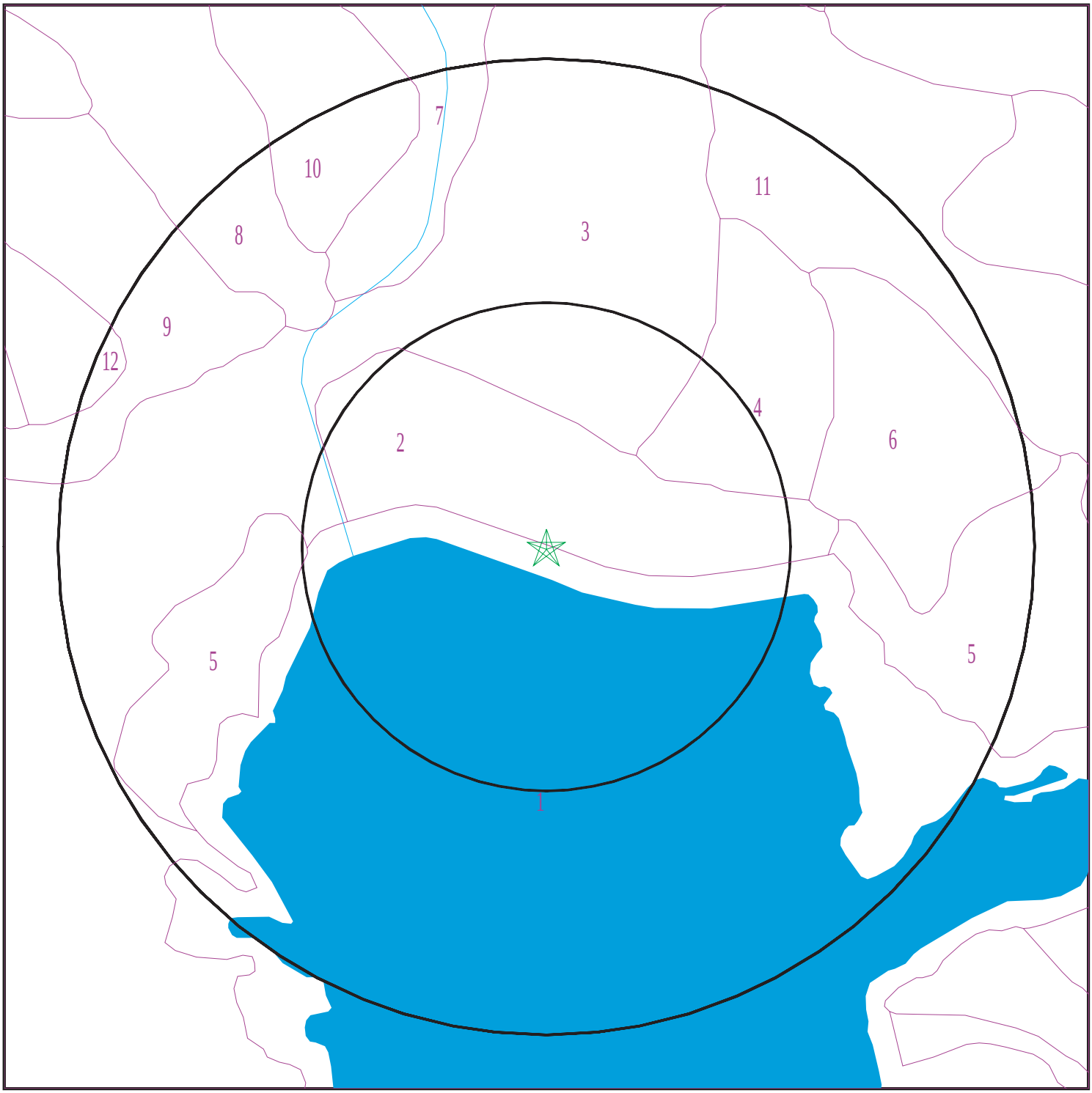
Era:	Cenozoic
System:	Tertiary
Series:	Paleocene
Code:	Tx *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 6196088.2s



SITE NAME:	Santiago Creek Dam Improvement	CLIENT:	Psomas
ADDRESS:	Silverado Anaheim CA 92808	CONTACT:	Megan Larum
LAT/LONG:	33.7861 / 117.7253	INQUIRY #:	6196088.2s
		DATE:	September 17, 2020 7:24 pm

Copyright © 2020 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Water

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name: Dam

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 3

Soil Component Name: SORRENTO

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 7.9
2	11 inches	61 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 7.9
3	61 inches	72 inches	stratified loamy fine sand to silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 7.9

Soil Map ID: 4

Soil Component Name: PITS

Soil Surface Texture: extremely gravelly coarse sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	extremely gravelly coarse sand	Not reported	Not reported	Max: 141 Min: 42	Max: Min:
2	5 inches	59 inches	extremely gravelly sand	Not reported	Not reported	Max: 141 Min: 42	Max: Min:

Soil Map ID: 5

Soil Component Name: ROCK OUTCROP

Soil Surface Texture: unweathered bedrock

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	3 inches	unweathered bedrock	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 6

Soil Component Name: SOPER

Soil Surface Texture: gravelly loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	gravelly loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 4 Min: 1.4	Max: Min:
2	9 inches	29 inches	gravelly clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 4 Min: 1.4	Max: Min:
3	29 inches	33 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 4 Min: 1.4	Max: Min:

Soil Map ID: 7

Soil Component Name: RIVERWASH

Soil Surface Texture: sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 31 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: Min:
2	5 inches	59 inches	stratified coarse sand to sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: Min:

Soil Map ID: 8

Soil Component Name: ANAHEIM

Soil Surface Texture: clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	20 inches	clay loam	Not reported	Not reported	Max: Min:	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	20 inches	25 inches	weathered bedrock	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 9

Soil Component Name: SOPER

Soil Surface Texture: gravelly loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	3 inches	gravelly loam	Not reported	Not reported	Max: Min:	Max: Min:
2	3 inches	20 inches	gravelly clay loam	Not reported	Not reported	Max: Min:	Max: Min:
3	20 inches	24 inches	weathered bedrock	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 10

Soil Component Name: SOBOBA

Soil Surface Texture: gravelly loamy sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	gravelly loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILIS, Gravels, Clean Gravels, Well-graded gravel.	Max: 141 Min: 141	Max: 7.8 Min: 6.1
2	9 inches	59 inches	very gravelly sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILIS, Gravels, Clean Gravels, Well-graded gravel.	Max: 141 Min: 141	Max: 7.8 Min: 6.1

Soil Map ID: 11

Soil Component Name: CIENEBA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 0.42 Min: 0	Max: Min:
2	7 inches	11 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 12

Soil Component Name: ANAHEIM

Soil Surface Texture: loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	25 inches	loam	Not reported	Not reported	Max: Min:	Max: Min:
2	25 inches	29 inches	weathered bedrock	Not reported	Not reported	Max: Min:	Max: Min:

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

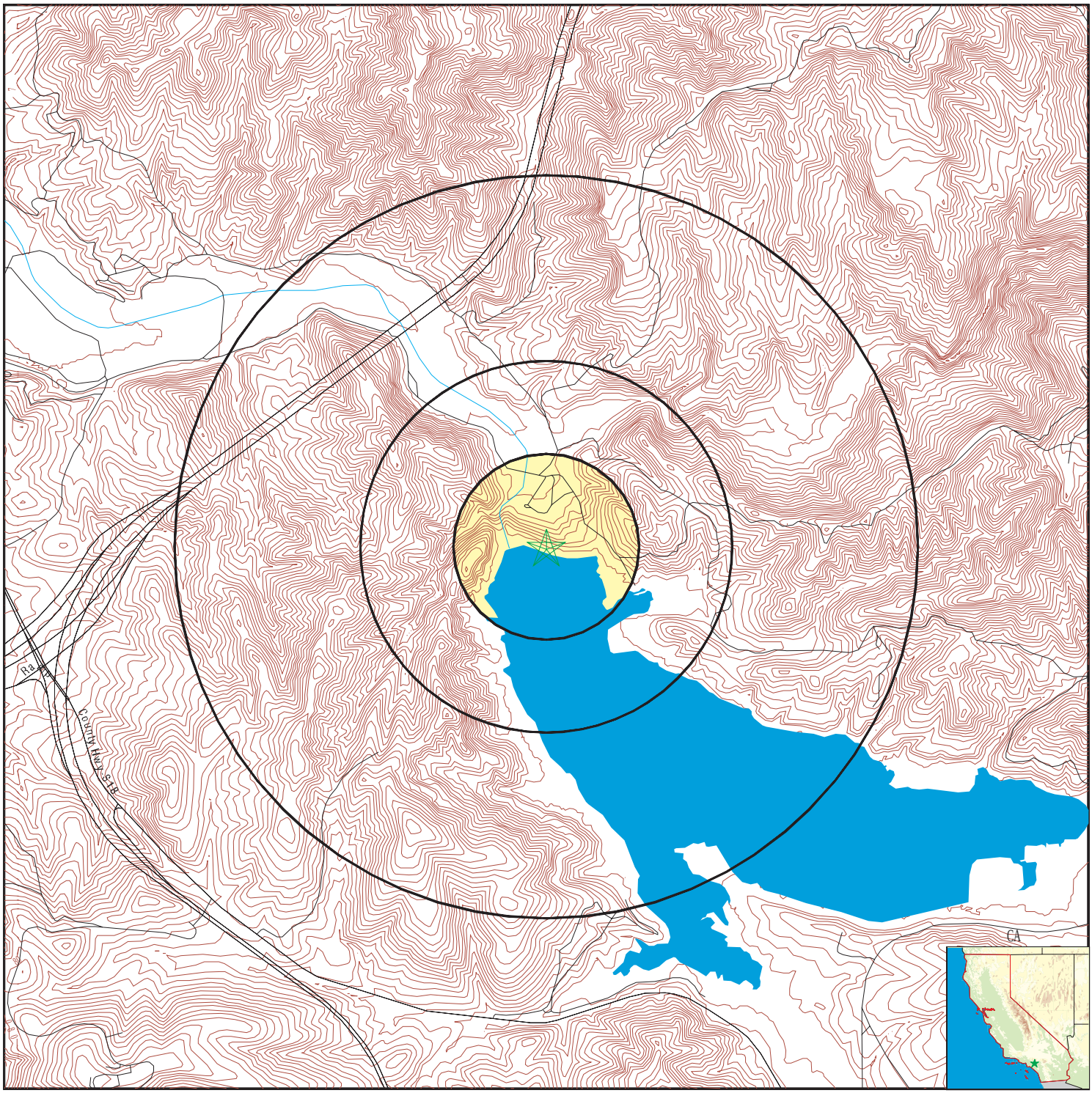
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 6196088.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME:	Santiago Creek Dam Improvement	CLIENT:	Psomas
ADDRESS:	Silverado Anaheim CA 92808	CONTACT:	Megan Larum
LAT/LONG:	33.7861 / 117.7253	INQUIRY #:	6196088.2s
		DATE:	September 17, 2020 7:24 pm

Copyright © 2020 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for ORANGE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for ORANGE COUNTY, CA

Number of sites tested: 30

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.763 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish and Wildlife
Telephone: 916-445-0411

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Dept of Conservation, Geologic Energy Management Division
Telephone: 916-323-1779
Oil and Gas well locations in the state.

California Earthquake Fault Lines
Source: California Division of Mines and Geology
The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

RADON

State Database: CA Radon
Source: Department of Public Health
Telephone: 916-210-8558
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

December 16, 2024

Andy Uk
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

VIA EMAIL
uk@irwd.com

Subject: Updated Noise and Vibration Analysis Technical Memorandum for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project

Dear Mr. Uk:

This Letter Report presents the results of the revised noise and vibration analysis for the proposed Santiago Creek Dam Outlet Tower and Spillway Improvements Project in the County of Orange, California (hereinafter referred to as the "Project"). This analysis addresses the potential noise and vibration impacts associated with the Project in accordance with the California Environmental Quality Act (CEQA) (*California Public Resources Code* §21000 et seq.) and the State CEQA Guidelines (*California Code of Regulations*, Title 14, §15000 et seq.). This updated noise and vibration analysis was prepared in order to include noise generated during a new construction phase in the overall Project construction noise calculations. This new phase would entail the placement of the embankment. This phase would take up to 16 months to complete and would be integrated into the overall Project construction schedule.

PROJECT SETTING AND DESCRIPTION

The proposed Project would include rehabilitation and replacement of the Santiago Creek Dam outlet works and spillway facilities, necessary to address identified seismic and dam safety concerns. The Project involves dewatering, demolition activities, and construction of inlet/outlet works, downstream outlet works, pipelines, ancillary site improvements, and utility relocation. The Project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in Unincorporated Orange County, California. The Project site location is shown on Exhibit 1-1 and 1-2, Regional Location and Local Vicinity, and is described in more detail below.

Noise and Vibration Basics and Terminology

Noise

"Sound" is a vibratory disturbance created by a moving or vibrating source and is capable of being detected. "Noise" is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance; interference with speech communication; sleep disturbance; and, in the extreme, hearing impairment (Caltrans 2013).

150 South Arroyo Parkway
Suite 102
Pasadena, CA 91105

Tel 714.481.8057
www.Psomas.com

Sound pressure levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale. A doubling of the energy of a noise source (such as doubling of traffic volume) would increase the noise level by 3 dB. The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale was devised. The A-weighted decibel scale (dBA) approximates the frequency response of the average healthy ear when listening to most ordinary everyday sounds and is used in this analysis.

Human perception of noise has no simple correlation with acoustical energy. Due to subjective thresholds of tolerance, the annoyance of a given noise source is perceived very differently from person to person. The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at 3 feet is approximately 60 dBA, while loud jet engine noises at 1,000 feet equate to 100 dBA, which can cause serious discomfort. Table 1 shows the relationship of various noise levels in dBA to commonly experienced noise events.

TABLE 1
NOISE LEVELS FOR COMMON EVENTS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet fly-over at 300 m (1,000 ft)	100	
Gas lawn mower at 1 m (3 ft)	90	
Diesel truck at 15 m (50 ft) at 80 km/hr (50 mph)	80	Food blender at 1 m (3 ft); garbage disposal at 1 m (3 ft)
Noisy urban area, daytime gas lawn mower at 30 m (100 ft)	70	Vacuum cleaner at 3 m (10 ft)
Commercial area, heavy traffic at 90 m (300 ft)	60	Normal speech at 1 m (3 ft)
Quiet urban daytime	50	Large business office, dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	30	Library
Quiet rural nighttime	20	Bedroom at night, concert hall (background)
	10	Broadcast/recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing
dBA: A-weighted decibels; m: meter; ft: feet; km/hr: kilometers per hour; mph: miles per hour Source: Caltrans 2013.		

Two equal noise sources, when heard together, do not “sound twice as loud” as one of the sources. As stated above, a doubling of noise sources results in a noise level increase of 3 dBA. It is widely accepted that (1) the average healthy ear can barely perceive changes of a 3 dBA increase or decrease, (2) a change of 5 dBA is readily perceptible, and (3) an increase (decrease) of 10 dBA sounds twice (half) as loud (Caltrans 2013).

From the source to the receiver, noise changes both in the level and frequency spectrum. The most obvious change is the decrease in noise level as the distance from the source increases. Sound from a small, localized source (approximating a “point” source) radiates uniformly outward as it travels away from the source in a spherical pattern. For point sources, such as heating, ventilation, and air conditioning (HVAC) units or construction equipment, the sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance (i.e., if the noise level is 70 dBA at 25 feet, it is 64 dBA at 50 feet). Vehicle movement on a road makes the source of the sound appear to emanate from a line (line source) rather than

a point when viewed over some time interval. The sound level attenuates or drops off at a rate of 3 dBA per doubling of distance for line sources.

A large object in the path between a noise source and a receiver can significantly attenuate noise levels at that receiver location. The amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain or landform features as well as man-made features (e.g., buildings and walls) can significantly alter noise exposure levels. For a noise barrier to work, it must be high enough and long enough to block the view from the receiver to a road or to the noise source. Effective noise barriers can reduce outdoor noise levels at the receptor by up to 15 dBA.

Several rating scales (or noise "metrics") exist to analyze effects of noise on a community. These scales include the equivalent noise level (L_{eq}), including L_{max} and L_{min}, which are respectively the highest and lowest A-weighted sound levels that occur during a noise event, and the Community Noise Equivalent Level (CNEL). Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, which is the equivalent noise level for that period of time. The period of time averaging may be specified; for example, $L_{eq(3)}$ would be a three-hour average. Noise of short duration (i.e., substantially less than the averaging period) is averaged into ambient noise during the period of interest. Thus, a loud noise lasting many seconds may have minimal effect on the measured sound level averaged over a one-hour period.

To evaluate community noise impacts, CNEL was developed to account for human sensitivity to nighttime noise. CNEL represents the 24-hour average sound level with a penalty for noise occurring at night. The CNEL computation divides a 24-hour day into three periods: daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM). The evening sound levels are assigned an approximately 5-dBA penalty, and the nighttime sound levels are assigned a 10-dBA penalty prior to averaging with daytime hourly sound levels.

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is described as the velocity, and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction of a project, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure. Analysis of this type of vibration is best measured in velocity and acceleration.

The three main wave types of concern in the propagation of groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

- Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding cylindrical wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation (known as retrograde elliptical).

- Compression or P-waves are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.
- Shear or S-waves are also body waves, carrying their energy along an expanding spherical wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

The peak particle velocity (PPV) or the root mean square (rms) velocity is usually used to describe vibration amplitudes. The PPV is defined as the maximum instantaneous peak of the vibration signal and the rms is defined as the square root of the average of the squared amplitude of the signal. The ppv is more appropriate for evaluating potential building damage and also used fora evaluating human response.

The units for PPV velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in VdB units in order to compress the range of numbers required to describe the vibration. In this study, all PPV velocity levels are in in/sec and all vibration levels are in VdB relative to one microinch per second. The threshold of perception is approximately 0.3 in/sec PPV. Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Even the more persistent Rayleigh waves decrease relatively quickly as they move away from the source of the vibration. Manmade vibration problems are, therefore, usually confined to short distances (500 feet or less) from the source.

Construction generally includes a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Heavy trucks can also generate groundborne vibrations, which vary depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, and other anomalies all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration of normal traffic on streets and freeways with smooth pavement conditions.

EXISTING CONDITIONS

Due to the undeveloped nature of the area proximate to the Project site, the existing noise environment at the Project Site is primarily influenced by traffic noise on nearby roads as well as activities held at the site and events that are regularly held at Oak Canyon Park that occur both during the day and through the evening. The nearest roadways that affect ambient noise levels at the Project site are the Eastern Transportation Corridor Toll Road (State Route 241), State Route 261 (SR-261), and Santiago Canyon Road. At its closest point, the nearest road (SR-241) is more than half a mile from Irvine Lake. As such, ambient noise levels are low and characteristic of rural areas.

Orange County Fire Authority (OCFA) currently uses portions of the proposed staging area for takeoff and landings associated with training and operational activities. During construction of the proposed Project, HeloPods would be designated near the lake for their continued use. In addition, Oak Canyon Park hosts a number of events, including graduation nights, picnics, concerts, athletic events, shows, and other events that may include crowds, music and amplified sound. Based on the 2023 Oak Canyon Park Calendar for 2023, there are approximately 80 scheduled events whose turnout ranges from 150-5,000 attendees. Noise from these existing activities contribute to substantially increasing the ambient noise levels within the area due to amplified speakers for music and announcements, cheering crowds, helicopter noise, music concerts, traffic noise, automobile shows, and other sources. Many of these events last 10 hours a day, and up to 17 days per month with overnight activities.

Noise-Sensitive Receptors

The State of California defines noise-sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions (State of California 2015). Noise-sensitive land uses typically include residences, hospitals, churches, schools, and libraries, which could all be adversely affected by an increase in noise levels. Noise sensitive receptors in the vicinity of each proposed Project Site include residential land uses located approximately 9,500 feet to the west. There are nearby parks which include Oak Canyon Park, Irvine Regional Park, and Irvine Lake.

Regulatory Setting – Noise Criteria

Public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. The Project is located within the County of Orange. For the evaluation of potential noise impacts, this analysis assumes compliance with the noise policies and regulations established by the County of Orange and the Federal Transit Administration.

Federal Transit Administration

The Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual (FTA 2018) has developed construction impact guidelines shown in Table 2.

TABLE 2
CONSTRUCTION NOISE CRITERIA

1-Hour Criteria (L_{eq})		
Land Use	**Day**	**Night**
Residential	90	80
Commercial	100	100
Industrial	100	100
8-Hour Criteria (L_{eq})		
Land Use	**Day**	**Night**
Residential	80	70
Commercial	85	85
Industrial	90	90

There are no construction noise criteria for parks. Residential uses are considered to be the most noise sensitive land use.

County of Orange

According to Section 7-9-20(h) of the Orange County Zoning Code, land owned or leased by the County is not subject to land use regulations of the County, including the Zoning Code, specific plans, and planned communities. However, the County noise standards are applicable to offsite noise-sensitive land uses that would potentially be impacted by noise from the Project construction and operations. For information disclosure purposes pursuant to CEQA, the County's standards, including the policies of the General Plan and the Noise Ordinance, are discussed below.

General Plan

The Noise Element, one of nine elements of the *County of Orange General Plan*, contains official County policies on the conservation and management of resources (County of Orange 2015). The Noise Element defines a Noise Referral Zone as "that area with a total noise environment of 60 decibels Community Noise Equivalent Level (CNEL) or more. The intent of the Noise Referral Zone is to act as a triggering mechanism or flag for development proposals in areas potentially adversely affected by high noise levels. [U]nless it can be shown with certainty that the project is outside the area that has a CNEL of 60 or more decibels, an acoustical analysis report will be required".

The Noise Element states, "A key objective of this Noise Element is to ensure that each County resident's quality of life is not affected adversely by high noise levels". The information from Tables VIII-2 and VIII-3 of the Noise Element, shown as Table 3 in this Section, defines the County's land use/noise compatibility standards. The Noise Element states that these standards apply to "situations where a new use is being proposed that is impacted by an existing noise source" and also "when an existing use is impacted by a new or expanded source of noise". For the latter case, "the project proponent is obliged to mitigate the impacts of the new source of noise".

TABLE 3
ORANGE COUNTY COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS

Type of Use	65+ dB CNEL	60 to 65 dB CNEL
Residential	3a, b, e	2a, e
Commercial	2c	2c
Employment	2c	2c
Open Space		
Local	2c	2c
Community	2c	2c
Regional	2c	2c
Educational Facilities		
Schools (K through 12)	2c, d, e	2c, d, e
Preschool, college, other	2c, d, e	2c, d, e
Places of Worship	2c, d, e	2c, d, e
Hospitals		
General	2a, c, d, e	2a, c, d, e
Convalescent	2a, c, d, e	2a, c, d, e
Group Quarters	1a, b, c, e	2a, c, e
Hotel/Motels	2a, c	2a, c
Accessory Uses		
Executive Apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

dB: decibel; CNEL: Community Noise Equivalent Level

EXPLANATION AND DEFINITIONS

Action Required to Ensure Compatibility Between Land Use and Noise From External Sources

1 = Allowed if interior and exterior community noise levels can be mitigated.

2 = Allowed if interior levels can be mitigated.

TABLE 3
ORANGE COUNTY COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS

Type of Use	65+ dB CNEL	60 to 65 dB CNEL
3 = New residential uses are prohibited in areas within the 65-dB CNEL contour from any airport or air station; allowed in other areas if interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "infill" development within an established neighborhood.		
Standards Required for Compatibility of Land Use and Noise		
a = Interior Standard: CNEL of less than 45 dB (habitable rooms only).		
b = Exterior Standard: CNEL of less than 65 dB in outdoor living areas.		
c = Interior Standard: $L_{eq(h)}$ = 45 to 65 dB interior noise level, depending on interior use.		
d = Exterior Standard: $L_{eq(h)}$ of less than 65 dB in outdoor living areas.		
e = Interior Standard: As approved by the Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains.		
Key Definitions		
Habitable Room – Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.		
Interior – Spaces that are covered and largely enclosed by walls.		
$L_{eq(h)}$ – The A-weighted equivalent sound level averaged over a period of "h" hours. An example would be $L_{eq(12)}$ where the equivalent sound level is the average over a specified 12-hour period (such as 7:00 AM to 7:00 PM). Typically, time period "h" is defined to match the hours of operation of a given type of use.		
Outdoor Living Area – Outdoor living area is a term used by the County of Orange to define spaces that are associated with residential land uses typically used for passive private recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, and other outdoor areas associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are front yard areas, driveways, greenbelts, maintenance areas, and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).		
Source: County of Orange 2005 (see Tables VIII-2 and VIII-3 of the Noise Element).		

Noise Ordinance

The County Noise Ordinance is codified as Title 4, Division 6 of the Codified Ordinances of the County of Orange.

(a) The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

TABLE 4
ORANGE COUNTY EXTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBA	7:00 AM–10:00 PM
	50 dBA	10:00 PM–7:00 AM
dBA: A-weighted decibels Source: County of Orange 2015		

TABLE 5
ORANGE COUNTY INTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBA	7:00 AM–10:00 PM
	45 dBA	10:00 PM–7:00 AM
dBA: A-weighted decibels Source: County of Orange 2015		

With respect to exterior noise levels, the Noise Ordinance states the following:

(a) In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

(b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, either incorporated or unincorporated, to exceed:

(1) The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or

(2) The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or

(3) The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or

(4) The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or

(5) The noise standard plus twenty (20) dB(A) for any period of time.

(c) In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

With respect to interior standards, the Noise Ordinance states the following:

(a) In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

(b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, either incorporated or unincorporated, to exceed:

(1) The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

(2) The interior noise standard plus five (5) db(A) for a cumulative period of more than one (1) minute in any hour; or

(3) The interior noise standard plus ten (10) db(A) for any period of time.

(c) In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category the maximum allowable noise level under said category shall be increased in reflect the maximum ambient noise level.

Section 4-6-7 of the Noise Ordinance exempts the following activities:

(a) Activities conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

(b) Outdoor gatherings, public dances and shows, provided such events are conducted pursuant to a license issued by the County of Orange pursuant to Title 5 of the Codified Ordinances of the County of Orange.

(c) Activities conducted on any park or playground, provided such park or playground is owned and operated by a public entity.

(d) Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

(e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

(i) Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a federal holiday.

(j) Any activity to the extent regulation thereof has been preempted by State or federal law.

Regulatory Setting – Vibration

Public agencies have established vibration guidelines and standards to protect citizens and structures from potential structural damage and annoyance and various other adverse physiological and social effects associated with vibration. The Project is located within the County of Orange. For the evaluation of potential vibration impacts, this analysis assumes compliance with the vibration policies and regulations established by the California Department of Transportation (Caltrans).

California Department of Transportation

As is typical of most cities and counties in California, there are no applicable County standards for vibration-induced annoyance or structural damage from vibration. The California Department of Transportation (Caltrans) has adopted vibration damage thresholds, which are shown in Table 6, to assess the potential for structural damage from vibration. The structural damage threshold for "older residential structures" of 0.3 in/sec PPV for continuous/frequent (i.e., intermittent) sources is most applicable to this analysis.

TABLE 6
VIBRATION DAMAGE THRESHOLD CRITERIA

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

PPV: peak particle velocity; in/sec: inch(es) per second

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans 2013.

The Caltrans vibration annoyance thresholds are shown in Table 7. These thresholds are used to assess the potential for a significant vibration impact for human annoyance; and annoyance is evaluated within occupied buildings.

TABLE 7
VIBRATION ANNOYANCE THRESHOLDS

Average Human Response	PPV
Severe	2.0
Strongly perceptible	0.9
Distinctly perceptible	0.24
Barely perceptible	0.035
PPV: peak particle velocity; in/sec: inch(es) per second Source: Caltrans 2013.	

IMPACT ANALYSIS

The following questions correspond to the questions in the Noise section of the Initial Study Checklist in Appendix G of the State CEQA Guidelines.

Question NOI-1 **Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**

Construction Noise

Construction noise occurring within the County of Orange is regulated under Section 4-6-7.e of the County Code of Ordinances. This Code exempts construction activities from the noise limits provided "Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday." Since construction activities may occur outside of these time periods, a variance will be obtained prior to the start of construction activities.

Construction is anticipated to start in March 2025 and the Project is expected to be completed in three years. During construction, concrete crushing would occur in one of the staging areas, which may include the primary staging area. Concrete crushing would be expected to occur generally during the day but could for approximately 3 weeks during the demolition phase of the Project.

The Project requires that some of the existing site improvements be demolished, or removed and relocated, prior to construction. The following existing features would be demolished or removed:

- Vertical outlet tower and portions of 60-inch outlet conduit
- Significant portions (or possibly all) of the spillway chute and walls
- Spillway bridge and piers
- Portions of the upstream dam embankment concrete facing
- Storage building on dam crest
- Outlet works control building and valve vault
- Outlet works energy dissipator vault
- Portions of the Irvine Lake Pipeline

- Catwalk and stair assembly across Santiago Creek
- Piezometers / Monitoring wells
- Other ancillary equipment, utilities, and facilities

Other activities, such as access road improvements, crest widenings, rock slope stabilization, and installation of erosion control measures would also be carried out prior to construction. All the pre-construction activities are addressed in the noise and vibration analyses.

The Project involves construction of multiple components that include:

- Inlet/Outlet Works
    - Inclined Inlet/Outlet Structure
    - Intake Risers and Platforms
- Downstream Outlet Works
    - Bifurcation Valve Vault
    - Emergency Outlet Valve Vault
- Spillway
- Pipelines
    - Irvine Lake Pipeline Relocation
    - Ancillary site improvements
- Inclined Inlet/Outlet Structure Access Roadway and Bridge
- Dam Control Building
- Existing Dam Crest Raise and Widening
- Emergency Access Walkway and Stairs
- Vehicle Bridge
- Additional Inundation During Operations
- Utility Relocation
- Embankment Mitigation

Primary construction access would be from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area, as well as the required conventional concrete batch plant and construction trailers, would be located in the large, flat plateau area at the upstream end of the reservoir. The primary onsite construction access/haul road (Blue Diamond) would connect the staging area to the toe of the existing dam within the lakebed after the lake is dewatered. An earthen ramp would be constructed up the right abutment of the existing dam to provide access for construction vehicles to the downstream area to construct the outlet works and spillway stilling basin facilities. To facilitate the construction of the downstream features, a secondary staging area would be located on the downstream toe of the dam near the existing outlet structure building.

Construction of the Project would normally occur 10 hours/day during the wet season (October-April) and 20 hours/day during the dry season (April to November). The County’s Code of Ordinances limits “Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said

activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday." Because construction activities would occur outside of the hours allowed within the County's Code of Ordinances, a variance would need to be obtained prior to the construction activities.

Construction noise levels for individual construction equipment reported in the Federal Highway Administration's Roadway Construction Noise Model (RCNM) were used to estimate future construction noise levels for the Project (FHWA 2008). Noise levels of construction activities from each component of the Project were assessed based on types, quantity, time frame, and distance relative to noise receptor locations. All construction equipment is anticipated to be fitted with the original equipment manufacturer or manufacturer approved equivalent mufflers or intake silencers to maintain, at minimum, published noise emission levels which were used in the calculation of offsite noise exposure from construction activities.

Typically, estimated construction noise levels are primarily influenced by equipment that produces the highest noise levels and those activities located closest to the receptor of interest. The Project consists of numerous structures that would be distributed over a large Project site. The distance between construction activities and any natural or manmade barriers provides noise attenuation for noise sensitive receptors. Noise levels during construction of each distinct Project component would vary due to the different numbers and types of construction activities/equipment. Table 8, Estimated Construction Noise Levels at Receptors, shows noise exposure levels for each of the four main activity areas associated with the Project. These include the dam area to the northwest of the Project site where the proposed upgrades to the infrastructure would occur, the primary staging area located to the southeast, the Blue Diamond haul route which runs along the southern and western perimeters of the Project's construction area, and the lakebed haul route that extends through the western portion of the lake. Each of these four construction areas were assessed for noise exposure levels at offsite residential areas, nearby parks, and habitats that may contain protected nesting areas. The range in noise exposure levels is due to the varying construction phases and associated distances of these activities that would occur between the Project and each respective noise sensitive receptor.

TABLE 8
ESTIMATED CONSTRUCTION NOISE LEVELS AT RECEPTORS

Construction Phase	Distance from Construction Activities (feet)	Noise Exposure Level (dBA L_{eq})
Construction of Main Dam Structures		
Irvine Regional Park	5,070	31-47
Residences Along Jamboree Road	9,785	25-41
Oak Canyon Park	9,035	41-57
Lakeview Park Camping Area	7,640	42-58
Sensitive Habitat to the South of Dam	140-1,300	49-86
Sensitive Habitat to the North of the Dam	150-1,370	63-84
Sensitive Habitat Near Primary Staging Area	8,300	42-57
Primary Staging Area		
Irvine Regional Park	12,700	32
Residences Along Jamboree Road	16,130	30
Oak Canyon Park	1,000	69
Lakeview Park Camping Area	1,000	69
Nearest Sensitive Habitat	239	82
Blue Diamond Haul Route		
Nearest Sensitive Habitat	100	61
Lakebed Haul Route		
Nearest Sensitive Habitat	41	69

dBA: A-weighted decibels; L_{eq}: Equivalent Noise Level; ft: feet; N/A: not applicable
Source: Noise calculations in Attachment B.

Noise Exposure at Residential Uses

Estimated noise levels at the nearest noise sensitive uses attributable to development of the Project are shown in Table 8. As shown in this Table, Project related construction activities would occur at distances of approximately two miles from existing residential uses located to the west of the Project site. In addition to the substantial distances between the Project site and the nearest developed noise sensitive land uses, Irvine Lake is surrounded by ridgelines which attenuate noise levels. Irvine Lake is at an elevation of approximately 780 feet above sea level (asl), while many of the downstream components of the Project are located at elevations of 660 feet asl. Intervening ridgelines to the east of the dam site rise to elevations of greater than 1,000 feet asl. Noise generated by Project construction would also be attenuated by these ridgelines. As shown in Table8, noise levels are expected to range from 25 to 41 dBA L_{eq} at the exterior areas of the nearest noise sensitive residential uses. Noise exposure from Project construction activities would occur during both daytime and nighttime activities. Noise generated during Project construction would be below the FTA's daytime and nighttime Leq criteria and the County's interior and exterior daytime and nighttime Leq thresholds for residential land uses. Noise exposure levels during noisiest Project construction periods would be approximately 46 dBA CNEL at exterior areas of the nearest residential land uses. Such noise levels would be substantially less than the exterior noise compatibility standard of 65 dBA CNEL. Interior noise exposure levels at these residences would be further reduced by approximately 20 dBA under a windows-closed condition and 12 dBA under a windows-open condition, resulting in interior noise levels less than 45 dBA CNEL. In addition, construction noise from the Project site may not be discernible with traffic noise occurring along the

SR-261 and SR-241. As such, noise impacts from Project related daytime and nighttime construction activities would result in less than significant noise impacts.

Noise Exposure at Nearby Park Uses

The nearest parks located proximate to the Project construction activities include Oak Canyon Park, Irvine Lake, and Irvine Regional Park. Irvine Regional Park is located approximately one mile northwest of the northernmost Project construction activities. Irvine Regional Park is also located such that intervening ridgelines with elevations greater than 1,000 feet provide substantial noise attenuation from the Project's construction activities. As shown in Table 8, construction noise exposure levels are anticipated to range from 31 to 47 dBA L_{eq} at Irvine Regional Park. These relatively low levels of noise exposure would be due to attenuation caused by sound spreading loss and obstruction of the line-of-sight between the Project site and the Irvine Reginal Park.

Irvine Lake would remain open, with the exception of select areas proximate to the Project construction which would be closed for safety reasons. Irvine Lake would also be affected by noise occurring at the Project's construction areas. Noise exposure levels throughout the lake area would be affected by proximity to construction activities. The degree of noise exposure is highly dependent on the proximity of lake users relative to the Project construction activities.

Oak Canyon Park is located approximately 1.7 miles from the Project's dam construction activities. As shown in Table 8, construction noise levels from activities occurring at the dam would be substantially attenuated due to the distance between the dam and the park with noise exposure levels of 41 to 57 dBA L_{eq}. However, Oak Canyon Park is located adjacent to the proposed primary staging area. The primary staging area is anticipated to be used for staging construction management trailers, materials, equipment, conventional concrete batch plant, and the concrete crushing operation. The concrete crushing operation involves the delivery of concrete from demolished structures that would be crushed for use in the concrete batch plant. The concrete batch plant would be supported by haul trucks transporting cement and aggregates as well as concrete trucks transporting concrete for use in the dam improvements. Concrete crushing would be expected to occur generally during the day and intermittently at night for approximately 3 weeks, during the demolition phase of the Project. The park would mostly be exposed to noise associated with activities occurring at the staging area where equipment and materials will be stored, concrete batching activities and concrete crushing activities. Equipment staging is expected to occur during the beginning and end of each work shift when equipment would be either taken out of or returned to the staging area. Material staging would involve the temporary storage of building materials, excavated aggregates, and soil storage piles. The delivery and removal of materials in the staging area would occur throughout the day and would involve haul trucks transporting these materials. With the exception of concrete crushing activities, construction related activities associated with the staging area would occur intermittently. Concrete crushing activities would generally occur during the day but could occur for up to 20 hours a day for a period of approximately three weeks. Concrete crushing activity would be the loudest Project construction activity, generating noise levels of 95 dBA L_{eq} at a distance of 50 feet (DEC 2001) prior to the installation of sound barriers. Assuming that the concrete crusher is located at least 1,000 feet away (this distance has been confirmed by the Applicant), noise exposure levels at Oak Canyon Park are estimated to be 69 dBA L_{eq}. The Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual (FTA 2018) has developed construction impact guidelines shown in Table 9.

TABLE 9
CONSTRUCTION NOISE CRITERIA

1-Hour Criteria (Leq)		
Land Use	**Day**	**Night**
Residential	90	80
Commercial	100	100
Industrial	100	100
8-Hour Criteria (L_{eq})		
Land Use	**Day**	**Night**
Residential	80	70
Commercial	85	85
Industrial	90	90

There are no construction noise criteria for parks. Residential uses are considered to be the most noise sensitive land use. Noise levels of 69 dBA L_{eq} from the staging area would not exceed the 80 dBA L_{eq} daytime and 70 dBA L_{eq} nighttime noise criteria and consequently would not expose Oak Canyon Park to excessive levels of noise.

The Lakeview Park Camping Area would be exposed to similar levels of noise as those at Oak Canyon Park, due to the large distance from the dam site and the proximity to the primary staging area. Noise levels from construction activities at the dam site range from 42 to 58 dBA L_{eq}. This park is proximate to construction activities occurring at the primary staging area and would likewise be exposed to daytime noise from these activities. Noise levels are estimated to be 69 dBA L_{eq} from the primary staging area. Daytime noise exposure of this level would not exceed the daytime noise criterion of 80 dBA L_{eq} established by the FTA. No camping is allowed at Irvine Lake (OC Parks 2023) so there would be no nighttime noise exposure. Noise from project-related construction noise would result in less than significant noise impacts at the Oak Canyon Park and Lakeview Park Camping Area.

Noise Exposure at Nearest Sensitive Habitat

Noise levels within the adjacent sensitive habitat are expected to average 61 dBA. The predominant source of noise that would affect this receptor would be the haul trucks. A more detailed analysis regarding construction noise impacts to biological resources is presented in the Biological Resources section of the EIR. Mitigation has been proposed in that section of the EIR that would reduce any noise impacts to biological resources to levels that are less than significant.

Operational Noise

During the operations phase of the Project, dam operations would continue consistent with operations prior to the infrastructure improvements. Under existing conditions, a small number of vehicle trips are associated with routine inspection and maintenance at the existing dam. It is anticipated that routine inspection and maintenance trips would continue, and no new operational trips would occur with implementation of the proposed Project. Therefore, because there would be no increase in vehicular trips associated with daily operation of the Project components, no Project related traffic noise impacts are anticipated. New stationary sources of noise are due to small compressors used for aeration within the reservoir. Due to the very large distances between these compressors and offsite noise sensitive land uses and its location within a concrete masonry unit building, noise related to these compressors would be inaudible. Impacts would be less than significant and no mitigation is necessary.

Question NOI-2 Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. Demolition activities, excavation, infrastructure development, and repaving would occur at the Project site around Irvine Lake. Vibration annoyance and building damage from typical construction activities have the potential to be excessive at nearfield distances of 100 feet or less. Because of the very substantial distances between the Project site and the nearest buildings, vibration induced annoyance and building damage would not occur. The operations phase of the Project would not involve machinery or activities that generate perceptible levels of vibration. There would be a less than significant impact, and no mitigation is required.

Question NOI-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in exposure of people residing or working in the Project area to excessive noise levels?

No Impact. The Project Site is not located within two miles of a public or private airport. The Project site is located approximately 10 miles northeast of John Wayne Airport. Helicopter operations have historically been conducted at Irvine Lake. Noise associated with these activities are intermittent and generally a substantial distance from workers at the dam. As such, the Project would not result in exposure of people residing or working in the Project area to excessive noise levels. Therefore, there would be no significant impact related to excessive aircraft noise exposure.

MITIGATION MEASURES

No significant noise or vibration impacts would occur from either the construction or operations phases of the Project. As such, no mitigation measures are necessary or recommended.

CUMULATIVE NOISE AND VIBRATION IMPACTS

Cumulative Short Term (Construction) Noise and Vibration Impact

Adverse noise and vibration impacts during construction of the proposed Project would be localized and would occur intermittently for varying periods of time throughout the construction period. Short-term cumulative impacts related to ambient noise and vibration levels could occur if construction associated with the proposed Project as well as surrounding current and future development were to occur simultaneously. Noise or vibration associated with construction of the proposed Project in combination with another project within approximately 500 feet of the Project site boundaries could adversely impact sensitive receptors in the vicinity of the site with a cumulative noise level greater than the noise generated solely at the Project site. Due to the remote location of the Project site, it is not likely that construction activities from other projects within 500 feet of the Project site would occur concurrently with those of the Project. Any construction noise impacts from other concurrent projects located at greater distances than 500 feet from the Project site would be solely due to the other projects. As such, cumulative noise impacts related to construction activities would result in less than significant noise impacts.

Cumulative Long-Term (Operations) Noise Impact

Cumulative traffic noise impacts would not occur due to the minimal vehicle trips required for maintenance of Project facilities and equipment. Stationary sources of machinery noise are minimal and would not result in a substantial increase in ambient noise levels in the local area. Additionally, noise produced during long-term operations would be regulated under the County's Code of Ordinances.

Lastly, the Project's operations are located at such distances that there would not be a substantial increase in noise due to cumulative contributions from other sources. As such, impacts associated with cumulative long-term noise would be less than significant, and no mitigation is required.

CONCLUSION

The proposed Project was analyzed for potential noise and vibration impacts from both the construction and operational phases. The Project's construction activities would result in less than significant noise impacts to local parks and more distant residential uses. The operations phase of the Project would result in minimal noise levels compared to conditions prior to the development of the Project and would result in less than significant impacts. Groundborne vibration and groundborne noise levels generated during construction would have less than significant impacts due to the very localized nature of vibration transmission and the substantial distances between construction activities and receptors that could be potentially affected. The Project would also not result in the exposure of people residing or working in the Project area to excessive noise levels from private or public airports.

Thank you for the opportunity to assist on this Project. If you have any questions or comments, please contact me at (714) 481-8057.

Sincerely,

PSOMAS

Farshad Farhang
Senior Acoustics Specialist

Attachments: A – Exhibits 1-1 through 1-2 – Regional Location and Local Vicinity
B – Noise Calculations

REFERENCES

California Department of Transportation (Caltrans). 2013 (September). *Transportation and Construction Vibration Guidance Manual.* Sacramento, CA: Caltrans.

———. 2016 (June). Technical Guidance for Assessment and Mitigation of the Effects of Traffic Noise and Road Construction Noise on Birds. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/noise-effects-on-birds-jun-2016-a11y.pdf.

County of Orange. 2005. General Plan. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/codes-and-regulations/general-plan.

Federal Highway Administration. 2008. Federal Highway Administration's Roadway Construction Noise Model Software Version 1.1. Prepared by US Department of Transportation Research and Innovative Technology Administration John A Volpe National Transportation Systems Center Environmental Measurement and Modeling Division. https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/.

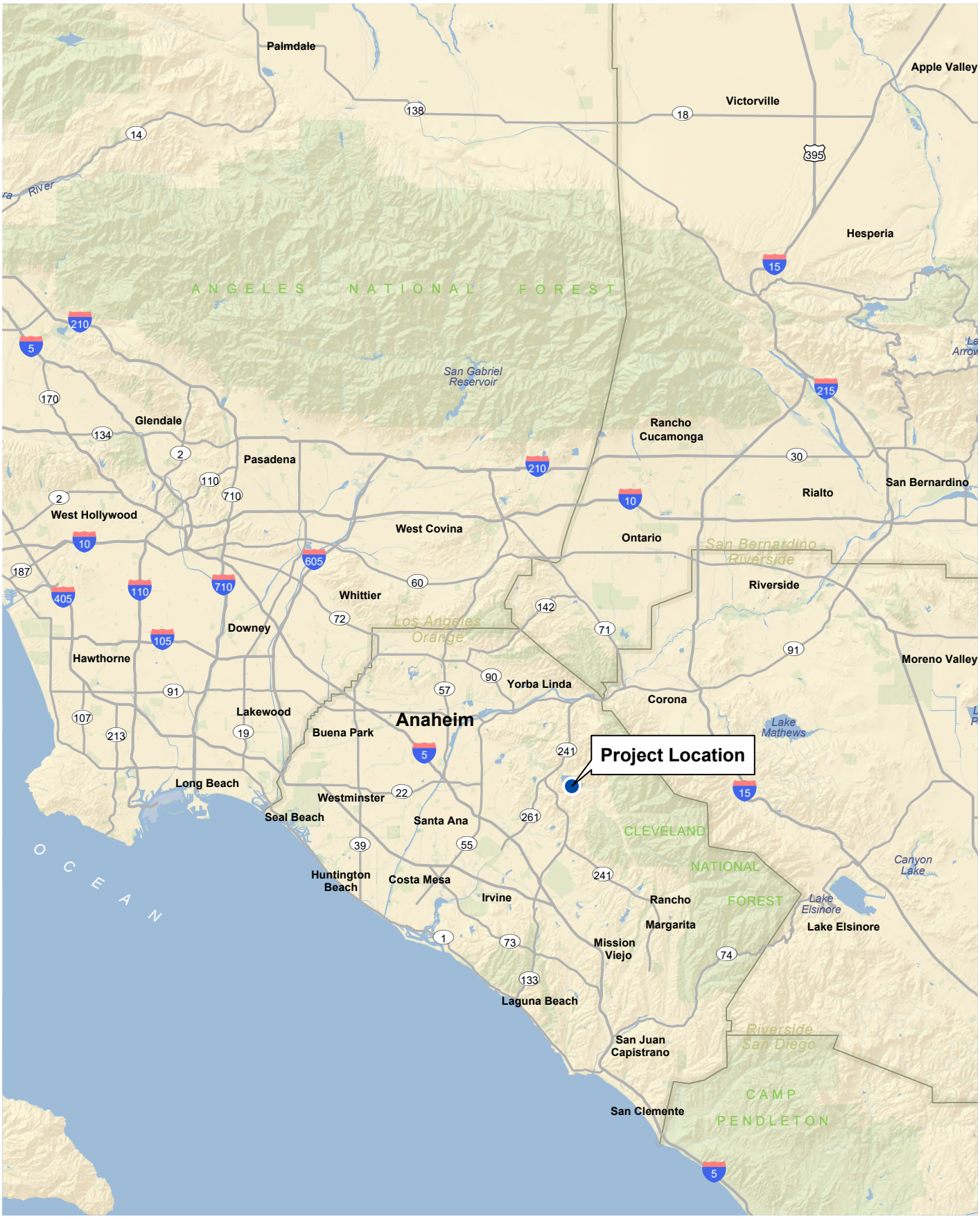
Federal Transit Administration. 2018 (September). Transit Noise and Vibration Impact Assessment. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

New York State Department of Environmental Conservation. 2001. "Assessing and Mitigating Noise Impacts". https://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf.

Orange County Parks. Irvine Lake Frequently Asked Questions. 2023. https://www.ocparks.com/parks-trails/irvine-lake/frequently-asked-questions.

ATTACHMENT A

EXHIBITS 1-1 THROUGH 1-2
REGIONAL LOCATION AND LOCAL VICINITY



D:\Projects\3IRW\SantiagoCreek\PROVSCD\SCD_Project.aprx\ex_RL

Regional Location

Exhibit 1-1

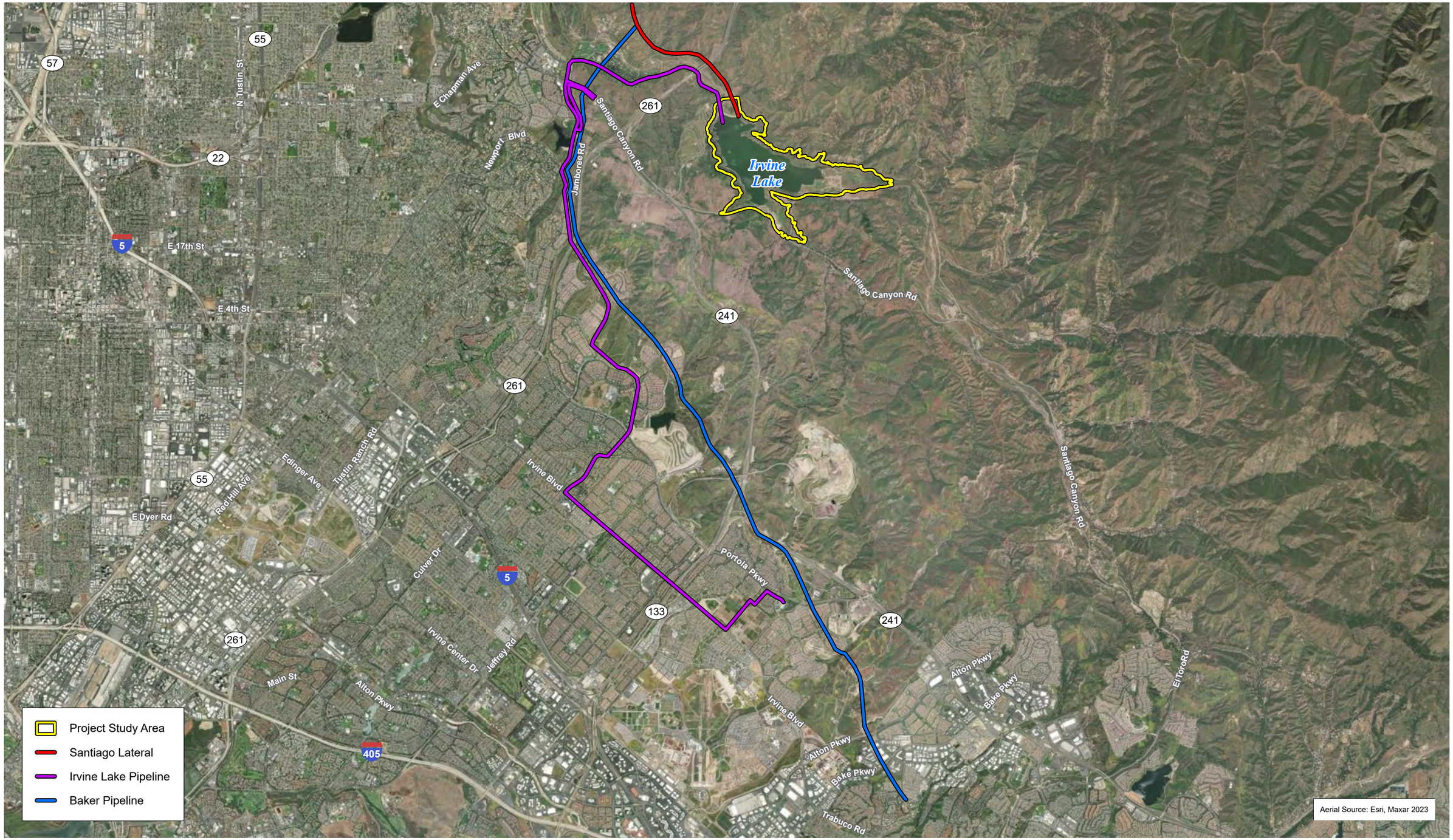
Santiago Creek Dam Improvements Project

N W E S

0 5 10 Miles

PSOMAS

(Rev: 11-14-2024 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_RL.pdf



D:\Projects\3IRWS\SantiagoCreek\PROS\SCD\SCD_Project.aprx\ex_Aerial_11x17L

Aerial Photograph

Exhibit 1-2

Santiago Creek Dam Improvements Project

N W E S

0 0.6 1.2 Miles

PSOMAS

(Rev: 11/27/2024 JVR) R:\Projects\IRW_IRWD\3IRW001101\Graphics\EIR\ex_Aerial.pdf

ATTACHMENT B

NOISE CALCULATIONS

						Receptor 1 - Irvine Regional Park					Receptor 2 - Residences Along Jamboree Road			Receptor 3 - Oak Canyon Park			Receptor 4 - Lakeview Park Camping Area			Receptor 5 - Sensitive Bird Species South of Dam			Receptor 6 - Sensitive Bird Species North of the Dam			Receptor 7 - Sensitive Bird Species Near Primary Staging Area		
Phase Name	Number per Day	Equipment Type	Typical Noise Level 50 ft from Source, dBA	Noise Level 50 ft Multiple Equipment, dBA	Construction Phase Noise Level, dBA	Hard/Soft	Distance	Utilization	Noise Level with Utilization	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level
Part 1 Site Demolition (Excludes Spillway)	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	42	0.00	7640.00	39	0.00	640.00	60	0.00	320.00	66	0.00	8300.00	38
Part 1 Site Demolition (Excludes Spillway)	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Part 2 Site Demolition (Excludes Spillway)	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	42	0.00	7640.00	39	0.00	360.00	65	0.00	590.00	61	0.00	8300.00	38
Part 2 Site Demolition (Excludes Spillway)	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Spillway Demolition: Existing Spillway Demo	3	Air Compressors	80	85	95	0.00	5070.00	0.40	81	55	0.00	9785.00	49	0.00	9035.00	50	0.00	7640.00	51	0.00	200.00	83	0.00	710.00	72	0.00	8300.00	50
Spillway Demolition: Existing Spillway Demo	4	Concrete/Industrial Saws	90	96				0.20	89																		
Spillway Demolition: Existing Spillway Demo	1	Cranes	88	88				0.16	80																		
Spillway Demolition: Existing Spillway Demo	2	Crushing/Proc. Equipment	89	92				1.00	92																		
Spillway Demolition: Existing Spillway Demo	2	Excavators	85	88				0.40	84																		
Spillway Demolition: Existing Spillway Demo	1	Off-Highway Trucks	84	84				0.40	80																		
Spillway Demolition: Existing Spillway Demo	1	Welders	73	73				0.40	69																		
Spillway Demolition: Crush Concrete Demo	1	Crushing/Proc. Equipment	89	89	91	0.00	5070.00	1.00	89	51	0.00	9785.00	45	0.00	9035.00	46	0.00	7640.00	47	0.00	770.00	67	0.00	240.00	77	0.00	8300.00	46
Spillway Demolition: Crush Concrete Demo	1	Excavators	85	85				0.40	81																		
Spillway Demolition: Crush Concrete Demo	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Spillway Demolition: Crush Concrete Demo	2	Off-Highway Trucks	84	87				0.40	83																		
Spillway Demolition: Bridge Pier and Facing Demo	3	Air Compressors	80	85	95	0.00	5070.00	0.40	81	55	0.00	9785.00	49	0.00	9035.00	50	0.00	7640.00	51	0.00	1100.00	68	0.00	290.00	79	0.00	8300.00	50
Spillway Demolition: Bridge Pier and Facing Demo	4	Concrete/Industrial Saws	90	96				0.20	89																		
Spillway Demolition: Bridge Pier and Facing Demo	1	Cranes	88	88				0.16	80																		
Spillway Demolition: Bridge Pier and Facing Demo	2	Crushing/Proc. Equipment	89	92				1.00	92																		
Spillway Demolition: Bridge Pier and Facing Demo	2	Excavators	85	88				0.40	84																		
Spillway Demolition: Bridge Pier and Facing Demo	1	Off-Highway Trucks	84	84				0.40	80																		
Spillway Demolition: Bridge Pier and Facing Demo	1	Welders	73	73				0.40	69																		
Temporary Flood Control Berm	1	Excavators	85	85	88	0.00	5070.00	0.40	81	48	0.00	9785.00	42	0.00	9035.00	43	0.00	7640.00	44	0.00	390.00	70	0.00	1220.00	60	0.00	8300.00	44
Temporary Flood Control Berm	4	Off-Highway Trucks	84	90				0.40	86																		
Temporary Flood Control Berm	1	Rubber Tired Dozers	85	85				0.20	78																		
Temporary Flood Control Berm	1	Rollers	85	85				0.20	78																		
Mobilization	1	Forklifts	85	85	89	0.00	5070.00	0.20	78	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	660.00	66	0.00	240.00	75	0.00	8300.00	44
Mobilization	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Mobilization	2	Off-Highway Trucks	84	87				0.40	83																		
Mobilization	1	Graders	85	85				0.40	81																		
Mobilization	1	Excavators	85	85				0.40	81																		
Mobilization	2	Skid Steer Loaders	80	83				0.40	79																		
Mobilization	1	Cranes	88	88				0.16	80																		
Demobilization	1	Forklifts	85	85	89	0.00	5070.00	0.20	78	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	660.00	66	0.00	240.00	75	0.00	8300.00	44
Demobilization	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Demobilization	2	Off-Highway Trucks	84	87				0.40	83																		
Demobilization	1	Graders	85	85				0.40	81																		
Demobilization	1	Excavators	85	85				0.40	81																		
Demobilization	2	Skid Steer Loaders	80	83				0.40	79																		
Demobilization	1	Cranes	88	88				0.16	80																		
Cleanup	2	Scrapers	85	88	88	0.00	5070.00	0.40	84	48	0.00	9785.00	42	0.00	9035.00	43	0.00	7640.00	44	0.00	660.00	65	0.00	240.00	74	0.00	8300.00	43
Cleanup	3	Rubber Tired Dozers	85	90				0.20	83																		
Cleanup	1	Graders	85	85				0.40	81																		
Cleanup	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Allowance for Piping Install	1	Excavators	85	85	83	0.00	5070.00	0.40	81	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	265.00	69	0.00	310.00	67	0.00	8300.00	39
Allowance for Piping Install	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Allowance for Piping Install	1	Skid Steer Loaders	80	80				0.40	76																		
Bypass Pumping Diversion Berm	1	Generator Sets	82	82	79	0.00	5070.00	0.50	79	39	0.00	9785.00	33	0.00	9035.00	34	0.00	7640.00	35	0.00	225.00	66	0.00	1370.00	50	0.00	8300.00	35
Inclined Inlet Structure: Steel Pipe and Appurtenances	1	Rollers	85	85	87	0.00	5070.00	0.20	78	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	140.00	78	0.00	1210.00	59	0.00	8300.00	42
Inclined Inlet Structure: Steel Pipe and Appurtenances	2	Excavators	85	88				0.40	84																		
Inclined Inlet Structure: Steel Pipe and Appurtenances	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Inclined Inlet Structure: Steel Pipe and Appurtenances	1	Welders	73	73				0.40	69																		
Inclined Inlet Structure: Steel Pipe and Appurtenances	1	Cranes	88	88				0.16	80																		
Inclined Inlet Structure: Reinforced Concrete	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	140.00	81	0.00	1210.00	62	0.00	8300.00	45
Inclined Inlet Structure: Reinforced Concrete	1	Pumps	77	77				0.50	74																		
Inclined Inlet Structure: Reinforced Concrete	2	Cranes	88	91				0.16	83																		
Inclined Inlet Structure: Reinforced Concrete	2	Rough Terrain Forklifts	85	88				0.20	81																		
Inclined Inlet Structure: Reinforced Concrete	2	Generator Sets	82	85				0.50	82																		
Inclined Inlet Structure: Reinforced Concrete	3	Cement and Mortar Mixers	85	90				0.40	86																		
Inclined Inlet Structure: Drilled Foundation Anchors	2	Bore/Drill Rigs	84	87	83	0.00	5070.00	0.20	80	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	140.00	74	0.00	1210.00	55	0.00	8300.00	39
Inclined Inlet Structure: Drilled Foundation Anchors	1	Skid Steer Loaders	80	80				0.40	76																		
Inclined Inlet Structure: Drilled Foundation Anchors	1	Forklifts	85	85				0.20	78																		
Inclined Inlet Structure: Excavation	1	Excavators	85	85	85	0.00	5070.00	0.40	81	45	0.00	9785.00	39	0.00	9035.00	40	0.00	7640.00	41	0.00	140.00	76	0.00	1210.00	57	0.00	8300.00	41
Inclined Inlet Structure: Excavation	2	Off-Highway Trucks	84	87				0.40	83																		
Inclined Inlet Structure: Stainless Steel Platform	1	Skid Steer Loaders	80	80	83	0.00	5070.00	0.40	76	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	140.00	74	0.00	1210.00	55	0.00	8300.00	39
Inclined Inlet Structure: Stainless Steel Platform	1	Forklifts	85	85				0.20	78																		
Inclined Inlet Structure: Stainless Steel Platform	1	Cranes	88	88				0.16	80																		
Inclined Inlet Structure: Pneumatic Actuation Control System	1	Skid Steer Loaders	80	80	83	0.00	5070.00	0.40	76	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	140.00	74	0.00	1210.00	55	0.00	8300.00	39
Inclined Inlet Structure: Pneumatic Actuation Control System	1	Forklifts	85	85				0.20	78																		
Inclined Inlet Structure: Pneumatic Actuation Control System	1	Cranes	88	88				0.16	80																		
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	2	Cranes	88	91	86	0.00	5070.00	0.16	83	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	470.00	66	0.00	1190.00	58	0.00	8300.00	42
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	1	Rough Terrain Forklifts	85	85				0.20	78																		
Cofferdam Installation and Removal: Install Cofferdam H/King Piles	2	Aerial Lifts	85	88				0.20	81																		
Cofferdam Installation and Removal: Dewatering	2	Generator Sets	82	85	82	0.00	5070.00	0.50	82	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	38	0.00	470.00	63	0.00	1190.00	54	0.00	8300.00	38
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	2	Cranes	88	91	86	0.00	5070.00	0.16	83	46		9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	470.00	66	0.00	1190.00	58	0.00	8300.00	42
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	1	Rough Terrain Forklifts	85	85				0.20	78																		
Cofferdam Installation and Removal: Remove Cofferdam H/King Piles	2	Aerial Lifts	85	88				0.20	81																		
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	1	Graders	85	85	88	0.00	5070.00	0.40	81	48	0.00	9785.00	42	0.00	9035.00	43	0.00	7640.00	44	0.00	250.00	74	0.00	855.00	63	0.00	8300.00	44
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	3	Scrapers	85	90				0.40	86																		
Access Road, Crest Ramp, and Existing Crest Widening: Roadway Excavation	1	Rubber Tired Dozers	85	85				0.40	81																		
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	1	Off-Highway Trucks	84	84	85	0.00	5070.00	0.40	80	45	0.00	9785.00	39	0.00	9035.00	39	0.00	7640.00	41	0.00	250.00	71	0.00	855.00	60	0.00	8300.00	40
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	1	Rubber Tired Dozers	85	85				0.40	81																		
Access Road, Crest Ramp, and Existing Crest Widening: Imported Fill & CMB Surface Course	1	Rollers	85	85				0.20	78																		
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	1	Graders	85	85	84	0.00	5070.00	0.40	81	43	0.00	9785.00	38	0.00	9035.00	38	0.00	7640.00	40	0.00	250.00	70	0.00	855.00	59	0.00	8300.00	39
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Access Road, Crest Ramp, and Existing Crest Widening: CMB Surface Course	1	Rollers	85	85				0.20	78																		
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	1	Excavators	85	85	88	0.00	5070.00	0.40	81	48	0.00	9785.00	42	0.00	9035.00	43	0.00	7640.00	44	0.00	250.00	74	0.00	855.00	63	0.00	8300.00	43
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	2	Off-Highway Trucks	84	87				0.40	83																		
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	1	Rubber Tired Dozers	85	85				0.40	81																		
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	1	Forklifts	85	85				0.20	78																		
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	1	Plate Compactors	82	82				0.20	75																		
Access Road, Crest Ramp, and Existing Crest Widening: MSE Retaining Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	1	Skid Steer Loaders	80	80	80	0.00	5070.00	0.40	76	40	0.00	9785.00	34	0.00	9035.00	35	0.00	7640.00	36	0.00	250.00	66	0.00	855.00	55	0.00	8300.00	36
Access Road, Crest Ramp, and Existing Crest Widening: Metal Beam Guard Rail	1	Forklifts	85	85				0.20	78																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Forklifts	85	85	87	0.00	5070.00	0.20	78	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	250.00	73	0.00	855.00	62	0.00	8300.00	42
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Generator Sets	82	82				0.50	79																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Pumps	77	77				0.50	74																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Access Road, Crest Ramp, and Existing Crest Widening: 1.5' Conc Parapet Wall	1	Cement and Mortar Mixers	85	85				0.40	81																		
Dam Control Building: Pt 1 CMU Control Building	1	Forklifts	85	85	84	0.00	5070.00	0.20	78	43	0.00	9785.00	38	0.00	9035.00	38	0.00	7640.00	40	0.00	620.00	62	0.00	720.00	60	0.00	8300.00	39
Dam Control Building: Pt 1 CMU Control Building	1	Skid Steer Loaders	80	80				0.40	76																		
Dam Control Building: Pt 1 CMU Control Building	1	Excavators	85	85				0.40	81																		
Dam Control Building: Pt 2 CMU Control Building	1	Forklifts	85	85	84	0.00	5070.00	0.20	78	43	0.00	9785.00	38	0.00	9035.00	38	0.00	7640.00	40	0.00	620.00	62	0.00	720.00	60	0.00	8300.00	39
Dam Control Building: Pt 2 CMU Control Building	1	Skid Steer Loaders	80	80				0.40	76																		
Dam Control Building: Pt 2 CMU Control Building	1	Excavators	85	85				0.40	81																		
Dam Control Building: Reinforced Concrete Foundation	1	Forklifts	85	85	87	0.00	5070.00	0.20	78	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	620.00	65	0.00	720.00	64	0.00	8300.00	42
Dam Control Building: Reinforced Concrete Foundation	1	Generator Sets	82	82				0.50	79																		
Dam Control Building: Reinforced Concrete Foundation	1	Skid Steer Loaders	80	80				0.40	76																		
Dam Control Building: Reinforced Concrete Foundation	1	Pumps	77	77				0.50	74																		
Dam Control Building: Reinforced Concrete Foundation	1	Bore/Drill Rigs	84	84				0.20	77																		
Dam Control Building: Reinforced Concrete Foundation	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Dam Control Building: Reinforced Concrete Foundation	1	Skid Steer Loaders	80	80				0.40	76																		
Dam Control Building: Reinforced Concrete Foundation	1	Cement and Mortar Mixers	85	85				0.40	81																		
Dam Control Building: Metal Frame Roofing	1	Forklifts	85	85	82	0.00	5070.00	0.20	78	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	38	0.00	620.00	60	0.00	720.00	59	0.00	8300.00	38
Dam Control Building: Metal Frame Roofing	1	Cranes	88	88				0.16	80																		
Dam Control Building: Ancillary Features	1	Forklifts	85	85	82	0.00	5070.00	0.20	78	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	38	0.00	620.00	60	0.00	720.00	59	0.00	8300.00	38

						Receptor 1 - Irvine Regional Park					Receptor 2 - Residences Along Jamboree Road			Receptor 3 - Oak Canyon Park			Receptor 4 - Lakeview Park Camping Area			Receptor 5 - Sensitive Bird Species South of Dam			Receptor 6 - Sensitive Bird Species North of the Dam			Receptor 7 - Sensitive Bird Species Near Primary Staging Area		
Phase Name	Number per Day	Equipment Type	Typical Noise Level 50 ft from Source, dBA	Noise Level 50 ft Multiple Equipment, dBA	Construction Phase Noise Level, dBA	Hard/Soft	Distance	Utilization	Noise Level with Utilization	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level
Dam Control Building: Ancillary Features	1	Cranes	88	88				0.16	80																		
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	1	Excavators	85	85	87	0.00	5070.00	0.40	81	46	0.00	9785.00	41	0.00	9035.00	41	0.00	7640.00	43	0.00	185.00	75	0.00	1220.00	59	0.00	8300.00	42
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	2	Off-Highway Trucks	84	87				0.40	83																		
Downstream Outlet Works Piping and Vault: Structure Excavation Shoring & Excavation	1	Rubber Tired Dozers	85	85				0.40	81																		
Downstream Outlet Works Piping and Vault: Structure Bkfl	1	Excavators	85	85	86	0.00	5070.00	0.40	81	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	185.00	75	0.00	1220.00	58	0.00	8300.00	42
Downstream Outlet Works Piping and Vault: Structure Bkfl	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Structure Bkfl	1	Plate Compactors	82	82				0.20	75																		
Downstream Outlet Works Piping and Vault: Structure Bkfl	2	Off-Highway Trucks	84	87				0.40	83																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Cranes	88	88	89	0.00	5070.00	0.16	80	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	185.00	78	0.00	1220.00	61	0.00	8300.00	45
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Forklifts	85	85				0.20	78																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Generator Sets	82	82				0.50	79																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Skid Steer Loaders	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Pumps	77	77				0.50	74																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Bore/Drill Rigs	84	84				0.20	77																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	1	Skid Steer Loaders	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Reinforced Conc Structures	3	Cement and Mortar Mixers	85	90				0.40	86																		
Downstream Outlet Works Piping and Vault: Piping and Valves	1	Rollers	85	85	87	0.00	5070.00	0.20	78	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	185.00	76	0.00	1220.00	59	0.00	8300.00	43
Downstream Outlet Works Piping and Vault: Piping and Valves	3	Excavators	85	90				0.40	86																		
Downstream Outlet Works Piping and Vault: Piping and Valves	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Piping and Valves	1	Welders	73	73				0.40	69																		
Downstream Outlet Works Piping and Vault: Steel Casing	1	Rollers	85	85	87	0.00	5070.00	0.20	78	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	185.00	76	0.00	1220.00	59	0.00	8300.00	43
Downstream Outlet Works Piping and Vault: Steel Casing	3	Excavators	85	90				0.40	86																		
Downstream Outlet Works Piping and Vault: Steel Casing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Steel Casing	1	Welders	73	73				0.40	69																		
Downstream Outlet Works Piping and Vault: Ladders and Platforms	1	Forklifts	85	85	82	0.00	5070.00	0.20	78	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	38	0.00	185.00	71	0.00	1220.00	54	0.00	8300.00	38
Downstream Outlet Works Piping and Vault: Ladders and Platforms	1	Cranes	88	88				0.16	80																		
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	1	Excavators	85	85	83	0.00	5070.00	0.40	81	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	185.00	72	0.00	1220.00	55	0.00	8300.00	39
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: Dam keeper Residence Water Supply System and Piping	1	Plate Compactors	82	82				0.20	75																		
Downstream Outlet Works Piping and Vault: Dewatering	1	Generator Sets	82	82	79	0.00	5070.00	0.50	79	39	0.00	9785.00	33	0.00	9035.00	34	0.00	7640.00	35	0.00	185.00	68	0.00	1220.00	51	0.00	8300.00	35
Downstream Outlet Works Piping and Vault: ARVs and Valves	1	Excavators	85	85	83	0.00	5070.00	0.40	81	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	185.00	72	0.00	1220.00	55	0.00	8300.00	39
Downstream Outlet Works Piping and Vault: ARVs and Valves	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Outlet Works Piping and Vault: ARVs and Valves	1	Plate Compactors	82	82				0.20	75																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	1	Excavators	85	85	85	0.00	5070.00	0.40	81	45	0.00	9785.00	39	0.00	9035.00	40	0.00	7640.00	41	0.00	490.00	65	0.00	855.00	60	0.00	8300.00	41
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Structure Excavation	2	Off-Highway Trucks	84	87				0.40	83																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Cranes	88	88	88	0.00	5070.00	0.16	80	47	0.00	9785.00	42	0.00	9035.00	42	0.00	7640.00	44	0.00	490.00	68	0.00	855.00	63	0.00	8300.00	43
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Forklifts	85	85				0.20	78																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Generator Sets	82	82				0.50	79																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Skid Steer Loaders	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Pumps	77	77				0.50	74																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Bore/Drill Rigs	84	84				0.20	77																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Skid Steer Loaders	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Concrete Walkway	1	Cement and Mortar Mixers	85	85				0.40	81																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	2	Cranes	88	91	87	0.00	5070.00	0.16	83	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	490.00	67	0.00	855.00	62	0.00	8300.00	43
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	1	Forklifts	85	85				0.20	78																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	1	Generator Sets	82	82				0.50	79																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	1	Forklifts	85	85				0.20	78																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Bridge	1	Cranes	88	88				0.16	80																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	1	Graders	85	85	88	0.00	5070.00	0.40	81	48	0.00	9785.00	42	0.00	9035.00	43	0.00	7640.00	44	0.00	490.00	68	0.00	855.00	63	0.00	8300.00	44
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	3	Scrapers	85	90				0.40	86																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Roadway Excavation	1	Rubber Tired Dozers	85	85				0.40	81																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	2	Bore/Drill Rigs	84	87		0.00	5070.00	0.20	80	50	0.00	9785.00	44	0.00	9035.00	44	0.00	7640.00	46	0.00	490.00	70	0.00	855.00	65	0.00	8300.00	45
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	1	Skid Steer Loaders	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Slope Anchors	1	Forklifts	85	85				0.20	78																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	2	Bore/Drill Rigs	84	87	89	0.00	5070.00	0.20	80	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	490.00	69	0.00	855.00	64	0.00	8300.00	44
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Forklifts	85	85				0.20	78																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Excavators	85	85				0.40	81																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Pumps	77	77				0.50	74																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Air Compressors	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Pedestrian Access Walkway, Stairs, Catwalk, Vehicle Ramp: Tie Back Wall	2	Cement and Mortar Mixers	85	88				0.40	84																		
Spillway Site Excavations	1	Excavators	85	85	89	0.00	5070.00	0.40	81	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	800.00	65	0.00	600.00	67	0.00	8300.00	45
Spillway Site Excavations	1	Excavators	85	85				0.40	81																		
Spillway Site Excavations	4	Off-Highway Trucks	84	90				0.40	86																		
Spillway Site Excavations	1	Rubber Tired Dozers	85	85				0.40	81																		
Rock Slope Stabilization	2	Bore/Drill Rigs	84	87	89	0.00	5070.00	0.20	80	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	800.00	65	0.00	600.00	67	0.00	8300.00	44
Rock Slope Stabilization	1	Skid Steer Loaders	80	80				0.40	76																		
Rock Slope Stabilization	1	Forklifts	85	85				0.20	78																		
Rock Slope Stabilization	1	Excavators	85	85				0.40	81																		
Rock Slope Stabilization	1	Pumps	77	77				0.50	74																		
Rock Slope Stabilization	1	Air Compressors	80	80				0.40	76																		
Rock Slope Stabilization	1	Bore/Drill Rigs	84	84				0.20	77																		
Rock Slope Stabilization	2	Cement and Mortar Mixers	85	88				0.40	84																		
Rock Slope Stabilization	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
RCC Weir Support Block	1	Bore/Drill Rigs	84	84	93	0.00	5070.00	0.20	77	53	0.00	9785.00	47	0.00	9035.00	48	0.00	7640.00	49	0.00	800.00	69	0.00	600.00	71	0.00	8300.00	48
RCC Weir Support Block	3	Pumps	77	82				0.50	79																		
RCC Weir Support Block	1	Plate Compactors	82	82				0.20	75																		
RCC Weir Support Block	1	Cranes	88	88				0.16	80																		
RCC Weir Support Block	4	Generator Sets	82	88				0.50	85																		
RCC Weir Support Block	3	Tractors/Loaders/Backhoes	80	85				0.40	81																		
RCC Weir Support Block	3	Pumps	77	82				0.50	79																		
RCC Weir Support Block	3	Rollers	85	90				0.20	83																		
RCC Weir Support Block	3	Rubber Tired Dozers	85	90				0.40	86																		
RCC Weir Support Block	5	Off-Highway Trucks	84	91				0.40	87																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	1	Bore/Drill Rigs	84	84	93	0.00	5070.00	0.20	77	53	0.00	9785.00	47	0.00	9035.00	48	0.00	7640.00	49	0.00	340.00	76	0.00	1000.00	67	0.00	8300.00	48
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	3	Pumps	77	82				0.50	79																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	1	Plate Compactors	82	82				0.20	75																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	4	Generator Sets	82	88				0.50	85																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	3	Tractors/Loaders/Backhoes	80	85				0.40	81																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	3	Pumps	77	82				0.50	79																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	3	Rollers	85	90				0.20	83																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	3	Rubber Tired Dozers	85	90				0.40	86																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	1	Cranes	88	88				0.16	80																		
Side Channel Control Structure (Zone A): Ogee Weir RCC 7 days per week	5	Off-Highway Trucks	84	91				0.40	87																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	44	0.00	9035.00	44	0.00	7640.00	46	0.00	340.00	73	0.00	1000.00	63	0.00	8300.00	45
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	1	Pumps	77	77				0.50	74																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	2	Cranes	88	91				0.16	83																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	2	Rough Terrain Forklifts	85	88				0.20	81																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	2	Generator Sets	82	85				0.50	82																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	1	Bore/Drill Rigs	84	84				0.20	77																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	2	Cement and Mortar Mixers	85	88				0.40	84																		
Side Channel Control Structure (Zone A): Ogee Weir concrete Overlay - CVC	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	2	Surfacing Equipment	76	79	88	0.00	5070.00	0.40	75	48	0.00	9785.00	43	0.00	9035.00	43	0.00	7640.00	45	0.00	340.00	72	0.00	1000.00	62	0.00	8300.00	44
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	1	Pumps	77	77				0.50	74																		
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	2	Cranes	88	91				0.16	83																		
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	2	Rough Terrain Forklifts	85	88				0.20	81																		
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	2	Generator Sets	82	85				0.50	82																		
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	2	Bore/Drill Rigs	84	87				0.20	80																		
Side Channel Control Structure (Zone A): Side Channel Reinforced Concrete	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	1	Skid Steer Loaders	80	80	86	0.00	5070.00	0.40	76	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	340.00	69	0.00	930.00	61	0.00	8300.00	42
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	1	Pumps	77	77				0.50	74																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	2	Cement and Mortar Mixers	85	88				0.40	84																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): CLSM Backfill	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	2	Excavators	85	88	89	0.00	5070.00	0.40	84	48	0.00	9785.00	43	0.00	9035.00	43	0.00	7640.00	45	0.00	340.00	72	0.00	930.00	63	0.00	8300.00	44

						Receptor 1 - Irvine Regional Park					Receptor 2 - Residences Along Jamboree Road			Receptor 3 - Oak Canyon Park			Receptor 4 - Lakeview Park Camping Area			Receptor 5 - Sensitive Bird Species South of Dam			Receptor 6 - Sensitive Bird Species North of the Dam			Receptor 7 - Sensitive Bird Species Near Primary Staging Area		
Phase Name	Number per Day	Equipment Type	Typical Noise Level 50 ft from Source, dBA	Noise Level 50 ft Multiple Equipment, dBA	Construction Phase Noise Level, dBA	Hard/Soft	Distance	Utilization	Noise Level with Utilization	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	3	Off-Highway Trucks	84	89				0.40	85																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	1	Rubber Tired Dozers	85	85				0.40	81																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17)\: Work Platform Construction	1	Plate Compactors	82	82				0.20	75																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Pumps	77	77	86	0.00	5070.00	0.50	74	45	0.00	9785.00	40	0.00	9035.00	40	0.00	7640.00	42	0.00	340.00	69	0.00	930.00	60	0.00	8300.00	41
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Air Compressors	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Temp Shotcrete Facing	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	340.00	72	0.00	930.00	64	0.00	8300.00	45
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Pumps	77	77				0.50	74																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Cranes	88	91				0.16	83																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Generator Sets	82	85				0.50	82																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	2	Bore/Drill Rigs	84	87	85	0.00	5070.00	0.20	80	45	0.00	9785.00	39	0.00	9035.00	40	0.00	7640.00	42	0.00	340.00	69	0.00	930.00	60	0.00	8300.00	41
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	1	Forklifts	85	85				0.20	78																		
Wall Type 1 Tieback Wall Left (0+27 to 2+17): Post Tensioned Rock Anchors	1	Excavators	85	85				0.40	81																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	1	Skid Steer Loaders	80	80	88	0.00	5070.00	0.40	76	48	0.00	9785.00	43	0.00	9035.00	43	0.00	7640.00	45	0.00	340.00	72	0.00	930.00	63	0.00	8300.00	44
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	1	Pumps	77	77				0.50	74																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): CLSM Backfill	4	Cement and Mortar Mixers	85	91				0.40	87																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	2	Excavators	85	88	89	0.00	5070.00	0.40	84	48	0.00	9785.00	43	0.00	9035.00	43	0.00	7640.00	45	0.00	340.00	72	0.00	930.00	63	0.00	8300.00	44
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	3	Off-Highway Trucks	84	89				0.40	85																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	1	Rubber Tired Dozers	85	85				0.40	81																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17) Work Platform Construction	1	Plate Compactors	82	82				0.20	75																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Pumps	77	77	86	0.00	5070.00	0.50	74	45	0.00	9785.00	40	0.00	9035.00	40	0.00	7640.00	42	0.00	340.00	69	0.00	930.00	60	0.00	8300.00	41
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Air Compressors	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Temp Shotcrete Facing	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	340.00	72	0.00	930.00	64	0.00	8300.00	45
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Pumps	77	77				0.50	74																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Cranes	88	91				0.16	83																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	2	Generator Sets	82	85				0.50	82																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Permanent Reinforced Concrete Facing	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	2	Bore/Drill Rigs	84	87	85	0.00	5070.00	0.20	80	45	0.00	9785.00	39	0.00	9035.00	40	0.00	7640.00	42	0.00	340.00	69	0.00	930.00	60	0.00	8300.00	41
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	1	Forklifts	85	85				0.20	78																		
Wall Type 1 Tieback Wall Right (0+27 to 2+17): Post Tensioned Rock Anchors	1	Excavators	85	85				0.40	81																		
Wall Transitions: Left Secant Pile Walls	1	Excavators	85	85	89	0.00	5070.00	0.40	81	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	46	0.00	600.00	68	0.00	760.00	66	0.00	8300.00	45
Wall Transitions: Left Secant Pile Walls	1	Cranes	88	88				0.16	80																		
Wall Transitions: Left Secant Pile Walls	1	Excavators	85	85				0.40	81																		
Wall Transitions: Left Secant Pile Walls	1	Forklifts	85	85				0.20	78																		
Wall Transitions: Left Secant Pile Walls	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Transitions: Left Secant Pile Walls	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Transitions: Left Secant Pile Walls	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Transitions: Left Secant Pile Walls	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Transitions: Left Secant Pile Walls	2	Cement and Mortar Mixers	85	88				0.40	84																		
Wall Transitions: Right Secant Pile Wall	2	Excavators	85	88	89	0.00	5070.00	0.40	84	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	46	0.00	600.00	68	0.00	760.00	66	0.00	8300.00	45
Wall Transitions: Right Secant Pile Wall	1	Cranes	88	88				0.16	80																		
Wall Transitions: Right Secant Pile Wall	1	Forklifts	85	85				0.20	78																		
Wall Transitions: Right Secant Pile Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Transitions: Right Secant Pile Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Transitions: Right Secant Pile Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Transitions: Right Secant Pile Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Transitions: Right Secant Pile Wall	2	Cement and Mortar Mixers	85	88				0.40	84																		
Right Closure Wall: Work Platform Construction	1	Excavators	85	85	87	0.00	5070.00	0.40	81	47	0.00	9785.00	41	0.00	9035.00	42	0.00	7640.00	43	0.00	600.00	65	0.00	760.00	63	0.00	8300.00	42
Right Closure Wall: Work Platform Construction	2	Off-Highway Trucks	84	87				0.40	83																		
Right Closure Wall: Work Platform Construction	1	Rubber Tired Dozers	85	85				0.40	81																		
Right Closure Wall: Work Platform Construction	1	Plate Compactors	82	82				0.20	75																		
Right Closure Wall: Secant Pile Wall	1	Excavators	85	85	89	0.00	5070.00	0.40	81	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	46	0.00	600.00	68	0.00	760.00	66	0.00	8300.00	45
Right Closure Wall: Secant Pile Wall	1	Cranes	88	88				0.16	80																		
Right Closure Wall: Secant Pile Wall	1	Excavators	85	85				0.40	81																		
Right Closure Wall: Secant Pile Wall	1	Forklifts	85	85				0.20	78																		
Right Closure Wall: Secant Pile Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Right Closure Wall: Secant Pile Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Right Closure Wall: Secant Pile Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Right Closure Wall: Secant Pile Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Right Closure Wall: Secant Pile Wall	2	Cement and Mortar Mixers	85	88				0.40	84																		
Right Closure Wall: Backfill Concrete	1	Skid Steer Loaders	80	80	88	0.00	5070.00	0.40	76	47	0.00	9785.00	42	0.00	9035.00	42	0.00	7640.00	44	0.00	600.00	66	0.00	760.00	64	0.00	8300.00	43
Right Closure Wall: Backfill Concrete	1	Pumps	77	77				0.50	74																		
Right Closure Wall: Backfill Concrete	1	Bore/Drill Rigs	84	84				0.20	77																		
Right Closure Wall: Backfill Concrete	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Right Closure Wall: Backfill Concrete	1	Skid Steer Loaders	80	80				0.40	76																		
Right Closure Wall: Backfill Concrete	3	Cement and Mortar Mixers	85	90				0.40	86																		
Wall Type 2 - Left: Leveling Concrete	1	Skid Steer Loaders	80	80	86	0.00	5070.00	0.40	76	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	600.00	65	0.00	765.00	62	0.00	8300.00	42
Wall Type 2 - Left: Leveling Concrete	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Left: Leveling Concrete	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Left: Leveling Concrete	2	Cement and Mortar Mixers	85	88				0.40	84																		
Wall Type 2 - Left: Leveling Concrete	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Left: 1 Inch Concrete Wall	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Left: 1 Inch Concrete Wall	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Left: 1 Inch Concrete Wall	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Left: 1 Inch Concrete Wall	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Left: 1 Inch Concrete Wall	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Left: 1 Inch Concrete Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Left: 1 Inch Concrete Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Left: 1 Inch Concrete Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Left: 1 Inch Concrete Wall	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	48	0.00	9785.00	43	0.00	9035.00	43	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	44
Wall Type 2 - Left: 2.5 Inch Concrete Wall	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	1	Generator Sets	82	82				0.50	79																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Left: 2.5 Inch Concrete Wall	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Left: Concrete Footing	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Left: Concrete Footing	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Left: Concrete Footing	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Left: Concrete Footing	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Left: Concrete Footing	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Left: Concrete Footing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Left: Concrete Footing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		

						Receptor 1 - Irvine Regional Park					Receptor 2 - Residences Along Jamboree Road			Receptor 3 - Oak Canyon Park			Receptor 4 - Lakeview Park Camping Area			Receptor 5 - Sensitive Bird Species South of Dam			Receptor 6 - Sensitive Bird Species North of the Dam			Receptor 7 - Sensitive Bird Species Near Primary Staging Area		
Phase Name	Number per Day	Equipment Type	Typical Noise Level 50 ft from Source, dBA	Noise Level 50 ft Multiple Equipment, dBA	Construction Phase Noise Level, dBA	Hard/Soft	Distance	Utilization	Noise Level with Utilization	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level
Wall Type 2 - Left: Concrete Footing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Left: Concrete Footing	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Left: Backfill	1	Graders	85	85	90	0.00	5070.00	0.40	81	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	600.00	68	0.00	765.00	66	0.00	8300.00	46
Wall Type 2 - Left: Backfill	1	Excavators	85	85				0.40	81																		
Wall Type 2 - Left: Backfill	2	Rollers	85	88				0.20	81																		
Wall Type 2 - Left: Backfill	5	Off-Highway Trucks	84	91				0.40	87																		
Wall Type 2 - Left: Backfill	1	Off-Highway Trucks	84	84				0.40	80																		
Wall Type 2 - Left: Reinforced Concrete Wall	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Left: Reinforced Concrete Wall	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Left: Reinforced Concrete Wall	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Left: Reinforced Concrete Wall	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Left: Reinforced Concrete Wall	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Left: Reinforced Concrete Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Left: Reinforced Concrete Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Left: Reinforced Concrete Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Left: Reinforced Concrete Wall	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Left: Footing Rock Anchors and Backfill	2	Bore/Drill Rigs	84	87	91	0.00	5070.00	0.20	80	51	0.00	9785.00	45	0.00	9035.00	46	0.00	7640.00	47	0.00	600.00	69	0.00	765.00	67	0.00	8300.00	46
Wall Type 2 - Left: Footing Rock Anchors and Backfill	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Left: Footing Rock Anchors and Backfill	1	Forklifts	85	85				0.20	78																		
Wall Type 2 - Left: Footing Rock Anchors and Backfill	1	Graders	85	85				0.40	81																		
Wall Type 2 - Left: Footing Rock Anchors and Backfill	1	Excavators	85	85				0.40	81																		
Wall Type 2 - Left: Footing Rock Anchors and Backfill	2	Rollers	85	88				0.20	81																		
Wall Type 2 - Left: Footing Rock Anchors and Backfill	6	Off-Highway Trucks	84	92				0.40	88																		
Wall Type 2 - Wall Right: Leveling Concrete	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Wall Right: Leveling Concrete	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Wall Right: Leveling Concrete	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Wall Right: Leveling Concrete	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Wall Right: Leveling Concrete	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Wall Right: Leveling Concrete	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Wall Right: Leveling Concrete	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Wall Right: Leveling Concrete	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Wall Right: Leveling Concrete	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Wall Right: 1 Inch Wall	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Wall Right: 1 Inch Wall	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Wall Right: 1 Inch Wall	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Wall Right: 1 Inch Wall	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Wall Right: 1 Inch Wall	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Wall Right: 1 Inch Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Wall Right: 1 Inch Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Wall Right: 1 Inch Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Wall Right: 1 Inch Wall	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Wall Right: 2.5 Inch Wall	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Wall Right: 2.5 Inch Wall	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Wall Right: Concrete Footing	2	Surfacing Equipment	76	79	89	0.00	5070.00	0.40	75	49	0.00	9785.00	43	0.00	9035.00	44	0.00	7640.00	45	0.00	600.00	67	0.00	765.00	65	0.00	8300.00	45
Wall Type 2 - Wall Right: Concrete Footing	1	Pumps	77	77				0.50	74																		
Wall Type 2 - Wall Right: Concrete Footing	2	Cranes	88	91				0.16	83																		
Wall Type 2 - Wall Right: Concrete Footing	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 2 - Wall Right: Concrete Footing	2	Generator Sets	82	85				0.50	82																		
Wall Type 2 - Wall Right: Concrete Footing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 2 - Wall Right: Concrete Footing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 2 - Wall Right: Concrete Footing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 2 - Wall Right: Concrete Footing	1	Cement and Mortar Mixers	85	85				0.40	81																		
Wall Type 2 - Wall Right: Backfill	1	Graders	85	85	90	0.00	5070.00	0.40	81	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	600.00	68	0.00	765.00	66	0.00	8300.00	46
Wall Type 2 - Wall Right: Backfill	1	Excavators	85	85				0.40	81																		
Wall Type 2 - Wall Right: Backfill	2	Rollers	85	88				0.20	81																		
Wall Type 2 - Wall Right: Backfill	6	Off-Highway Trucks	84	92				0.40	88																		
Wall Type 3 - Left: Roller Compacted Concrete	1	Bore/Drill Rigs	84	84	93	0.00	5070.00	0.20	77	53	0.00	9785.00	47	0.00	9035.00	48	0.00	7640.00	49	0.00	970.00	67	0.00	400.00	75	0.00	8300.00	48
Wall Type 3 - Left: Roller Compacted Concrete	3	Pumps	77	82				0.50	79																		
Wall Type 3 - Left: Roller Compacted Concrete	1	Plate Compactors	82	82				0.20	75																		
Wall Type 3 - Left: Roller Compacted Concrete	1	Cranes	88	88				0.16	80																		
Wall Type 3 - Left: Roller Compacted Concrete	4	Generator Sets	82	88				0.50	85																		
Wall Type 3 - Left: Roller Compacted Concrete	3	Tractors/Loaders/Backhoes	80	85				0.40	81																		
Wall Type 3 - Left: Roller Compacted Concrete	3	Pumps	77	82				0.50	79																		
Wall Type 3 - Left: Roller Compacted Concrete	3	Rollers	85	90				0.20	83																		
Wall Type 3 - Left: Roller Compacted Concrete	3	Rubber Tired Dozers	85	90				0.40	86																		
Wall Type 3 - Left: Roller Compacted Concrete	5	Off-Highway Trucks	84	91				0.40	87																		
Wall Type 3 - Left: CVC Facing	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	45	0.00	9035.00	45	0.00	7640.00	47	0.00	970.00	65	0.00	400.00	72	0.00	8300.00	46
Wall Type 3 - Left: CVC Facing	1	Pumps	77	77				0.50	74																		
Wall Type 3 - Left: CVC Facing	2	Cranes	88	91				0.16	83																		
Wall Type 3 - Left: CVC Facing	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 3 - Left: CVC Facing	2	Generator Sets	82	85				0.50	82																		
Wall Type 3 - Left: CVC Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 3 - Left: CVC Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 3 - Left: CVC Facing	5	Skid Steer Loaders	80	87				0.40	83																		
Wall Type 3 - Left: CVC Facing	2	Cement and Mortar Mixers	85	88				0.40	84																		
Wall Type 3 - Right: Roller Compacted Concrete	1	Bore/Drill Rigs	84	84	93	0.00	5070.00	0.20	77	53	0.00	9785.00	47	0.00	9035.00	48	0.00	7640.00	49	0.00	970.00	67	0.00	400.00	75	0.00	8300.00	48
Wall Type 3 - Right: Roller Compacted Concrete	3	Pumps	77	82				0.50	79																		
Wall Type 3 - Right: Roller Compacted Concrete	1	Plate Compactors	82	82				0.20	75																		
Wall Type 3 - Right: Roller Compacted Concrete	1	Cranes	88	88				0.16	80																		
Wall Type 3 - Right: Roller Compacted Concrete	4	Generator Sets	82	88				0.50	85																		
Wall Type 3 - Right: Roller Compacted Concrete	3	Tractors/Loaders/Backhoes	80	85				0.40	81																		
Wall Type 3 - Right: Roller Compacted Concrete	3	Pumps	77	82				0.50	79																		
Wall Type 3 - Right: Roller Compacted Concrete	3	Rollers	85	90				0.20	83																		
Wall Type 3 - Right: Roller Compacted Concrete	3	Rubber Tired Dozers	85	90				0.40	86																		
Wall Type 3 - Right: Roller Compacted Concrete	5	Off-Highway Trucks	84	91				0.40	87																		
Wall Type 3 - Right: CVC Facing	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	970.00	64	0.00	400.00	72	0.00	8300.00	45
Wall Type 3 - Right: CVC Facing	1	Pumps	77	77				0.50	74																		
Wall Type 3 - Right: CVC Facing	2	Cranes	88	91				0.16	83																		
Wall Type 3 - Right: CVC Facing	2	Rough Terrain Forklifts	85	88				0.20	81																		
Wall Type 3 - Right: CVC Facing	2	Generator Sets	82	85				0.50	82																		
Wall Type 3 - Right: CVC Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Wall Type 3 - Right: CVC Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Wall Type 3 - Right: CVC Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Wall Type 3 - Right: CVC Facing	2	Cement and Mortar Mixers	85	88				0.40	84																		
Wall Type 3 - Right: Backfill	1	Graders	85	85	90	0.00	5070.00	0.40	81	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	970.00	64	0.00	400.00	72	0.00	8300.00	46
Wall Type 3 - Right: Backfill	1	Excavators	85	85				0.40	81																		
Wall Type 3 - Right: Backfill	2	Rollers	85	88				0.20	81																		
Wall Type 3 - Right: Backfill	6	Off-Highway Trucks	84	92				0.40	88																		
Stilling Basin: RCC	1	Bore/Drill Rigs	84	84	93	0.00	5070.00	0.20	77	53	0.00	9785.00	47	0.00	9035.00	48	0.00	7640.00	49	0.00	970.00	67	0.00	400.00	75	0.00	8300.00	48
Stilling Basin: RCC	3	Pumps	77	82				0.50	79																		
Stilling Basin: RCC	1	Plate Compactors	82	82				0.20	75																		
Stilling Basin: RCC	1	Cranes	88	88				0.16	80																		
Stilling Basin: RCC	4	Generator Sets	82	88				0.50	85																		
Stilling Basin: RCC	3	Tractors/Loaders/Backhoes	80	85				0.40	81																		
Stilling Basin: RCC	3	Pumps	77	82				0.50	79																		
Stilling Basin: RCC	3	Rollers	85	90				0.20	83																		
Stilling Basin: RCC	3	Rubber Tired Dozers	85	90				0.40	86																		
Stilling Basin: RCC	5	Off-Highway Trucks	84	91				0.40	87																		
Stilling Basin: Upstream/Downstream CVC Facing	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	970.00	64	0.00	400.00	72	0.00	8300.00	45
Stilling Basin: Upstream/Downstream CVC Facing	1	Pumps	77	77				0.50	74																		
Stilling Basin: Upstream/Downstream CVC Facing	2	Cranes	88	91				0.16	83																		
Stilling Basin: Upstream/Downstream CVC Facing	2	Rough Terrain Forklifts	85	88				0.20	81																		

						Receptor 1 - Irvine Regional Park					Receptor 2 - Residences Along Jamboree Road			Receptor 3 - Oak Canyon Park			Receptor 4 - Lakeview Park Camping Area			Receptor 5 - Sensitive Bird Species South of Dam			Receptor 6 - Sensitive Bird Species North of the Dam			Receptor 7 - Sensitive Bird Species Near Primary Staging Area		
Phase Name	Number per Day	Equipment Type	Typical Noise Level 50 ft from Source, dBA	Noise Level 50 ft Multiple Equipment, dBA	Construction Phase Noise Level, dBA	Hard/Soft	Distance	Utilization	Noise Level with Utilization	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level
Stilling Basin: Upstream/Downstream CVC Facing	2	Generator Sets	82	85				0.50	82																		
Stilling Basin: Upstream/Downstream CVC Facing	1	Bore/Drill Rigs	84	84				0.20	77																		
Stilling Basin: Upstream/Downstream CVC Facing	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Stilling Basin: Upstream/Downstream CVC Facing	1	Skid Steer Loaders	80	80				0.40	76																		
Stilling Basin: Upstream/Downstream CVC Facing	2	Cement and Mortar Mixers	85	88				0.40	84																		
Stilling Basin: Basin Steps	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	970.00	64	0.00	400.00	72	0.00	8300.00	45
Stilling Basin: Basin Steps	1	Pumps	77	77				0.50	74																		
Stilling Basin: Basin Steps	2	Cranes	88	91				0.16	83																		
Stilling Basin: Basin Steps	2	Rough Terrain Forklifts	85	88				0.20	81																		
Stilling Basin: Basin Steps	2	Generator Sets	82	85				0.50	82																		
Stilling Basin: Basin Steps	1	Bore/Drill Rigs	84	84				0.20	77																		
Stilling Basin: Basin Steps	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Stilling Basin: Basin Steps	1	Skid Steer Loaders	80	80				0.40	76																		
Stilling Basin: Basin Steps	2	Cement and Mortar Mixers	85	88				0.40	84																		
Stilling Basin: Chute Blocks	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	970.00	64	0.00	400.00	72	0.00	8300.00	45
Stilling Basin: Chute Blocks	1	Pumps	77	77				0.50	74																		
Stilling Basin: Chute Blocks	2	Cranes	88	91				0.16	83																		
Stilling Basin: Chute Blocks	2	Rough Terrain Forklifts	85	88				0.20	81																		
Stilling Basin: Chute Blocks	2	Generator Sets	82	85				0.50	82																		
Stilling Basin: Chute Blocks	1	Bore/Drill Rigs	84	84				0.20	77																		
Stilling Basin: Chute Blocks	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Stilling Basin: Chute Blocks	1	Skid Steer Loaders	80	80				0.40	76																		
Stilling Basin: Chute Blocks	2	Cement and Mortar Mixers	85	88				0.40	84																		
Stilling Basin: Dentated Sill	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	46	0.00	970.00	64	0.00	400.00	72	0.00	8300.00	45
Stilling Basin: Dentated Sill	1	Pumps	77	77				0.50	74																		
Stilling Basin: Dentated Sill	2	Cranes	88	91				0.16	83																		
Stilling Basin: Dentated Sill	2	Rough Terrain Forklifts	85	88				0.20	81																		
Stilling Basin: Dentated Sill	2	Generator Sets	82	85				0.50	82																		
Stilling Basin: Dentated Sill	1	Bore/Drill Rigs	84	84				0.20	77																		
Stilling Basin: Dentated Sill	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Stilling Basin: Dentated Sill	1	Skid Steer Loaders	80	80				0.40	76																		
Stilling Basin: Dentated Sill	2	Cement and Mortar Mixers	85	88				0.40	84																		
Spillway Slab Construction: RCC Foundation Support Block	1	Bore/Drill Rigs	84	84	93	0.00	5070.00	0.20	77	53	0.00	9785.00	47	0.00	9035.00	48	0.00	7640.00	49	0.00	800.00	69	0.00	600.00	71	0.00	8300.00	48
Spillway Slab Construction: RCC Foundation Support Block	6	Pumps	77	85				0.50	82																		
Spillway Slab Construction: RCC Foundation Support Block	1	Plate Compactors	82	82				0.20	75																		
Spillway Slab Construction: RCC Foundation Support Block	1	Cranes	88	88				0.16	80																		
Spillway Slab Construction: RCC Foundation Support Block	4	Generator Sets	82	88				0.50	85																		
Spillway Slab Construction: RCC Foundation Support Block	3	Tractors/Loaders/Backhoes	80	85				0.40	81																		
Spillway Slab Construction: RCC Foundation Support Block	3	Rollers	85	90				0.20	83																		
Spillway Slab Construction: RCC Foundation Support Block	3	Rubber Tired Dozers	85	90				0.40	86																		
Spillway Slab Construction: RCC Foundation Support Block	5	Off-Highway Trucks	84	91				0.40	87																		
Spillway Slab Construction: Spillway Chute Slab	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	47	0.00	800.00	66	0.00	600.00	69	0.00	8300.00	46
Spillway Slab Construction: Spillway Chute Slab	1	Pumps	77	77				0.50	74																		
Spillway Slab Construction: Spillway Chute Slab	2	Cranes	88	91				0.16	83																		
Spillway Slab Construction: Spillway Chute Slab	2	Rough Terrain Forklifts	85	88				0.20	81																		
Spillway Slab Construction: Spillway Chute Slab	2	Generator Sets	82	85				0.50	82																		
Spillway Slab Construction: Spillway Chute Slab	1	Bore/Drill Rigs	84	84				0.20	77																		
Spillway Slab Construction: Spillway Chute Slab	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Spillway Slab Construction: Spillway Chute Slab	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Slab Construction: Spillway Chute Slab	3	Cement and Mortar Mixers	85	90				0.40	86																		
Spillway Slab Construction: Stilling Basin Slab	2	Surfacing Equipment	76	79	90	0.00	5070.00	0.40	75	50	0.00	9785.00	44	0.00	9035.00	45	0.00	7640.00	47	0.00	800.00	66	0.00	600.00	69	0.00	8300.00	46
Spillway Slab Construction: Stilling Basin Slab	1	Pumps	77	77				0.50	74																		
Spillway Slab Construction: Stilling Basin Slab	2	Cranes	88	91				0.16	83																		
Spillway Slab Construction: Stilling Basin Slab	2	Rough Terrain Forklifts	85	88				0.20	81																		
Spillway Slab Construction: Stilling Basin Slab	2	Generator Sets	82	85				0.50	82																		
Spillway Slab Construction: Stilling Basin Slab	1	Bore/Drill Rigs	84	84				0.20	77																		
Spillway Slab Construction: Stilling Basin Slab	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Spillway Slab Construction: Stilling Basin Slab	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Slab Construction: Stilling Basin Slab	3	Cement and Mortar Mixers	85	90				0.40	86																		
Spillway Slab Construction: Zone B	2	Bore/Drill Rigs	84	87	83	0.00	5070.00	0.20	80	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	800.00	59	0.00	600.00	62	0.00	8300.00	39
Spillway Slab Construction: Zone B	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Slab Construction: Zone B	1	Forklifts	85	85				0.20	78																		
Spillway Slab Construction: Zone C	2	Bore/Drill Rigs	84	87	83	0.00	5070.00	0.20	80	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	800.00	59	0.00	600.00	62	0.00	8300.00	39
Spillway Slab Construction: Zone C	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Slab Construction: Zone C	1	Forklifts	85	85				0.20	78																		
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	800.00	58	0.00	600.00	61	0.00	8300.00	38
Spillway Drains and Cleanouts: Wall Drains & Cleanouts	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	800.00	58	0.00	600.00	61	0.00	8300.00	38
Spillway Drains and Cleanouts: Longitudinal Drains & Cleanouts	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	800.00	58	0.00	600.00	61	0.00	8300.00	38
Spillway Drains and Cleanouts: Transverse Drains & Cleanouts	1	Skid Steer Loaders	80	80				0.40	76																		
Spillway Drains and Cleanouts: Drain Gravel	1	Tractors/Loaders/Backhoes	80	80	84	0.00	5070.00	0.40	76	44	0.00	9785.00	38	0.00	9035.00	39	0.00	7640.00	41	0.00	800.00	60	0.00	600.00	63	0.00	8300.00	40
Spillway Drains and Cleanouts: Drain Gravel	1	Rubber Tired Dozers	85	85				0.40	81																		
Spillway Drains and Cleanouts: Drain Gravel	1	Off-Highway Trucks	84	84				0.40	80																		
Spillway Drains and Cleanouts: Filter Sand	1	Tractors/Loaders/Backhoes	80	80	84	0.00	5070.00	0.40	76	44	0.00	9785.00	38	0.00	9035.00	39	0.00	7640.00	41	0.00	800.00	60	0.00	580.00	63	0.00	8300.00	40
Spillway Drains and Cleanouts: Filter Sand	1	Rubber Tired Dozers	85	85				0.40	81																		
Spillway Drains and Cleanouts: Filter Sand	1	Off-Highway Trucks	84	84				0.40	80																		
Surface Ditch from Landfill: Excavation	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	870.00	57	0.00	580.00	61	0.00	8300.00	38
Surface Ditch from Landfill: Excavation	1	Skid Steer Loaders	80	80				0.40	76																		
Surface Ditch from Landfill: Drop Structures	1	Excavators	85	85	82	0.00	5070.00	0.40	81	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	870.00	57	0.00	580.00	61	0.00	8300.00	38
Surface Ditch from Landfill: Drop Structures	1	Skid Steer Loaders	80	80				0.40	76																		
Surface Ditch from Landfill: Ditch Lining	1	Excavators	85	85	86	0.00	5070.00	0.40	81	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	870.00	61	0.00	580.00	64	0.00	8300.00	41
Surface Ditch from Landfill: Ditch Lining	1	Skid Steer Loaders	80	80				0.40	76																		
Surface Ditch from Landfill: Ditch Lining	1	Cranes	88	88				0.16	80																		
Surface Ditch from Landfill: Ditch Lining	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Surface Ditch from Landfill: Ditch Lining	1	Forklifts	85	85				0.20	78																		
Downstream Apron: Concrete Apron	1	Forklifts	85	85	88	0.00	5070.00	0.20	78	47	0.00	9785.00	42	0.00	9035.00	42	0.00	7640.00	44	0.00	1300.00	59	0.00	150.00	78	0.00	8300.00	43
Downstream Apron: Concrete Apron	1	Generator Sets	82	82				0.50	79																		
Downstream Apron: Concrete Apron	1	Skid Steer Loaders	80	80				0.40	76																		
Downstream Apron: Concrete Apron	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Apron: Concrete Apron	1	Skid Steer Loaders	80	80				0.40	76																		
Downstream Apron: Concrete Apron	1	Cement and Mortar Mixers	85	85				0.40	81																		
Downstream Apron: Concrete Apron	1	Cranes	88	88				0.16	80																		
Downstream Apron: Concrete Apron	1	Pumps	77	77				0.50	74																		
Downstream Apron: Concrete Apron	1	Bore/Drill Rigs	84	84				0.20	77																		
Downstream Apron: Zone C	2	Bore/Drill Rigs	84	87	83	0.00	5070.00	0.20	80	43	0.00	9785.00	37	0.00	9035.00	38	0.00	7640.00	39	0.00	1300.00	55	0.00	150.00	74	0.00	8300.00	39
Downstream Apron: Zone C	1	Skid Steer Loaders	80	80				0.40	76																		
Downstream Apron: Zone C	1	Forklifts	85	85				0.20	78																		
Downstream Apron: Riprap Apron	1	Excavators	85	85	86	0.00	5070.00	0.40	81	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	1300.00	57	0.00	150.00	76	0.00	8300.00	41
Downstream Apron: Riprap Apron	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Apron: Riprap Apron	2	Dumpers/Tenders	84	87				0.40	83																		
Downstream Apron: Riprap Bedding	1	Excavators	85	85	86	0.00	5070.00	0.40	81	46	0.00	9785.00	40	0.00	9035.00	41	0.00	7640.00	42	0.00	1300.00	57	0.00	150.00	76	0.00	8300.00	41
Downstream Apron: Riprap Bedding	1	Tractors/Loaders/Backhoes	80	80				0.40	76																		
Downstream Apron: Riprap Bedding	2	Dumpers/Tenders	84	87				0.40	83																		
Furnish and Install Electrical / Controls and Instrumentation	1	Forklifts	85	85	84	0.00	5070.00	0.20	78	43	0.00	9785.00	38	0.00	9035.00	38	0.00	7640.00	40	0.00	620.00	62	0.00	715.00	61	0.00	8300.00	39
Furnish and Install Electrical / Controls and Instrumentation	1	Skid Steer Loaders	80	80				0.40	76																		
Furnish and Install Electrical / Controls and Instrumentation	1	Excavators	85	85				0.40	81																		
Furnish and Install Aeration System	1	Forklifts	85	85	84	0.00	5070.00	0.20	78	43	0.00	9785.00	38	0.00	9035.00	38	0.00	7640.00	40	0.00	320.00	67	0.00	1330.00	55	0.00	8300.00	39
Furnish and Install Aeration System	1	Skid Steer Loaders	80	80				0.40	76																		
Furnish and Install Aeration System	1	Excavators	85	85				0.40	81																		
Part 1 Furnish and Install Erosion Control Measures	1	Skid Steer Loaders	80	80	82	0.00	5070.00	0.40	76	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	775.00	58	0.00	600.00	61	0.00	8300.00	38
Part 1 Furnish and Install Erosion Control Measures	1	Excavators	85	85				0.40	81																		
Part 2 Furnish and Install Erosion Control Measures	1	Skid Steer Loaders	80	80	82	0.00	5070.00	0.40	76	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	775.00	58	0.00	600.00	61	0.00	8300.00	38
Part 2 Furnish and Install Erosion Control Measures	1	Excavators	85	85				0.40	81																		
Part 3 Furnish and Install Erosion Control Measures	1	Skid Steer Loaders	80	80	82	0.00	5070.00	0.40	76	42	0.00	9785.00	36	0.00	9035.00	37	0.00	7640.00	39	0.00	775.00	58	0.00	600.00	61	0.00	8300.00	38
Part 3 Furnish and Install Erosion Control Measures	1	Excavators	85	85				0.40	81																		
Embankment Mitigation	4	Rubber Tired Dozers	85	91	92	0.00	5070.00	0.40	87	52	0.00	9785.00	46	0.00	9035.00	47	0.00	7640.00	49	0.00	775.00	68	0.00	600.00	71	0.00	8300.00	48
Embankment Mitigation	2	Excavators	85	88				0.40	84																		
Embankment Mitigation	2	Graders	85	88				0.40	84																		

						Receptor 1 - Irvine Regional Park					Receptor 2 - Residences Along Jamboree Road			Receptor 3 - Oak Canyon Park			Receptor 4 - Lakeview Park Camping Area			Receptor 5 - Sensitive Bird Species South of Dam			Receptor 6 - Sensitive Bird Species North of the Dam			Receptor 7 - Sensitive Bird Species Near Primary Staging Area		
Phase Name	Number per Day	Equipment Type	Typical Noise Level 50 ft from Source, dBA	Noise Level 50 ft Multiple Equipment, dBA	Construction Phase Noise Level, dBA	Hard/Soft	Distance	Utilization	Noise Level with Utilization	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level	Hard/Soft	Distance	Noise Level
Embankment Mitigation	2	Tractors/Loaders/Backhoes	80	83				0.40	79																			
Embankment Mitigation	4	Dumpers/Tenders	84	90				0.40	86																			
Embankment Mitigation	3	Plate Compactors	82	87				0.40	83																			
Note: A new phase was added to the Project. This phase includes the mitigated placement of the embankment. The type and amount of construction equipment that would be utilized during this new phase was obtained from the Applicant and the Project team.																												