DRAFT ENVIRONMENTAL IMPACT REPORT

SFPUC Alameda Creek Recapture Project

Volume 2

PLANNING DEPARTMENT
CASE NO. 2015-004827ENV
STATE CLEARINGHOUSE NO. 2015062072

SAN FRANCISCO PLANNING DEPARTMENT

Screencheck Administrative Draft	Draft EIR Publication Date:	November 30, 2016
	Draft EIR Public Hearing Date:	January 5, 2017
	Draft EIR Public Comment Period:	November 30, 2016 through January 17, 2017

Written comments should be sent to:
Lisa Gibson, Acting Environmental Review Officer | 1650 Mission Street, Suite 400 | San Francisco, CA 94103 or Lisa.Gibson@sfgov.org

DRAFT ENVIRONMENTAL IMPACT REPORT

SFPUC Alameda Creek Recapture Project

Volume 2

PLANNING DEPARTMENT
CASE NO. 2015-004827ENV
STATE CLEARINGHOUSE NO. 2015062072

Screencheck Administrative Draft	Draft EIR Publication Date:	November 30, 2016
	Draft EIR Public Hearing Date:	January 5, 2017
	Draft EIR Public Comment Period:	November 30, 2016 through January 17, 2017

Written comments should be sent to:
Lisa Gibson, Acting Environmental Review Officer | 1650 Mission Street, Suite 400 | San Francisco, CA 94103 or Lisa.Gibson@sfgov.org

SAN FRANCISCO
PLANNING
DEPARTMENT

VOLUME 2 – APPENDICES

This page intentionally left blank

APPENDIX NOP

Scoping Report and Notice of Preparation

This page intentionally left blank

San Francisco Public Utilities Commission

Alameda Creek Recapture Project
Environmental Impact Report

Final Scoping Report

September 2015

Prepared for the San Francisco Planning Department

Prepared by ESA

TABLE OF CONTENTS

San Francisco Public Utilities Commission Alameda Creek Recapture Project Environmental Impact Report Final Scoping Report

Page

List of Tables

Appendices

1.0 Introduction and Background

1.1 Introduction

The San Francisco Planning Department is the lead agency for implementation of California Environmental Quality Act (CEQA) requirements for all projects sponsored by the City and County of San Francisco (CCSF) or conducted within San Francisco. The San Francisco Planning Department is preparing an Environmental Impact Report (EIR) for the San Francisco Public Utilities Commission's (SFPUC's) proposed Alameda Creek Recapture Project (ACRP or proposed project). The EIR, which will assess the potential impacts of the project on the physical environment, is being prepared in accordance with CEQA. CEQA requires the preparation of an EIR when a proposed project could significantly affect the physical environment.

As part of the EIR process, the San Francisco Planning Department conducted a public scoping effort in June and July 2015, soliciting comments from interested parties, State and resource agencies, and the public to help determine the scope of the Draft EIR. This report describes the scoping process and summarizes the comments received during the scoping period.

1.2 Notice of Preparation

The San Francisco Planning Department published a Notice of Preparation (NOP) on June 24, 2015, announcing the preparation of the EIR for the project under CEQA (see **Appendix A**). The NOP summarized the project objectives and provided a description of the proposed project. The NOP also described the scoping process and included information on the public scoping meeting. The scoping process, notification procedures, and outcome of the scoping meeting are described below, following a brief description of the proposed project.

1.3 Alameda Creek Recapture Project

The SFPUC is proposing the ACRP on SFPUC Alameda watershed[1] lands in unincorporated Alameda County. The proposed project would recapture an annual average of up to 9,820 acre-feet per year (ac-ft/yr) (or 3,200 million gallons per year [mgal/yr]) of water that will be released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam during future operation of Calaveras Reservoir. Water would be recaptured from a quarry pit, Pit F2, in the Sunol Valley located approximately 6 miles downstream of Calaveras Reservoir and 0.5-mile south of the Interstate 680/State Route 84 interchange. The ACRP would recapture an amount of water equivalent to that which is released and/or bypassed. Proposed project components for recapture of the water from Pit F2 include pumps mounted on barges, pipelines extending from the pumps to shore; a new pipeline connecting to the existing Sunol Pump Station Pipeline; and ancillary facilities such as throttle valves, a flow meter, and electrical facilities. No work would occur in the bed, bank, or channel of Alameda Creek.

[1] The SFPUC Alameda watershed refers to CCSF-owned lands managed by the SFPUC as part of the SFPUC regional water system. The Alameda watershed lands are located within the much larger hydrologic boundary of the Alameda Creek watershed.

The City and County of San Francisco (CCSF), through the SFPUC, owns and operates a regional water supply conveyance, treatment, and distribution system that extends from the Sierra Nevada to San Francisco and serves drinking water to 2.6 million people in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The proposed ACRP is a component of the SFPUC's Water System Improvement Program (WSIP)[2]. The basic goals of the WSIP are to increase the reliability of the regional water system with respect to water quality, seismic response, delivery, and water supply to meet water delivery needs in the service area. A Program EIR (PEIR) for the WSIP was certified by the San Francisco Planning Commission and the WSIP was adopted by the SFPUC on October 30, 2008. The PEIR addresses the potential environmental impacts of the WSIP facility improvement projects at a programmatic level and evaluates the WSIP's water supply strategy at a project level of detail. Implementation of the proposed project would contribute to meeting the WSIP's overall goals and objectives. Specifically, the ACRP would assist the SFPUC in achieving the established WSIP level of service goals and objectives related to water supply during both nondrought and drought periods by increasing operational flexibility and avoiding the loss of yield to the regional system from the SFPUC Alameda watershed system that would otherwise result from future operations of Calaveras Reservoir.

2.0 Purpose of the Scoping Process

The purpose of the scoping process is to solicit input from the public, interested parties, and agencies with discretionary authority over the project on the appropriate scope, focus, and content of the Draft EIR. The San Francisco Planning Department will consider all of the input received during the scoping process in the preparation of the Draft EIR.

The Draft EIR will describe the existing environmental conditions of the area that could be affected by the proposed project and evaluate the potential effects of the project on the environment in accordance with CEQA. The comments provided by the public and agencies during scoping will help the San Francisco Planning Department identify pertinent issues, methods of analyses, and level of detail that should be addressed in the Draft EIR. The scoping comments will also provide input for development of a reasonable range of feasible alternatives to be evaluated in the Draft EIR.

The scoping comments will augment the information developed by the EIR project team, which includes specialists in each of the environmental subject areas covered in the EIR. This combined input will result in an EIR that is both comprehensive and responsive to issues raised by the public and regulatory agencies, and that meets CEQA requirements.

In addition to facilitating public and regulatory agency input on the scope and focus of the Draft EIR, scoping allows the San Francisco Planning Department to explain the EIR process to the public and to identify additional opportunities for public comment and public involvement during the EIR process.

3.0 Notification of Scoping

The scoping period began on June 24, 2015 with the issuance of the NOP. The San Francisco Planning Department held a scoping meeting on July 9, 2015 and accepted written comments through July 27,

[2] The Alameda Creek Recapture Project is listed in the WSIP PEIR under its former title of Alameda Creek Fishery Enhancement project.

2015. The following methods were used to notify agencies and the public about the availability of the NOP, the scoping meeting dates and locations, and details on the comment process:

- **Mailing List.** A mailing list was compiled, including approximately 600 contacts for federal, state, regional, and local agencies; federal, state, regional, and local elected officials; regional and local interest groups; member agencies of the Bay Area Water Supply and Conservation Agency; Sunol water account holders; adjacent water districts; information repositories; media contacts; and property owners and residents within 300 feet of the proposed project limits.
- **Notice of Preparation of an EIR and Notice of Public Scoping Meeting.** Copies of the NOP were distributed via certified mail to responsible and trustee agencies and 15 copies were delivered to the State Clearinghouse (See Appendix A for a copy of the NOP and NOP Notice of Availability). In addition, a notice of availability of the NOP was distributed via first-class mail to the entire mailing list (approximately 600 addressees):

  - ***Locations to obtain a copy of the NOP***. The NOP was posted to the San Francisco Planning Department's website (http://www.sf-planning.org/index.aspx?page=1829). A printed copy of the NOP was also provided to anyone who requested it from the San Francisco Planning Department.
  - ***Notice to entire mailing list***. Notifications of the scoping meeting, including information on the project EIR and the scoping process, and instructions on how to obtain a copy of the NOP and provide public comment were mailed to the entire project mailing list approximately two weeks prior to the scoping meeting.
  - ***Legal notices.*** Notices of the scoping meeting and information on how to obtain a copy of the NOP and provide public comment were placed in the legal classified section of the Valley Times, Argus, and Oakland Tribune on June 24, 2015.

Table 1 presents an itemized list of mailings.

TABLE 1
NUMBER OF RECIPIENTS ON MAILING LIST FOR NOP AND NOTICE OF SCOPING MEETING

Category	Number of NOP Recipients	Number of NOP Notice of Availability Recipients
Owners and Occupants	0	7
Wholesale Customers	3	45
SF Standard List	7	99
Other Interested Parties	7	245
Responsible and Trustee Agencies	7	9
Local and Bordering Jurisdictions	1	32
Media and Libraries	14	11
SFPUC Sunol Accounts	0	150
TOTAL	**39**	**598**

4.0 Scoping Meeting

The San Francisco Planning Department held a public scoping meeting on July 9, 2015 at the Sunol Glen School (11601 Main Street, Sunol), approximately two weeks after publication of the NOP. An informational open house was held prior to the formal scoping meeting. The objective of the scoping meeting was to solicit input from the public on potential environmental impacts of the proposed project, the appropriate scope of the EIR, potential mitigation measures, and potential alternatives to the proposed project.

The scoping meeting included presentations on the environmental review process and the proposed project, followed by a formal public comment period. Attendees interested in presenting verbal comments submitted speaker cards and were allowed to speak. The meeting concluded with closing remarks. **Appendix B** includes copies of the scoping meeting presentation, handouts, comment/speaker cards, and sign-in sheets.

The total attendance for the scoping meeting was 11 (based on the meeting sign-in sheets and excluding CCSF and EIR consultant staff). Meeting attendees primarily consisted of private citizens residing near the proposed project area. A total of 4 participants provided verbal comments at the meeting. The scoping meeting was recorded by a certified court reporter who provided a verbatim written transcript of the proceedings. The transcript can be found in **Appendix C** of this report.

5.0 Overview of Comments Received

Agencies and members of the public utilized several different methods of providing input: verbal comments during the scoping meeting, or written comments sent via U.S. mail, email and fax. **Table 2** lists the agencies, groups, and other individuals that provided written comments in response to the NOP. Table 3 lists individuals that commented at the scoping meeting, listed in alphabetical order by last name. The scoping meeting transcript is located in Appendix C. Copies of written comment letters and emails are located in **Appendix D**.

TABLE 2
INDEX OF WRITTEN COMMENTS

Comment Agency	Commenter
State Agencies	
S1	California Department of Conservation, Office of Mine Reclamation
S2	California Department of Transportation, District 4 (Caltrans)
S3	California Department of Water Resources, Division of Safety of Dams (DWR DSOD)
S4	San Francisco Bay Regional Water Quality Control Board (SF Bay RWQCB)
Local/Regional Agencies	
L1	Bay Area Water Supply and Conservation Agency (BAWSCA)
L2	Alameda County Water District (ACWD)
L3	Alameda County Flood Control and Water Conservation District, Zone 7 (Zone 7 Water Agency)
L4	North Coast County Water District
Groups	
G1	Alameda Creek Alliance (ACA)
G2	Save the Frogs
Individuals	
I1	Jim O'Laughlin

TABLE 3
INDEX OF VERBAL COMMENTS

Verbal Comment	Commenter	Affiliation (if applicable)
V1	Connie DeGrange	Sunol Resident
V2	Bob Foster	Sunol Resident
V3	Jeff Miller	Alameda Creek Alliance
V	Jim O'Laughlin	Sunol Resident

6.0 Summary of Comments by Subject Area

Table 4 provides a summary of scoping comments by commenter. For the full comments, please refer to Appendices C and D.

TABLE 4
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
Federal Agencies				
	No scoping comments received from Federal Agencies			
State Agencies				
S1	California Department of Conservation, Office of Mine Reclamation (Beth Hendrickson)	Page 1, paragraph 1 (email dated 7/20/15)	In accordance with the Surface Mining and Reclamation Act of 1975 the reclamation plan for SMP-24 will need to be amended to account for the proposed new end use.	• Project Description • Plans & Policies • Permits and Approvals
S2	Caltrans (Sherie George)	Page 1, paragraph 3.	Recommends coordinating with Caltrans if ACRP construction overlaps with construction of State Route 84–Niles Canyon Road Safety Improvements.	• Cumulative Projects • Transportation and Circulation
S2	Caltrans (Sherie George)	Page 2, paragraphs 1 and 2.	Describes criteria for determining whether preparation of a Transportation Impact Study (TIS) is required.	• Transportation and Circulation
S2	Caltrans (Sherie George)	Page 2, paragraphs 3.	Preparation of a TIS or Traffic Management Plan (TMP) may be required if project-related traffic restrictions or detours affect State highways.	• Transportation and Circulation
S2	Caltrans (Sherie George)	Page 2, paragraph 4.	Project work that requires movement of oversized or excessive load vehicles on State facilities requires a transportation permit.	• Transportation and Circulation
S2	Caltrans (Sherie George)	Pages 2 (last paragraph) to 3 (first partial paragraph)	An encroachment permit is required for any work or traffic control that encroaches the State ROW.	• Transportation and Circulation
S2	Caltrans (Sherie George)	Page 3, full paragraph.	The EIR should fully discuss the project's fair share contribution, financing, scheduling, and implementation responsibilities associated with planned improvements on the State ROW.	• Transportation and Circulation
S3	DWR DSOD (Roberto Cervantes)	Page 1, paragraphs 2 thru 4.	Describes criteria for dams under the DWR DSOD's jurisdiction and states that, as the project would not involve an aboveground barrier, the project would not be subject to DSOD jurisdiction.	• Permits and Approvals
S4	SF Bay RWQCB (Brian Wines)	Page 1, paragraph 2	The EIR should discuss/describe SFPUC's water rights to the water that infiltrates into Pit F2.	Water Rights
S4	SF Bay RWQCB	Page 2, paragraph 1	The EIR should evaluate the potential for the project to increase the	• Hydrology and Water Quality

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
	(Brian Wines)		regional rate of infiltration into the subsurface and quarry pits (i.e., losses) in the Sunol Valley, and associated effects on surface flows in and fish passage along Alameda Creek.	• Hydrology Appendix • Fishery Resources
Local/Regional Agencies				
L1	BAWSCA (Michael Hurley)	Page 1, paragraph 2	The EIR should confirm and/or update any information derived from the WSIP PEIR, as appropriate.	• Introduction and Background • Project Objectives (Project Description) • WSIP PEIR Consistency and Analysis and Mitigation Measures, Applicability to the Proposed Project
L1	BAWSCA (Michael Hurley)	Page 1, paragraph 3	The EIR should clarify the basis for the target recapture amount (9,820 afy) and demonstrate how the target amount satisfies WSIP level of service goals and objectives related to water supply during both non-drought and drought periods.	• Introduction and Background • Project Objectives (Project Description)
L1	BAWSCA (Michael Hurley)	Page 1, paragraph 4	The EIR should provide information to support the assumption that water quality in Pit F2 would be adequate and pretreatment would not be needed prior to conveying the water to the SVWTP or San Antonio Reservoir.	• Need for Pretreatment (Project Description)
L1	BAWSCA (Michael Hurley)	Page 2, paragraph 1	The EIR should provide information regarding the mechanism for infiltration of water into Pit F2 and any other means by which water enters/exits Pit F2 (evaporation/precipitation).	• Hydrology and Water Quality • Hydrology Appendix
L2	ACWD (Steven Inn)	Page 1, paragraph 3 thru page 2, end of 2nd full paragraph	Due to the timing and rate of releases/bypasses and recapture, during certain periods the ACRP may capture flows that are neither releases nor bypasses. Additional water originating from sources other than Calaveras Reservoir and the ACDD, such as Welch Creek, may be captured. Due to this mechanism of operations, it is difficult to define the ACRP as strictly a "recapture" facility.	• Operations (Project Description) • Hydrology and Water Quality • Hydrology Appendix

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
L2	ACWD (Steven Inn)	Page 2, 3rd full paragraph	The EIR should evaluate potential impacts to Alameda Creek, the Alameda Creek Watershed, and downstream agencies.	• Hydrology and Water Quality • Hydrology Appendix • Fishery Resources • Terrestrial Biological Resources
L2	ACWD (Steven Inn)	Page 2, 4th full paragraph thru 1st set of bullets on page 3 (Comment 1)	Surface water and groundwater interactions are complex and dynamic physical processes. Alameda System Daily Hydrologic Model (ASDHM) will need to be substantially modified to fully analyze the project's impacts on stream flow, subsurface flow, and groundwater. The EIR should describe the origin of the water that will be recaptured or pumped out of Pit F2 at various times of operation.	• Hydrology and Water Quality • Hydrology Appendix
L2	ACWD (Steven Inn)	Page 3, 2nd set of bullets (Comment 2)	The EIR should provide sufficient detail to analyze impacts associated with differing rates of release and recapture on: anadromous fish passage in Alameda Creek Flood Control Channel, Niles Canyon, and Sunol Valley; aquatic and riparian habitat in Niles Canyon and Sunol Valley; and ACWD groundwater recharge operations and water supply. The EIR should evaluate impacts separately for dry, average, and wet year conditions.	• Operations (Project Description) • Hydrology and Water Quality • Hydrology Appendix • Fishery Resources • Terrestrial Biological Resources
L2	ACWD (Steven Inn)	Page 3 (Comment 3)	The EIR should clarify the basis for the target recapture amount (9,820 afy) vs. the 6,300 afy identified for the Alameda Creek Fishery Enhancement project in the WSIP.	• Introduction and Background • Project Objectives (Project Description)
L2	ACWD (Steven Inn)	Page 3 (Comment 4)	The EIR should discuss/describe SFPUC's water rights to the water that infiltrates into Pit F2.	Water Rights
L2	ACWD (Steven Inn)	Page 4 (Comment 5)	The cumulative impact analysis should consider other projects being pursued by the Alameda Creek Fisheries Restoration Workgroup.	• Cumulative Projects
L2	ACWD (Steven Inn)	Page 4 (Comment 6)	The EIR should evaluate potential impacts to waters of the U.S. and permit requirements under the Clean Water Rule published on 6/29/15 in the Federal Register (80 FR 37054), and take into account the recent holding in the case Siskiyou County Farm Bureau v. Department of Fish and Wildlife C.D.O.S. 5632, No. C073735 (6/1/15).	• Permits and Approvals • Fishery Resources • Terrestrial Biological Resources

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
L2	ACWD (Steven Inn)	Page 4 (Comment 7)	The EIR should evaluate potential impacts to DWR South Bay Aqueduct.	• Utilities and Service Systems
L2	ACWD (Steven Inn)	Page 4 (Comment 8)	The commenter encourages the SFPUC to coordinate w/ACWD on the scoping and assessment of project alternatives, including operational alternatives of the proposed project.	• Alternatives Analysis
L3	Zone 7 Water Agency (Elke Rank)	Page 1, 1st bullet	The EIR should evaluate potential impacts on groundwater supplies as there will be water losses associated with the instream flow schedules (evapo-transpiration, surface water outflow, soil moisture and bank storage increases, and infiltration of stream flow to parts of the groundwater basin where it may become unrecoverable or non-beneficial).	• Hydrology and Water Quality • Hydrology Appendix
L3	Zone 7 Water Agency (Elke Rank)	Page 1, 2nd bullet	The EIR should require groundwater monitoring at key locations around the groundwater basin to ensure ACRP operations are not having an unacceptable impact on groundwater supplies.	• Project Description
L4	North Coast County Water District (Janice Zavala-Clark)		Mailing list correction RE General Manager at North Coast County Water District	N/A
Groups				
G1	ACA (Jeff Miller)	Page 1, paragraph 1	The SFPUC's current concept for the ACRP is an improvement over previous concepts that involved construction of infrastructure in the Alameda Creek channel.	• Opinion (Alternatives Analysis)
G1	ACA (Jeff Miller)	Page 1, paragraph 2	The EIR should describe the origin of the water that infiltrates into Pit F2, the hydrologic connections between the groundwater that infiltrates into Pit F2 and the Sunol Valley Groundwater Basin, and the hydrologic connections between this water and surface water in Alameda Creek above, adjacent to, and below the project reach. The project should evaluate impacts on surface flow in Alameda Creek through the Sunol Valley and downstream into Niles Canyon, and the associated impacts on fisheries and other aquatic resources through Niles Canyon.	• Hydrology and Water Quality • Hydrology Appendix • Fishery Resources • Terrestrial Biological Resources
G1	ACA (Jeff Miller)	Page 1, paragraph 3 through page 2	Recapture of summer flows released from Calaveras Reservoir that are intended to enhance rearing habitat in upper Alameda Creek would have no impact on trout rearing conditions or trout migration. However, recapturing the water that will be bypassed at the ACDD that is specifically intended to benefit upstream and downstream migration of adult and juvenile trout along the length of Alameda Creek from ACDD downstream	• Hydrology Appendix • Fishery Resources

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
			to the SF Bay is an issue. *"Yet the March 5, 2011 Biological Opinion ("BO") by the National Marine Fisheries Service for the Calaveras Dam Replacement Project explicitly anticipated (pp 49-52) that bypass flows at the Alameda Creek Diversion Dam would provide suitable migration conditions for steelhead trout from Alameda Creek below the ACDD all the way downstream through Niles Canyon and Lower Alameda Creek to San Francisco Bay. The BO stated (p 52) that "CDRP minimum flows from the southern watershed when combined with flows from the northern watershed (at the confluence with the Arroyo de la Laguna) through Niles Canyon are expected to provide suitable conditions for adult upstream migration and smolt downstream migration. These flows will arrive at the upstream end of the Alameda Creek Flood Control Channel and ACWD will provide bypass flows at their water diversion facilities for fish passage through the Flood Channel."*	
G2	Save the Frogs (Kerry Kriger)	Page 1, 2nd paragraph to top of page 2	The EIR should consider the project's contribution to cumulative impacts on stream-dwelling amphibians and aquatic reptiles together with the CDRP impacts to the same species.	• Hydrology Appendix • Terrestrial Biological Resources
G2	Save the Frogs (Kerry Kriger)	Page 2, 1st full paragraph	The commenter urges the SFPUC to uphold its Environmental Stewardship Policy. The EIR should evaluate impacts on the federally endangered foothill yellow-legged frog and western pond turtle (neither of which was identified in the NOP), as well as common amphibians.	• Hydrology Appendix • Terrestrial Biological Resources
G2	Save the Frogs (Kerry Kriger)	Page 3	The EIR should assess the potential for ACRP operations to lower groundwater levels and result in stream baseflow depletion in Alameda Creek at times of the year that are critical for amphibians, snakes, and turtles. The commenter is concerned that the ACRP's recapture rate may be out of sync with the timing of the bypasses and releases and result in the capture of water from other origins. The EIR should evaluate how the magnitude, timing, and duration of surface flows in lower San Antonio Creek and Alameda Creek may be changed by the proposed recapture of water.	• Hydrology Appendix • Terrestrial Biological Resources
G2	Save the Frogs (Kerry Kriger)	Page 4, 1st paragraph	The EIR should assess the potential for ACRP operations to lower groundwater levels and adversely affect Sycamore alluvial woodlands.	• Hydrology Appendix • Terrestrial Biological Resources
G2	Save the Frogs (Kerry Kriger)	Page 4, 2nd paragraph	The EIR should clarify the basis for the target recapture amount (9,820 afy) vs. the 6,300 afy identified for the Alameda Creek Fishery Enhancement project in the WSIP and provide additional information regarding how the water bypassed/released will coincide with the the water recaptured. Commenter expresses the opinion that evaluation of the proposed recapture separately from the evaluation of CDRP is piecemealing.	• Introduction and Background • Operations (Project Description)

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
G2	Save the Frogs (Kerry Kriger)	Page 5, Conclusion	The EIR should: *"(1) describe in detail the flow paths of water that recharge the groundwater basin and provide summer baseflows to San Antonio Creek and Alameda Creek;* *(2) quantify what percent of bypass and release flows will actually enter the groundwater and clearly illustrate whether this project is truly recapturing flows or simply mining groundwater in excess of amounts released and bypassed;* *(3) evaluate the impacts of groundwater extraction on riparian flora and fauna under various climate change scenarios which may exacerbate fluctuations between series of extremely wet and extremely dry years; and* *(4) detail the likely impacts on amphibians and reptiles, as described above. Because the dynamic interactions among surface water, ground water, and rock moisture are extremely complex, we would like to see direct observations and controlled physical tests made to trace water sources and address our questions about impacts on in-stream flow conditions."*	• Hydrology and Water Quality • Hydrology Appendix • Fishery Resources • Terrestrial Biological Resources
Individuals				
I1	Jim O'Laughlin	Page 1, paragraph 3	Commenter expresses opinion that the project is not needed; SFPUC has other more substantive water supply sources.	• Project purpose and need (Project Description)
I1	Jim O'Laughlin	Page 1, paragraph 4	Commenter suggests that SFPUC should shift their focus to improving watershed management to better utilize water resources.	N/A - opinion
I1	Jim O'Laughlin	Page 1, paragraph 5	Commenter suggests that SFPUC operate the ACRP to recapture water during wet periods (as opposed to dry periods).	• Operations (Project Description)
I1	Jim O'Laughlin	Page 2, paragraph 1	Commenter asks if the CDRP instream flow schedules will support restoration of steelhead in the watershed.	• Relationship to CDRP (Introduction and Background)
I1	Jim O'Laughlin	Page 2, paragraph 2	The EIR should evaluate the potential for the ACRP to adversely affect groundwater levels in the Sunol Valley.	• Hydrology and Water Quality • Hydrology Appendix
I1	Jim O'Laughlin	Page 2, paragraph 3	The EIR should consider options for improving the visual quality of Pit F2.	• Aesthetics
I1	Jim O'Laughlin	Page 2, bullets	*"- What is the cost of the project?* *- How much electricity be used and what would it cost?* *- Does the existing Pump Station Pipeline take water out of the South Bay Aquaduct ? How*	• Project Description • Utilities and Service Systems • Permits and Approvals

	Commenter	Page, Paragraph	Summary of Comment	CEQA Subject Area(s)
			much? *- What approvals will Alameda County have to provide for this project?* *- Exactly what is required of the SFPUC in regards to increased flow into Alameda Creek for steelhead habitat ?"*	• Relationship to CDRP (Introduction and Background)
Verbal Comments				
V1	Connie DeGrange	Page 18, paragraph 1	The EIR should include an evaluation of the impacts of the draw-down that would result from pumping Pit F2.	• Hydrology and Water Quality • Hydrology Appendix • Biology
V2	Bob Foster	Page 16, paragraph 2	The EIR should describe other alternatives to the project that have been rejected by the SFPUC.	• Alternatives
V3	Jeff Miller (Alameda Creek Alliance)	Page 12 to Page 13	The EIR should describe the source for the recaptured flow and where it originates from The EIR should describe if there is a hydraulic connection between the recaptured flow and surface flows in Alameda Creek. The EIR should include an evaluation of the change in groundwater infiltration rates when pumping is happening. The EIR should include an evaluation of the pumping effects on surface flow in Niles Canyon or in downstream reaches of the creek. Comment suggests that the EIR describe the cold water flows coming in the summer and the flows that infiltrate into the subsurface.	• Hydrology and Water Quality • Hydrology Appendix • Fisheries
V4	Jim O'Laughlin	Page 14 Page 18, paragraph 3	The EIR should evaluate what impacts there is going to be on the groundwater levels, especially below Pit F2. The EIR should describe is there is a way to for the project to provide acceleration of the reclamation plan for Pit F2. The EIR should include an alternative that evaluates only the legally responsible operations based on current historical agreements, and does not include the project.	• Hydrology and Water Quality • Hydrology Appendix • Hazards

APPENDICES

A. Notice of Preparation (NOP) and NOP Notice of Availability
B. Scoping Meeting Materials
C. Scoping Meeting Transcripts
D. Comments Received During EIR Scoping Process

APPENDIX A

Notice of Preparation and NOP Notice of Availability

SAN FRANCISCO
PLANNING DEPARTMENT

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meeting

Date:	June 24, 2015
Case No.:	**2015-004827ENV**
Project Title:	**Alameda Creek Recapture Project**
Location:	The Sunol Valley in unincorporated Alameda County, west of Calaveras Road and south of Interstate 680. The proposed facilities would be constructed within and adjacent to a quarry pit in the Surface Mining Permit 24 (SMP-24) area and at the existing Hetch Hetchy Water and Power Calaveras Substation site.
BPA Nos.:	N/A
Zoning:	Water Management
Block/Lot:	N/A
Project Sponsor	San Francisco Public Utilities Commission Kelley Capone KCapone@sfwater.org (415) 934-5715
Lead Agency:	San Francisco Planning Department
Staff Contact:	Steven Smith Steve.Smith@sfgov.org (415) 558-6373

This Notice of Preparation (NOP) of an Environmental Impact Report (EIR) has been prepared by the San Francisco Planning Department in connection with the project listed above. The purpose of the EIR is to provide information about the potential significant physical environmental effects of the proposed project, to identify possible ways to minimize the project's significant adverse effects, and to describe and analyze possible alternatives to the proposed project. The San Francisco Planning Department is issuing this NOP to inform the public and responsible and interested agencies about the proposed project and the intent to prepare an EIR. This NOP is also available online at: http://www.sf-planning.org/puccases.

PROJECT SUMMARY

The San Francisco Public Utilities Commission (SFPUC) is proposing the Alameda Creek Recapture Project (ACRP or proposed project) on SFPUC Alameda watershed[1] lands in unincorporated Alameda County. The proposed project would recapture an annual average of up to 9,820 acre-feet per year (ac-ft/yr) (or 3,200 million gallons per year [mgal/yr]) of water that will be released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam during future operation of Calaveras Reservoir. Water would be recaptured from a quarry pit, Pit F2, in the Sunol Valley located approximately 6 miles downstream of Calaveras Reservoir and 0.5-mile south of the Interstate 680/State

[1] The SFPUC Alameda watershed refers to CCSF-owned lands managed by the SFPUC as part of the SFPUC regional water system. The Alameda watershed lands are located within the much larger hydrologic boundary of the Alameda Creek watershed.

Route 84 interchange. The ACRP would recapture an amount of water equivalent to that which is released and/or bypassed. Proposed project components for recapture of the water from Pit F2 include pumps mounted on barges, pipelines extending from the pumps to shore; a new pipeline connecting to the existing Sunol Pump Station Pipeline; and ancillary facilities such as throttle valves, a flow meter, and electrical facilities. No work would occur in the bed, bank, or channel of Alameda Creek. The project location and components are described in more detail further below.

OVERVIEW AND BACKGROUND

The ACRP would recapture water that the SFPUC will release from Calaveras Reservoir and/or bypass around the Alameda Creek Diversion Dam as part of the future operations plan for the Calaveras Dam Replacement project. As further described below, the releases and bypasses are required by regulatory permits for the Calaveras Dam Replacement project.

The SFPUC Water System Improvement Program and the Alameda Creek Recapture Project

The City and County of San Francisco (CCSF), through the SFPUC, owns and operates a regional water supply conveyance, treatment, and distribution system that extends from the Sierra Nevada to San Francisco and serves drinking water to 2.6 million people in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The proposed ACRP is a component of the SFPUC's Water System Improvement Program (WSIP)[2] (see www.sfwater.org). The basic goals of the WSIP are to increase the reliability of the regional water system with respect to water quality, seismic response, delivery, and water supply to meet water delivery needs in the service area. A Program EIR (PEIR) for the WSIP was certified by the San Francisco Planning Commission and the WSIP was adopted by the SFPUC on October 30, 2008.[3] The PEIR addresses the potential environmental impacts of the WSIP facility improvement projects at a programmatic level and evaluates the WSIP's water supply strategy at a project level of detail. Implementation of the proposed project would contribute to meeting the WSIP's overall goals and objectives, which are to:

- Maintain high-quality water
- Reduce vulnerability to earthquakes
- Increase delivery reliability
- Meet customer water supply needs
- Enhance sustainability in all system activities
- Achieve a cost-effective, fully operational system

Specifically, the ACRP would assist the SFPUC in achieving the established WSIP level of service goals and objectives related to water supply during both nondrought and drought periods by increasing operational flexibility and avoiding the loss of yield to the regional system from the SFPUC Alameda watershed system that would otherwise result from future operations of Calaveras Reservoir.

---

2 The Alameda Creek Recapture project is listed in the WSIP PEIR under its former title of Alameda Creek Fishery Enhancement project.

3 San Francisco Planning Department, 2008. *Final Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program.* San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.

Project Relationship to the Calaveras Dam Replacement Project

Calaveras Reservoir, located at the southern end of the SFPUC Alameda watershed and approximately 6 miles upstream of the ACRP project area, collects and stores local runoff, including flows from Alameda, Calaveras, and Arroyo Hondo Creeks. The Alameda Creek Diversion Dam and Tunnel divert flows from Alameda Creek into Calaveras Reservoir.[4] Water stored in Calaveras Reservoir is conveyed to the Sunol Valley Water Treatment Plant (SVWTP) for treatment prior to delivery to customers, or to San Antonio Reservoir for storage prior to being treated at the SVWTP. Local runoff that is collected in Calaveras and San Antonio Reservoirs accounts for approximately 13 percent of the SFPUC's total water yield. **Figure 1** shows SFPUC facilities in the Alameda watershed.

In 2001, due to safety deficiencies regarding the seismic stability of Calaveras Dam, the California Department of Water Resources, Division of Safety of Dams, placed interim operational restrictions on Calaveras Reservoir that limit the reservoir's water storage volume to approximately 40 percent of its historical storage capacity. The Calaveras Dam Replacement project, another key regional facility improvement project of the WSIP, will restore the storage capacity of Calaveras Reservoir and is designed to help the SFPUC meet the WSIP level of service goals related to seismic reliability and water delivery reliability.[5] The Calaveras Dam Replacement project is currently under construction, with completion anticipated in 2018.

Through the permitting process for the Calaveras Dam Replacement project, the SFPUC, in coordination with the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS), agreed to two in-stream flow schedules that satisfy the requirements of the Federal Endangered Species Act and the provisions of the California Fish and Game Code. These in-stream flow schedules will be implemented as part of the future operations plan for Calaveras Reservoir to be protective of Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) distinct population segment (DPS), a species listed as threatened under the federal Endangered Species Act, in Alameda and Calaveras Creeks below the Alameda Creek Diversion Dam and Calaveras Dam, respectively. The in-stream flow schedule at the Alameda Creek Diversion Dam will increase flows in Alameda Creek below the dam, with a corresponding reduction in the amount of water that the SFPUC historically diverted from Alameda Creek into Calaveras Reservoir; the in-stream flow schedule for Calaveras Creek below Calaveras Dam will provide year-round releases from Calaveras Reservoir (see Figure 1).

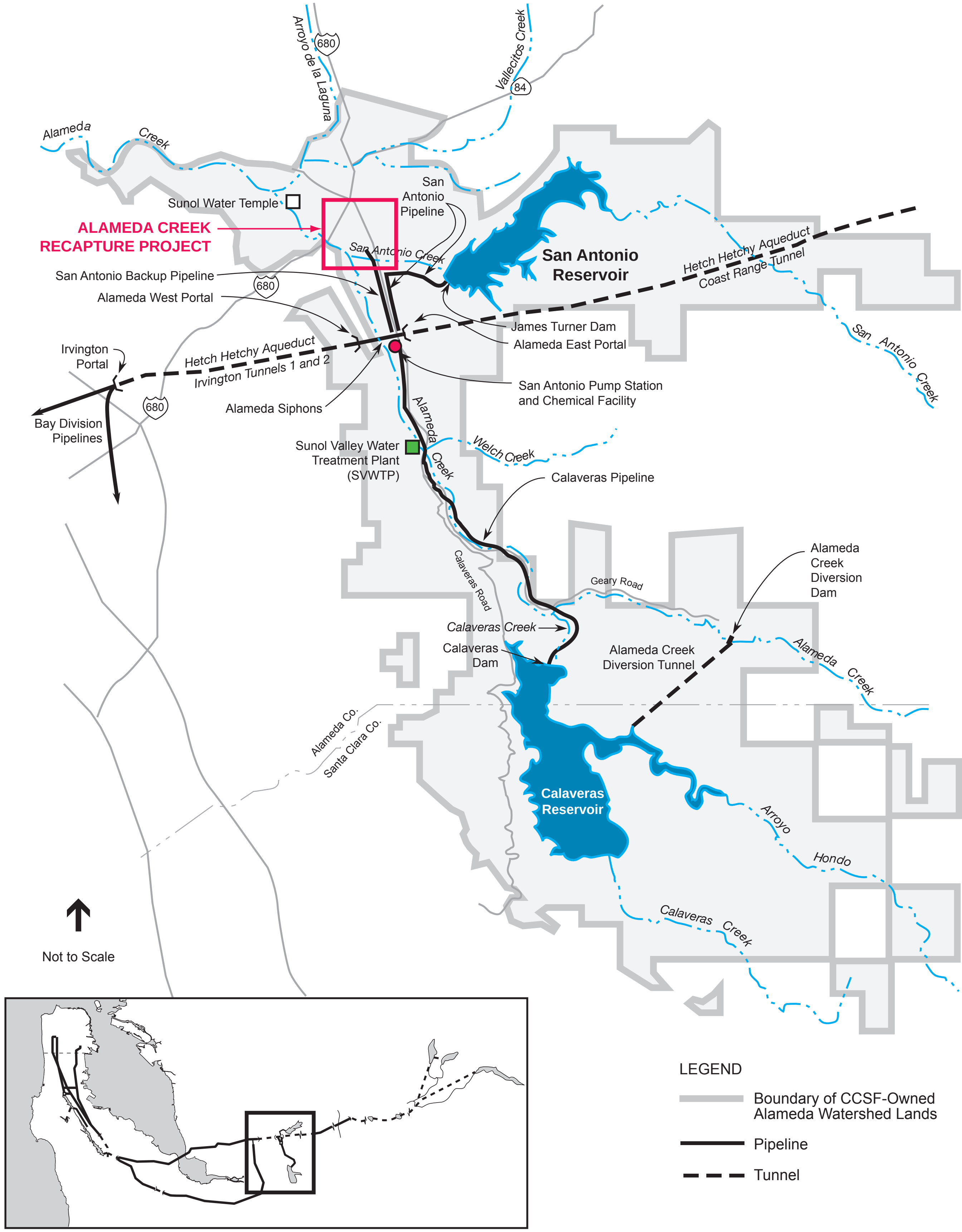
The SFPUC used the Alameda System Daily Hydrologic Model (ASDHM)[6] to estimate the water supply loss from the SFPUC Alameda watershed if the water that is bypassed and/or released during future operations of Calaveras Reservoir is not recaptured. Using historic hydrology data for the period of October 1995 through September 2009, the model was used to compare the water loss to the regional system under

---

[4] The SFPUC operates the Alameda Creek Diversion Dam and Calaveras Reservoir under pre-1914 appropriative water rights that were originally established by the Spring Valley Water Company.

[5] San Francisco Planning Department, 2011. *Final Environmental Impact Report for the San Francisco Public Utilities Commission Calaveras Dam Replacement Project*. San Francisco Planning Department File No. 2005.0161E, State Clearinghouse No. 2005102102. Certified January 27, 2011.

[6] ASDHM was first developed during the Calaveras Dam Replacement Project permitting process and has been continuously modified and improved. For more information on the model and the assumptions incorporated into the model, please refer to "Dhakal, A. S., E. Buckland, S. McBain, 2012. Overview of Methods, Models, and Results to Develop Unimpaired, Impaired, and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrologic Years 1996-2009. 81 pp".



SOURCE: San Francisco Planning Department, 2008

SFPUC Alameda Creek Recapture Project

Figure 1
Overview of Alameda Watershed Facilities

two scenarios: (a) Calaveras Reservoir is restored to its historical storage capacity and the in-stream flow schedules are implemented, against (b) Calaveras Reservoir is restored to its historical storage capacity and the in-stream flow schedules are not implemented. The difference in the volume of water diverted to Calaveras Reservoir at the Alameda Creek Diversion Dam and released from Calaveras Dam under these two scenarios represents the total water supply loss associated with the in-stream flow schedules. The model estimated an average annual loss of 9,820 ac-ft/yr[7] (or 3,200 mgal/yr), which is equal to the average annual volume of water that SFPUC proposes to recapture with the ACRP.[8]

PROJECT DESCRIPTION

Project Location

The project area[9] is in unincorporated Alameda County, south of the Interstate 680/State Route 84 interchange and west of Calaveras Road. Figure 1 shows the regional location of the project. The proposed facilities would be in the Sunol Valley on the east side of Alameda Creek, approximately 6 miles north of Calaveras Reservoir and 1 mile west of San Antonio Reservoir. The ACRP would be located within the SFPUC Alameda watershed.

Project Objectives

As stated previously, implementation of the proposed project would assist the SFPUC in achieving established WSIP level of service goals and objectives related to ensuring the SFPUC has an adequate supply of water to deliver to customers during both non-drought and drought periods. The primary purpose of the ACRP is the downstream recapture of an annual average of up to 9,820 ac ft/yr (or 3,200 mgal/yr) of water that is released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam, pursuant to the Calaveras Dam Replacement project's in-stream flow schedules to be implemented during future operations of Calaveras Reservoir. The ACRP would recapture an amount of water equivalent to that which is released and/or bypassed. By recapturing the water, the SFPUC would be able to maintain historic water diversions from the SFPUC Alameda watershed system and avoid the loss of yield to the regional water system.

Project Components

The ACRP would recapture the water by collecting Alameda Creek water that naturally infiltrates into quarry Pit F2, operated under Surface Mining Permit-24 (SMP-24) by Hanson Aggregates, and pumping the water directly to SVWTP or San Antonio Reservoir. The quarry pit is located adjacent to Alameda Creek in the Sunol Valley, approximately six miles downstream of Calaveras Reservoir. The project area and vicinity are shown on **Figure 2** and the preliminary project site plan is shown on **Figure 3**. The proposed project components include:

- Four pumps mounted on barges that would be floated in quarry Pit F2 (including a mooring system)
- Four flexible discharge pipelines extending from each pump to a new pipe manifold located on shore

[7] The total volume of water released from Calaveras Reservoir and/or bypassed at the Alameda Creek Diversion Dam will vary year to year depending on precipitation over the watershed and the future operations plan for Calaveras Reservoir.

[8] San Francisco Public Utilities Commission (SFPUC), 2014. *Final Conceptual Engineering Report for Alameda Creek Recapture Project.* Prepared by SFPUC Engineering Management Bureau. November 21, 2014.

[9] "Project area" refers to the area within which all construction-related disturbance would occur.

- 100-foot-long, 36-inch-diameter pipeline connection between the new pipe manifold and the existing Sunol Pump Station Pipeline
- Throttling valves and a flow meter
- Electrical control building
- Electrical transformer, ten new power poles, and approximately 1,600 feet of overhead power lines extending from the HHWP Calaveras Electrical Substation to the new electrical control building.[10]

SFPUC assumes that the water quality in Pit F2 would be adequate and that pretreatment would not be required prior to conveying the water to the SVWTP or San Antonio Reservoir. This assumption will be confirmed through water quality monitoring and testing at Pit F2.[11]

Construction

Construction is expected to begin in 2017 and to be completed within 1.5 years (by 2018), resulting in an overall construction period of approximately 18 months. Construction activities would include staging/laydown, site clearing, demolition, drilling, earth work, structural placement and backfilling, concrete and paving work, dewatering, excavation, and trenching in the project area. Calaveras Road would be the primary construction access route to the project area. Two existing quarry access roads that run east-to-west along either side of San Antonio Creek would provide secondary access to the ACRP site. No construction work would be required within the Alameda Creek bed, bank or channel.

Proposed Operations

Operation of the ACRP is dependent on the in-stream flow schedules that will be implemented as part of future operations of Calaveras Reservoir; that is, ACRP operations would not commence until the in-stream flow schedules are implemented. The maintenance of the in-stream flows will be measured at two compliance points: (1) the compliance point for the releases from Calaveras Dam is the existing United States Geological Service (USGS) gage located on Calaveras Creek immediately below Calaveras Dam, and (2) the compliance point for the water that is bypassed around the Alameda Creek Diversion Dam is a new stream flow gage that will be installed as part of the Calaveras Dam Replacement project below the Alameda Creek Diversion Dam.

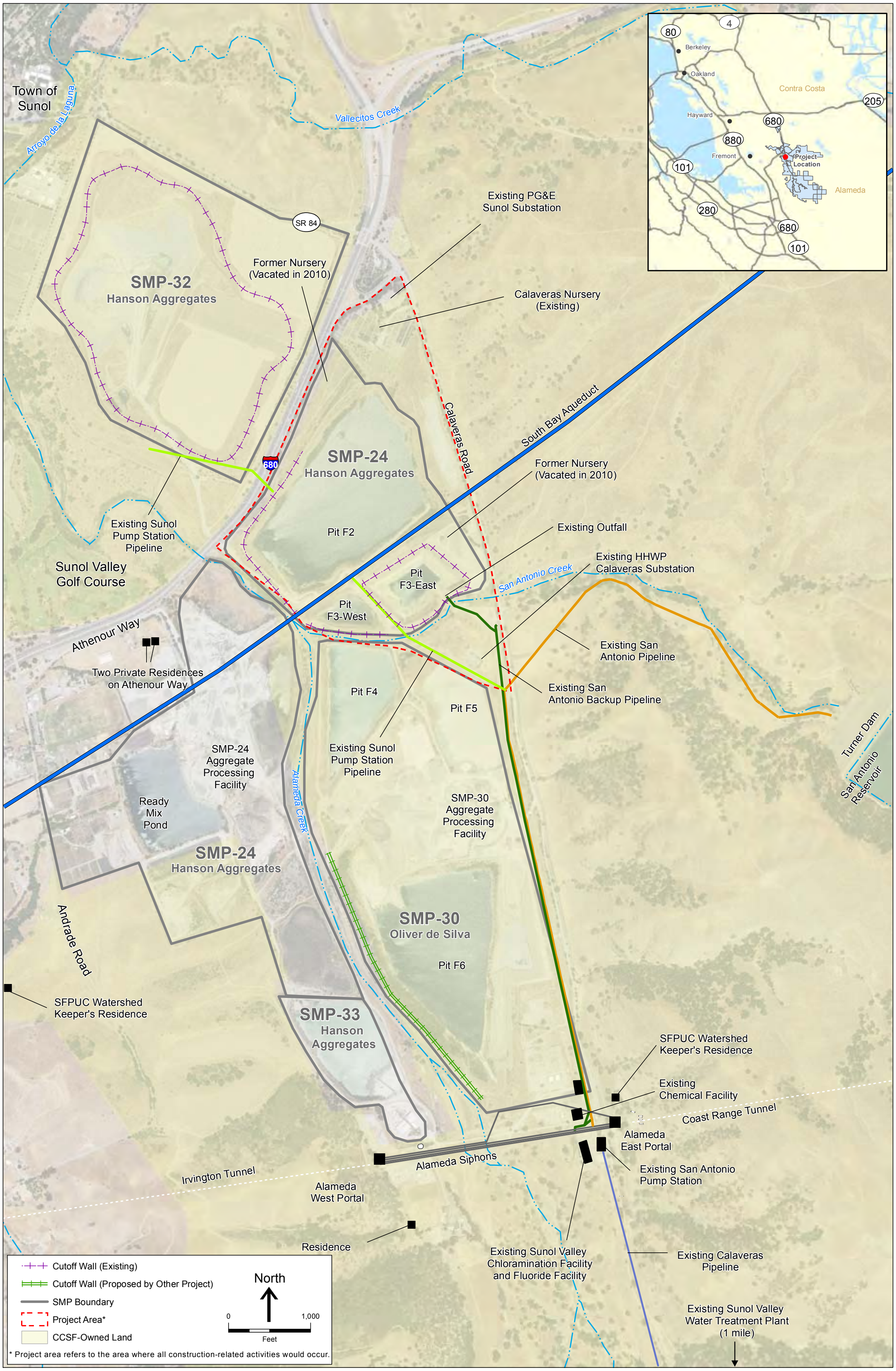
SFPUC modeling and monitoring of current conditions at Pit F2 in Sunol Valley, approximately six miles downstream of the compliance points, shows that natural infiltration occurs from Alameda Creek into Pit F2. SFPUC facility operators would use the proposed pumps in Pit F2 and existing facilities and infrastructure in the Sunol Valley and surrounding areas of the Alameda watershed system to recapture an amount of water equivalent to that which is released and/or bypassed by collecting water that naturally infiltrates into Pit F2. SFPUC would convey the recaptured water from the quarry pit directly to either the SVWTP or San Antonio Reservoir.[12] The SFPUC would document the amounts of water recaptured from pumping at Pit F2, and operate the project in a manner that would assure the amounts recaptured correlate with amounts released and/or bypassed.

---

[10] Alternatively, if the HHWP Calaveras Electrical Substation cannot meet the power needs of the ACRP, power would come from the PG&E Sunol Electrical Substation.

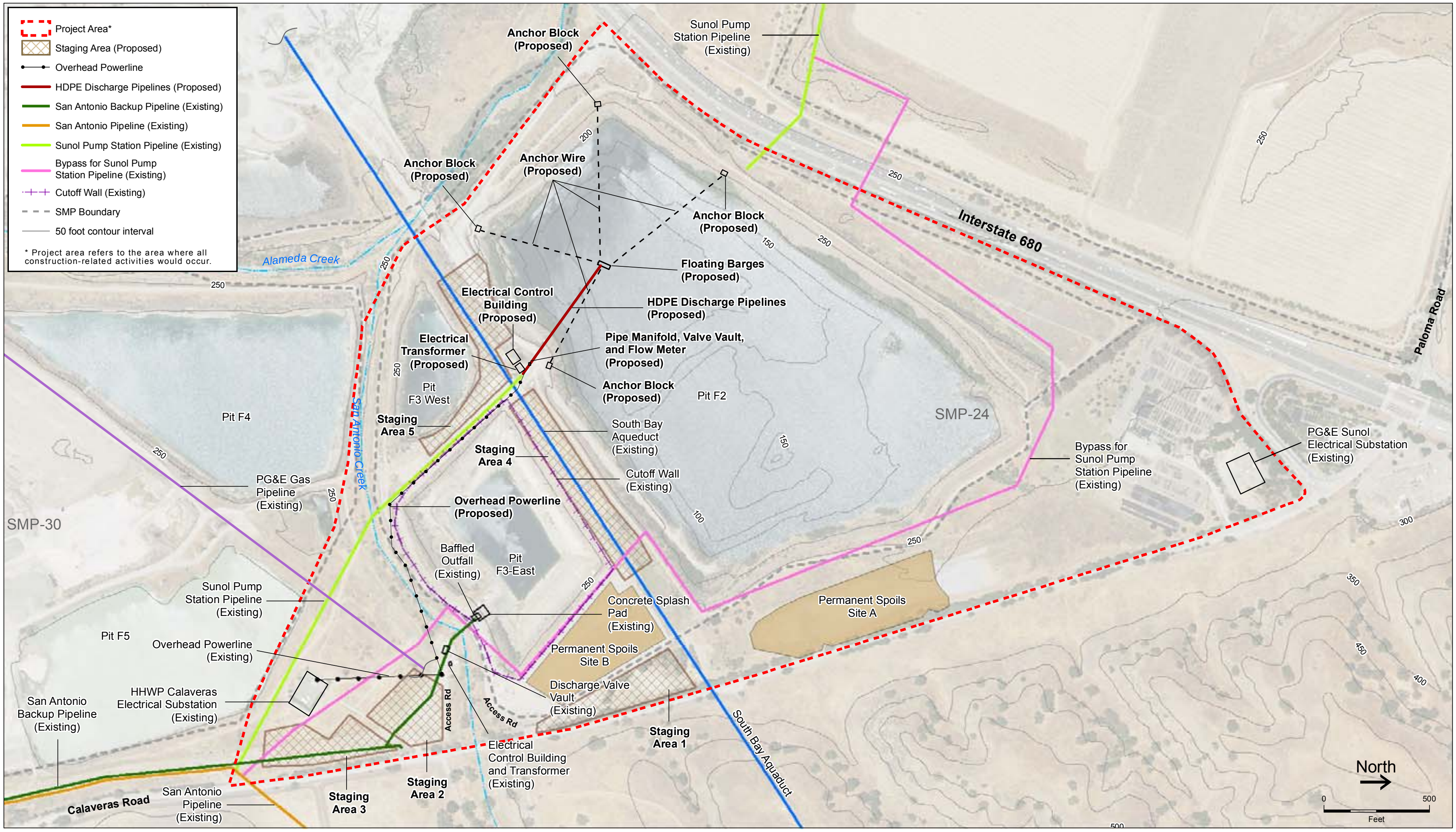
[11] San Francisco Public Utilities Commission (SFPUC), 2014. *Final Conceptual Engineering Report for Alameda Creek Recapture Project*. Prepared by SFPUC Engineering Management Bureau. November 21, 2014.

[12] San Francisco Public Utilities Commission (SFPUC), 2014. Final Conceptual Engineering Report for Alameda Creek Recapture Project. Prepared by SFPUC Engineering Management Bureau. November 21, 2014.



SOURCE: ESA, 2015; Date of aerial photo is 2014.

Figure 2
Project Vicinity Map



SOURCE: SFPUC, 2014a

SFPUC Alameda Creek Recapture Project

Figure 3
Preliminary Site Plan

PERMITS AND APPROVALS

The SFPUC could be required to obtain the following permits and approvals for project construction and operations.

Federal

No federal permits are anticipated at this time.

State/Regional

- California Department of Water Resources – Temporary encroachment permit for construction access within the South Bay Aqueduct right-of-way and permanent encroachment permit for overhead power line crossing.
- State Water Resources Control Board (SWRCB) Division of Drinking Water – Amendment to SF Regional Water System domestic water supply permit to utilize Pit F2 as a new source of water supply.
- Regional Water Quality Control Board, San Francisco Bay Region – Construction General Permit coverage and preparation of a Stormwater Pollution Prevention Plan.
- California Department of Fish and Wildlife – California Endangered Species Act Section 2081 incidental take permit.
- Bay Area Air Quality Management District – Authority to construct permit.
- State Water Resources Control Board – Issuance of a new National Pollutant Discharge Elimination System (NPDES) permit for discharges of water pumped from quarry Pit F2 to San Antonio Reservoir.

Local

- San Francisco Planning Commission – Certification of the Final EIR.
- SFPUC – Project approval and adoption of CEQA findings and a Mitigation Monitoring and Reporting Program.
- San Francisco Board of Supervisors – Consideration of any appeals of the Planning Commission's certification of the Final EIR and appropriation of project funding.

ENVIRONMENTAL REVIEW PROCESS

The San Francisco Planning Department is preparing an Environmental Impact Report (EIR) to evaluate the environmental effects of the proposed project on the environment. The EIR will be prepared in compliance with CEQA (California Public Resources Code, Sections 21000 *et seq.*), the *CEQA Guidelines*, and Chapter 31 of the San Francisco Administrative Code, and will address project-specific construction and operational impacts. The EIR is an informational document for use by governmental agencies and the public to aid in the planning and decision-making process. The EIR will disclose any physical environmental effects of the project and identify possible ways of reducing or avoiding its potentially significant impacts.

The EIR will address all environmental issue topics required under CEQA. The EIR will evaluate the environmental impacts of the ACRP resulting from construction and operation activities, and will propose mitigation measures for impacts determined to be significant. The EIR will address all environmental topics in the San Francisco Planning Department's CEQA environmental checklist. Key environmental issues that will be addressed in the EIR are described below.

Hydrology and Water Quality

The EIR will address the potential for the ACRP to adversely affect surface water and groundwater resources, and the designated beneficial uses of these resources. Construction activities could result in soil erosion and sedimentation that impairs water quality. Water recapture could affect surface water quality or flow, and groundwater resources. Potential secondary impacts on fisheries and other aquatic resources resulting from project-related effects on hydrology and water quality will also be evaluated, as described below.

Aquatic and Terrestrial Biological Resources

The EIR will address the potential for construction and operation of the proposed project to adversely affect aquatic and terrestrial habitats, as well as special-status plants and wildlife including California red-legged frog, California tiger salamander, Alameda whipsnake, and Central California Coast steelhead. These biological resources could be directly affected during construction (e.g., species mortality) or indirectly affected by construction-related noise, vibration, dust, soil erosion, or water quality effects. Potential operational impacts include entrainment or impingement of aquatic species at the intake locations within Pit F2. In addition, operation of the ACRP could result in adverse impacts on fisheries and other aquatic resources if surface water flow or surface water quality were altered in a way that adversely affected habitat conditions or impaired migration corridors.

Other Environmental Issues

Other topics to be addressed in the EIR include, but are not limited to, the potential for impacts related to:

- Other land use activities in the Alameda watershed, including nearby residences, nursery and quarry operations, and recreational activities;
- Temporary visual effects resulting from construction activities;
- Handling, storage, and use of common hazardous materials (such as fuels) during construction and operations; and
- Increases in criteria air quality pollutants and noise levels during construction and operational activities.

The EIR will also evaluate the potential for cumulative impacts resulting from implementation of the ACRP in combination with other projects in the vicinity.

Alternatives

CEQA requires that an EIR evaluate a reasonable range of feasible alternatives to the project or the project location that would attain most of the project objectives, but avoid or substantially lessen any of the project's significant effects. The significant impacts identified by the EIR preparers will guide the development of an appropriate range of alternatives to be evaluated in the EIR that would avoid or substantially lessen significant impacts, while still meeting the project objectives. Alternatives suggested during the public scoping period will be considered. The EIR will also discuss impacts associated with the No Project Alternative.

FINDING

This project may have a significant effect on the environment and an Environmental Impact Report is required. This determination is based upon the criteria of the State CEQA Guidelines, Sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance), and for the reasons documented in the attached project description and description of potential environmental effects. (Documents are also available online at: http://www.sf-planning.org/puccases).

PUBLIC SCOPING PROCESS

Pursuant to the State of California Public Resources Code Section 21083.9 and California Environmental Quality Act Guidelines Section 15206, a public scoping meeting will be held to receive oral comments concerning the scope of the EIR. The meeting will be held on **Thursday, July 9, 2015 at 6:30 p.m. at Sunol Glen School located at 11601 Main Street, Sunol**. The SFPUC will provide an informational open house from **5:30 to 6:30 p.m.** prior to the formal scoping meeting. To request a language interpreter or to accommodate persons with disabilities at the scoping meeting, please contact the staff contact listed above at least 72 hours in advance of the meeting. Written comments will also be accepted at this meeting and until 5:00 p.m. on **July 27, 2015.** Written comments should be sent to Sarah B. Jones, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103; by fax to 415-558-6409 (Attn: Sarah Jones); or by email to Sarah.B.Jones@sfgov.org.

If you work for a responsible State agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

Members of the public are not required to provide personal identifying information when they communicate with the Commission or the Department. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the Department's website or in other public documents.

6/24/15
Date

FOR
Sarah B. Jones
Environmental Review Officer

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

PUBLIC NOTICE
Availability of Notice of Preparation of Environmental Impact Report and Notice of Public Scoping Meeting

Date:	June 24, 2015
Case No.:	2015-004827ENV
Project Title:	**Alameda Creek Recapture Project**
Location:	The Sunol Valley in unincorporated Alameda County, west of Calaveras Road and south of Interstate 680. Proposed facilities would be constructed within and adjacent to a quarry pit in the Surface Mining Permit 24 (SMP-24) area and at the existing Hetch Hetchy Water and Power Calaveras Substation site.
Zoning:	Water Management
Block/Lot:	N/A
Project Sponsor:	San Francisco Public Utilities Commission Kelley Capone KCapone@sfwater.org (415) 934-5715
Staff Contact:	Steven H. Smith Steve.Smith@sfgov.org (415) 558-6373

A notice of preparation (NOP) of an environmental impact report (EIR) has been prepared by the San Francisco Planning Department in connection with this project. The NOP is available for public review and comment on the Planning Department's SFPUC Negative Declarations and EIRs web page (http://www.sf-planning.org/puccases). CDs and paper copies are also available at the Planning Information Center (PIC) counter on the first floor of 1660 Mission Street, San Francisco. Referenced materials are available for review by appointment at the Planning Department's office on the fourth floor of 1650 Mission Street. (Call (415) 558-6378).

PROJECT DESCRIPTION:

The San Francisco Public Utilities Commission (SFPUC) is proposing the Alameda Creek Recapture Project (ACRP or proposed project) on SFPUC Alameda watershed lands in unincorporated Alameda County approximately 0.5-mile south of the Interstate 680 (I-680)/State Route 84 (SR 84) interchange and west of Calaveras Road. The primary goal of the proposed project is the downstream recapture of an annual average of up to 9,820 acre-feet per year (ac ft/yr) (or 3,200 million gallons per year [mgal/yr]) of water that the SFPUC will release from Calaveras Reservoir or bypass around the Alameda Creek Diversion Dam, pursuant to the Calaveras Dam Replacement project's in-stream flow schedules that will be implemented as part of the future operations plan for Calaveras Reservoir.[1] The SFPUC would operate the ACRP to recapture an amount of water equivalent to that which is released and/or bypassed by collecting Alameda Creek water that naturally infiltrates into a quarry pit, Pit F2, in the Sunol Valley approximately 6 miles downstream of Calaveras Reservoir. In doing so, the ACRP would allow the SFPUC to maintain its historic water diversions from the Alameda watershed system and avoid the loss of yield to the regional water system that will occur if the water is not recaptured.

Proposed project components for recapture of the water from Pit F2 include pumps mounted on barges, pipelines extending from the pumps to shore; a new pipeline connecting to the existing Sunol Pump Station Pipeline; throttling valves; flow meter; electrical control building; electrical transformer, and approximately 1,600 feet of overhead power lines extending from HHWP Calaveras Electrical Substation to the new electrical control building. The proposed pumps in Pit F2 would be used to pump the recaptured water from the quarry pit directly to either the SVWTP or San Antonio Reservoir. SFPUC facility operators would utilize existing facilities and infrastructure in the Alameda watershed to support ACRP operations. No work would occur in the bed, bank, or channel of Alameda Creek.

The proposed project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of this project would contribute to meeting the overall WSIP goals and objectives.[2,3]

The Planning Department has determined that an EIR must be prepared for the proposed project prior to any final decision regarding whether to approve the project. The purpose of the EIR is to provide information about potential significant physical environmental effects of the proposed project, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to the proposed project. Preparation of an NOP or EIR does not indicate a decision by the City to approve or to disapprove the project. However, prior to making any such decision, the decision makers must review and consider the information contained in the EIR.

The Planning Department will hold a **PUBLIC SCOPING MEETING** on **Thursday, July 9, 2015 at 6:30 p.m.** at **Sunol Glen School located at 11601 Main Street, Sunol**. The SFPUC will provide an informational open house from **5:30 to 6:30 p.m.** prior to the formal scoping meeting. Meeting location access and restrooms are compliant with the Americans with Disabilities Act. To request a language interpreter or to accommodate persons with disabilities at the scoping meeting, please contact the staff contact listed

---

1 The in-stream flow schedules are required by the Calaveras Dam Replacement project's California Department of Fish and Game (CDFG) Streambed Alteration Agreement (CDFG, 2011) and National Marine Fisheries Service (NMFS) Biological Opinion (NMFS, 2011).

2 San Francisco Planning Department, 2008. *Final Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program*. San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.

3 The Alameda Creek Recapture project is listed in the WSIP Program Environmental Impact Report under its former title, the Alameda Creek Fishery Enhancement project.

above at least 72 hours in advance of the meeting. The purpose of this meeting is to receive oral comments to assist the Planning Department in reviewing the scope and content of the environmental impact analysis and information to be contained in the EIR for the project. Written comments will also be accepted until 5:00 p.m. on July 27, 2015. Written comments should be sent to Sarah B. Jones, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103 or sent by email to Sarah.B.Jones@sfgov.org.

If you work for an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is relevant to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. We will also need the name of the contact person for your agency. If you have questions concerning environmental review of the proposed project, please contact **Steven Smith** at **(415) 558-6373**.

Members of the public are not required to provide personal identifying information when they communicate with the Commission or the Department. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the Department's website or in other public documents.

APPENDIX B

Scoping Meeting Materials

Public Scoping Meeting

San Francisco Planning Department
Environmental Planning Division

SCOPING MEETING

Alameda Creek Recapture Project
Environmental Impact Report

July 9, 2015

SAN FRANCISCO
PLANNING DEPARTMENT

Agenda
SFPUC Alameda Creek Recapture Project Environmental Impact Report
Public Scoping Meeting

Sunol Glen School, 11601 Main Street, Sunol
July 9, 2015

Informational Open House 5:30pm to 6:30pm

Brief Overview of Proposed Project

Formal Scoping Meeting starts at 6:30pm.

I. Introduction
- Introductions to EIR Preparers and Project Sponsor
  - Steven Smith – SF Planning Department (Environmental Review Coordinator)
  - Kelley Capone – SFPUC (Environmental Project Manager)
  - Jesus Almaguer – SFPUC (Project Engineer)
  - Ravi Krishnaiah SFPUC (Project Manager)
  - Ellen Levin – SFPUC Water Enterprise
  - Betsy Lauppe Rhodes – SFPUC (Communications)
  - Kelly White – Environmental Science Associates (EIR Consultant)
  - Meryka Dirks – Environmental Science Associates (EIR Consultant)
- Purpose of meeting
- Meeting format

II. Project Overview

II. Summary of California Environmental Quality Act (CEQA) Process
- Notice of Preparation/IS (30-day public review period)
- Scoping Meeting
- Draft EIR (45-day public review period, Planning Commission hearing)
- Comments and Responses Document (approx. 14-day review)
- Final EIR Certification (Planning Commission hearing)

IV. Public Comment
- Comments on environmental review issues from speakers who fill out a speaker card
- Three minutes per speaker

V. Final Reminders
- Submit written comments to **Sarah B. Jones, Environmental Review Officer, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103**, by 5:00 p.m., **July 27, 2015.** Please include **"Alameda Creek Recapture Project"** in the subject line.
- If you have questions or comments regarding the proposed project and the environmental process, please contact Steven Smith at **(415) 558-6373**.

www.sfplanning.org

Meeting Agenda

- Introductions
- Environmental Review Process Overview (Planning)
- Proposed Project Overview (SFPUC)
- Public Comments
- Closing Remarks

Alameda Creek Recapture Project – EIR Scoping Meeting

- Sign in at the table near the entrance.
- Pick up copies of meeting materials.
- If you would like to speak tonight, fill out a speaker card.
- To make written comments, pick up a comment card.
  - ***Drop in Comment Box at the end of the meeting***
  - ***Mail, email, or fax later***
- Please hold all comments until the end of the overview/presentation.

ENVIRONMENTAL REVIEW PROCESS

Project Team Introductions

San Francisco Planning Department

- ***Steven Smith, Environmental Review Coordinator***
- ***Kelly White, Environmental Consultant Lead, ESA***

San Francisco Public Utilities Commission (SFPUC)

- ***Ravi Krishnaiah, Project Manager***
- ***Jesus Almaguer, Project Engineer***
- ***Kelley Capone, Environmental Project Manager***
- ***Betsy Lauppe Rhodes, Communications***

CEQA Objectives

- Disclose environmental impacts of proposed projects
- Identify ways to avoid or reduce environmental impacts
- Inform the agency decision-making process
- Encourage public participation
- Promote interagency coordination

California Environmental Quality Act

Projects require environmental review under the California Environmental Quality Act (CEQA) before they can be considered for approval.

For SFPUC projects, CEQA is implemented by the San Francisco Planning Department, the CEQA Lead Agency

Environmental Impact Report

- Primary focus of EIR analysis:
  - *Hydrology and Water Quality*
  - *Aquatic and Terrestrial Biology*
  - *Aesthetics*
  - *Land Use*
  - *Air Quality*
  - *Hazards*
- *All environmental topics* provided in the CEQA Guidelines will be addressed in the EIR

What will the EIR do?

- Provide a description of the project and surrounding environment
- Identify potential environmental effects of the project
- Identify ways to avoid or reduce significant environmental effects through mitigation
- Evaluate a reasonable range of alternatives to the proposed project

Meeting Purpose

- Hear your comments on the proposed scope aof the environmental review for the Alameda Creek Recapture Project
- Help identify the following to be identified in depth:
  - *Environmental effects (e.g., biology, hydrology, noise, transportation, etc.)*
  - *Range of alternatives*
  - *Methods of assessment*
  - *Mitigation measures*

Proposed Environmental Review Schedule

- Notice of Preparation – June 24, 2015
- Public Scoping Meeting – July 9, 2015
- Scoping Period Ends – July 27, 2015

Tentative EIR schedule

- Public Review of Draft EIR – Spring 2016
- Certification of Final EIR – Fall 2016

ACRP Project Needs & Objectives

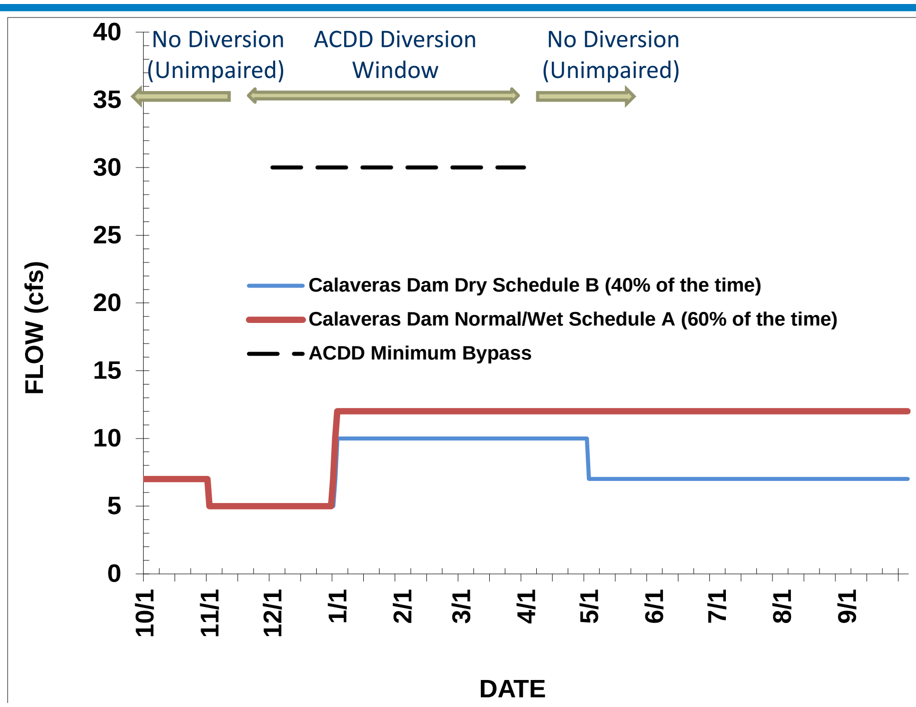
- Recapture future in-stream flow releases from Calaveras Reservoir and Alameda Creek Diversion Dam required under the Calaveras Dam Replacement Project permits.
- Annual average recapture: 9800 AF.

SFPUC PRESENTATION OF THE PROJECT

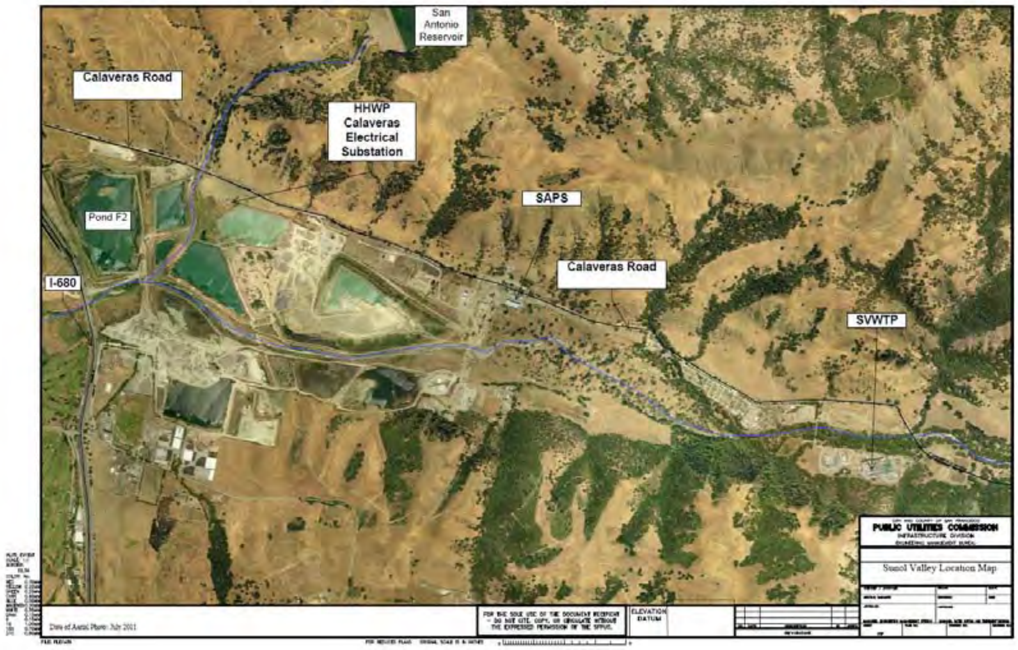
ACRP Operation

- Operate the Pond as a reservoir:
  - Let the Pond fill in the winter
  - Bring the Pond down in late-Spring to early-Fall
- Pumping to occur generally May - October
- Pumps will be on barges in the Pond
  - Pumping rate: 19.4 MGD (30 cfs)
- Distribution to the RWS through the existing Sunol Pump Pipeline

Future Instream Flow Releases in Alameda Creek from Calaveras Reservoir and ACDD



Sunol Valley



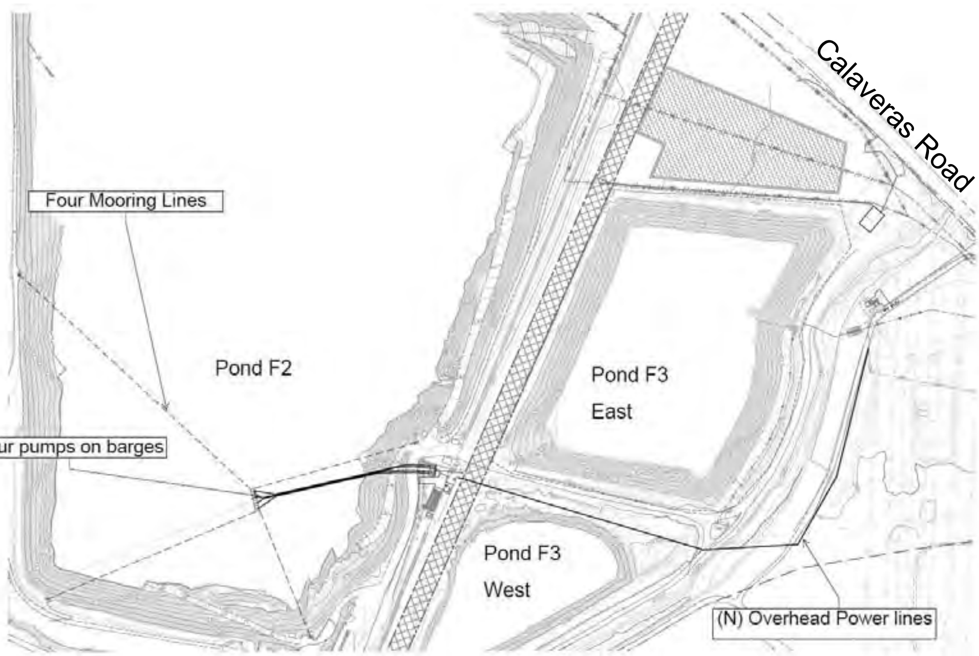
Project components

- Four vertical turbine pumps on barges
  - including a mooring system
- Four 16-inch flexible discharge pipelines
- New pipe manifold and connection to existing Sunol Pump Station Pipeline
- Throttling valves and a flow meter
- Electrical control building
- Electrical transformer and utility poles

PUBLIC COMMENTS

Hetch Hetchy Regional Water System

ACRP Site Plan



Where to send comments

Scoping comments accepted through Monday, July 27, 2015 (by 5 p.m.).

Send Comment Letter :

- By U.S. mail to:

  San Francisco Planning Department
  Attn: Sarah Jones, Environmental Review Officer
  Alameda Creek Recapture Project
  1650 Mission Street, Suite 400
  San Francisco, CA 94103

- By fax to (415) 558-*6409*
- By email to: *Sarah.B.Jones@sfgov.org*

Comment Session Ground Rules

- Submit speaker cards to speak
- Wait until your name is called
- State your name & speak clearly
- Limit comments to 3 minutes
- Use comment forms for more extensive input

San Francisco Planning Department
EIR Public Scoping Meeting Written Comment Form

SFPUC Alameda Creek Recapture Project
Case # 2015-004827ENV

If you wish to submit written comments on the above project, you may do so on this sheet (although use of this form is not required). Please drop written comments in the Comment Box at today's public scoping meeting, or submit by mail to Sarah B. Jones, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103; by fax to 415-558-6409 (Attn: Sarah Jones); or by email to Sarah.B.Jones@sfgov.org. **All comments must be submitted no later than 5 P.M., July 27, 2015.**

Write your comments regarding the environmental review for the project here. Use the back of the sheet or additional pages if necessary.

Name: __________

Organization (if any): __________

Address: __________

For More Information

About the Environmental Review Process:

Steven Smith, SF Planning Dept.
Environmental Planning Division
(415) 558-6373, Steve.Smith@sfgov.org
The Notice of Preparation (NOP) is available online at the Planning Department website:
http://tinyurl.com/sfpucceqadocs

About the Proposed Project:

Kelley Capone, SFPUC
Bureau of Environmental Management
(415) 934-5715, KCapone@sfwater.org

SAN FRANCISCO
PLANNING DEPARTMENT

EIR Public Scoping Meeting Sign-In Sheet
SFPUC Alameda Creek Recapture Project
July 9, 2015

PRINT NAME	ORGANIZATION/AFFILIATION	ADDRESS	TELEPHONE	EMAIL
1. Jeff Miller	ACA		510-499-9185	jeff@alamedacreek.org
2. BOB FOSTER	SUNOL RESIDENT	PO Box 6 Sunol CA 94586	9258620223	
3. THOMAS NIESAR	ACWD		510-668-6549	Thomas.Niesar@ACWD.com
4. DOUG WITMORE	TVFF		925-980-8760	DOUGWIT@SBCGLOBAL.NET
5. Connie DeGrange	Sunol Resident	10833 Foothill Rd Sunol 94586	925-862-2084	cdegrange@comcast.net
6. ROSEMARY CHANG	Sunol Resident	11011 Foothill Rd Sunol CA 94586	925-862-2019	RECHANGE@COMCAST.NET
7. Ted Buttner	"	"	"	EMBUTTNER@COMCAST.NET
8. DAN ZACHARISEN	HANSON AGGREGATES	7999 ATHENOUR WAY SUNOL, 94586	925-835-1203	DAN.ZACHARISEN@LEHIGHHANSON.COM
9. Jim Summers	Sunol Aggregate		925 828-7999	JSummers@desilvagroup.com
10.				

Privacy Notice: All information provided on this form will become part of the public record.

San Francisco Planning Department
Speaker Card

To aid in the preparation of minutes or a transcript, you are requested, but not required, to provide this information:

Please **PRINT** then give to meeting moderator

Name: ______

Organization (if any): ______

Address: ______

SAN FRANCISCO
PLANNING DEPARTMENT

EIR Public Scoping Meeting Sign-In Sheet

SFPUC Alameda Creek Recapture Project

July 9, 2015

PRINT NAME	ORGANIZATION/AFFILIATION	ADDRESS	TELEPHONE	EMAIL
1. Ralph Boniello	Alameda Creek Alliance	5701 El Dorado St. El Cerrito, CA		ralph@alamedacreek.org
2. Jim O'Laughlin	Sunol Resident	199 Bond St. Sunol	925.862.7550	jtopol7@comcast.net
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

****Privacy Notice: All information provided on this form will become part of the public record.***

APPENDIX C

Scoping Meeting Transcripts

SAN FRANCISCO PLANNING DEPARTMENT
PUBLIC SCOPING MEETING
ENVIRONMENTAL IMPACT REPORT

ALAMEDA CREEK RECAPTURE PROJECT

---o0o---

Thursday, July 9, 2015
Sunol Glen School
11601 Main Street
Sunol, California

REPORTED BY: DEBORAH FUQUA, CSR #12948

A P P E A R A N C E S

SAN FRANCISCO PLANNING COMMISSION:
Steven Smith, EIR Coordinator

SAN FRANCISCO PUBLIC UTILITIES COMMISSION
Ravi Krishnaiah, Project Manager
Kelley Capone, Environmental Project Manager
Jesus Almaguer, Project Engineer
Betsy Lauppe Rhodes, Communications

ESA
Kelly White, Consultant

PUBLIC COMMENTS

---o0o---

Thursday, July 9, 2015 6:39 o'clock p.m.

---o0o---

P R O C E E D I N G S

STEVEN SMITH: Okay. I think we're going to get started with the scoping portion, if folks are all set.

Well, welcome everybody. Thanks for coming. This is the scoping meeting for Alameda Creek Recapture Project.

My name is Steven Smith. I'm with the San Francisco Planning Department. The Planning Department is the CEQA lead agency.

Just a couple reminders, if you haven't already, we'd appreciate if you would sign in. If you would like to speak tonight, filling out a speaker card is also very helpful. There also are ways to make written comments, so tonight is one opportunity. We've got a court reporter here tonight I want people to be aware of.

Everything said goes into a transcript which becomes part of the administrative record for the project. But you're also welcomed to provide brief comments tonight. We've got a box for that. Or you could follow up with an e-mail or a written letter if you'd like.

And if you would, this is something of a

one-way communication. I'm going to do a presentation, and I'd just ask for your comments after that. I heard a lot of good comments during the open house, so hopefully of you will repeat those either tonight or in writing. But it's not a question-and-answer kind of forum; I just want you to be aware of that.

So we'll do some introductions. I'll talk about the environmental review process related to CEQA, the California Environmental Quality Act. We'll do a recap of the proposed project, a short version of what Jesus did earlier, and then we'll open up for public comments after that.

So again, I'm Steven Smith. I wanted to introduce Kelly White, our consultant for the project. She's from ESA. And then from PUC, Ravi Krishnaiah's here; he's the project manager. Jesus Almaguer is the project engineer. You'll hear from him again in a bit. He's going to do the project description.

Kelley Capone is my counterpart at PUC; she's the environmental project manager. And Betsy Rhodes is also here from PUC, communications.

So just a couple slides about the environmental review process, which will hopefully help inform your comments tonight.

Why we're here is the California Environmental

Quality Act, or CEQA. It's a state law, basically requires the consideration of environmental consequences before any public agency approves a project. It does a lot more than that, but that's basically the gist of it.

In the City of San Francisco, the Planning Department, whom I work for is, is always the CEQA lead agency. So the PUC is the project sponsor, but the San Francisco Planning Department is responsible for compliance with the California Environmental Quality Act.

Some of the objectives of CEQA, again, really primarily about disclosing environmental impacts. In so doing, that also helps us identify ways to avoid or reduce the environmental impacts. Public participation is also a big part of it. Tonight is a good example.

As well, there's a lot of agencies that will rely on our analysis that also will issue permits. So it's also a means by which to inform other public agencies that are involved and help us all communicate together on a common analysis.

So we will be preparing an environmental impact report for this project, also known as an EIR. Basically, the EIR provides a very detailed project description for this project, specifically during this

case. We'll do a thorough analysis of the environmental impacts, look for ways to mitigate those impacts, and also formulate and then analyze a range of alternatives that could meet some, maybe most, of the project's objectives but that could also help reduce or avoid the environmental consequences of the proposed project.

So this is more or less what we expect the focus of the EIR to be: Hydrology and water quality, biology -- you know, those are some of the obvious topics. We're still getting started with the analysis.

I do want to emphasize that we're going to look at all of the topics that are required under CEQA, so to the extent anybody has a comment or concern about any environment issue area, please just let us know because it will be addressed in some fashion in the EIR.

Just real briefly, the schedule: the Notice of Preparation went out. If anybody wanted a copy of that, we have some at the back table. It's a good overview of the proposed project. That was published on the 24th. Tonight, we're here obviously having the scoping meeting. And the scoping period ends on July 27th. Please keep that in mind. If you want to submit written comments, that's the deadline.

And then, tentatively we expect the Draft EIR to be published in spring of 2016. And that's, again, an opportunity for the public to comment. Once that's distributed, we solicit comments from the public and other agencies about our draft analysis before we certify it as a final EIR, which we expect to occur around fall of 2016.

So, again, the purpose of this meeting is really to hear from you. There's not going to be any back and forth tonight. We're really here to hear your concerns. A lot of you have local perspective that can be valuable to help shape the content and scope of the EIR.

So in that regard, your comments are most pertinent in terms of the environmental impacts. It's not so much whether you like the project or not. You're helping us write the EIR by commenting on concerns related to environmental effects, alternatives, perhaps the way we go about analyzing the impacts, mitigation measures. Those are the types of relevant topics that are really most pertinent to the scoping meeting.

So I'll turn it back, I think, to Jesus. We'll get into a brief overview, kind of a mini version of what some of you heard earlier.

JESUS ALMAGUER: Hi, I'm Jesus Almaguer. I'm the project engineer for the Alameda Creek Recapture Project.

So the recapture -- sorry.

The project, the proposed needs and objectives: recapture the future instream flow releases from Calaveras Reservoir and Alameda Creek Diversion Dam required under the Calaveras Dam Replacement Project permits. The annual recapture average is 9,800 acre feet. That's equivalent to 32 million gallons -- 3200 million gallons, sorry.

Shown up here is the future instream flow releases for the Alameda Creek from the Calaveras Reservoir and bypasses around the Alameda Creek Diversion Dam.

On the top is the Alameda Creek Diversion Dam flow releases. And then on the bottom is the Calaveras flow releases for the dry year and the normal wet years. Those are the three flow releases.

The Alameda Creek Recapture Project plans to operate the pond similar to -- as a reservoir. The water naturally infiltrates into the pond and fills in the winter, and then the pond is slowly drawn down late spring to early fall.

So pumping will occur generally from May to

October. The water will be captured by pumping it, using pumps on barges in the pond. And the pumping rate is 19.4 million gallons per day, or it's equivalent to 30 cubic feet per second.

Once the water's pumped, it's going to get sent to the Regional Water System through the existing pipes in the Sunol Valley, direct connected to our existing Sunol pipeline.

So the project components which will be designed and installed into the proposed project are:

Four vertical turbine pumps on barges. Each vertical turbine pump will have a dedicated barge, be clustered together, tethered into a cluster of four. A mooring system will help -- will keep it in its desired location.

Each pump has its 16-inch flexible discharge line. So this will connect the pumps to the valve vaults and the pipelines on the shore.

The new manifold and pipeline will connect it to the existing pipes and send it into the regional water system.

The throttling valves or control valves and flow meter will be used to operate the facility.

And an electrical control building is used to house all the major electrical components to operate

the facility.

The power will be provided by a nearby substation so the power and communication cables will be ran through overhead lines and utility poles to the project site.

So this is a location of the map of the Sunol area. This is where the Pond F2 is. This pond water will be sent to either San Antonio Reservoir or the Sunol Valley Water Treatment Plant using pipes that are not shown on this drawing.

The power will come primarily -- will come from the substation, which is located close to Pond F2 on the other side of -- south side of San Antonio Creek.

This is the site plan which shows the mooring lines and the four pumps on barges and the discharge -- flexible discharge lines which go to onshore valve vault. And the other note is the new overhead power lines, which also will have the communication wires. So it runs from the new project site, the proposed project site, to the existing power lines just south of San Antonio Creek.

At the electrical control building, which is shown, a small area here, that's a prefabricated building. And it will house all the electrical components, like I said earlier.

And that is it.

STEVEN SMITH: Great. So, again, you know, we're here to hear from you tonight. So hopefully, if you're interested in making a comment, you filled out a speaker card.

Meryka, I think, was collecting those.

KELLY WHITE: I can collect it.

STEVEN SMITH: Okay, Kelly's got it.

Briefly, a couple of ground rules.

If you wouldn't mind speaking your name when you come up. Three minutes, that's a rough guideline. I don't think it's going to take a long time to get through public comments tonight. But just a reminder too, there's ways to submit written comments, whether it's by e-mail or through a letter or fax even.

So -- and we have a court reporter here. Again, I just want you to be aware of that.

So let me ask, if folks get up and just speak, that will work for you? Okay.

Kelly do you have the first?

KELLY WHITE: I do.

STEVEN SMITH: Do you mind?

KELLY WHITE: Jeff Miller from the Alameda Creek Alliance.

JEFF MILLER: Yes. Hope you can hear me. Jeff Miller, J-E-F-F, M-I-L-L-E-R, Director of the Alameda Creek Alliance.

I've got to say, I mean, it's a pretty interesting project. It is kind of elegant to take water off stream. But, unfortunately, water doesn't just appear from nowhere. So I'm hoping the EIR would look at where this flow is coming from.

It's apparently already known that it's subsurface flow coming into F pit. If there's any hydraulic connection between that flow and surface flows in Alameda Creek so that, when pumping is happening, is that going to increase infiltration rates? Is it in any way going to affect surface flow in Alameda Creek adjacent to the quarry or upstream of the quarry?

And then also look at downstream; is there -- where is that water ultimately going? And will pumping at all impact surface flow in, say, Niles Canyon or in downstream reaches.

Obviously, the time of year, if it is impacting, the time of year will have some impact on migratory fish or fish habitat.

I'm also hoping the EIR will look at -- I see it as kind of two-flow. There's two kinds of flows being released. There are flows being released from Calaveras Reservoir, cold water flows coming in the summer. Those are flows that are being released at a time when they naturally are going to infiltrate into the alluvium there in Sunol Valley and were not going to continue downstream. So recapturing those flows is not going to harm any fish or fish habitat downstream.

The flows from the diversion dam that are being bypassed the diversion dam, though, are intended as migration flows. And that's a different type of mitigation flow. And that's flow that's intended to be moving downstream so the fish can move upstream on those flows and other flows that are in the creek.

And I'd be curious how the Calaveras Dam Environmental Impact Report and the Biological Opinion for the Calaveras Dam Replacement Project characterized those bypass flows. If those are mitigation flows, that it states clearly are going to be moving down stream and providing fish passage and habitat downstream, I think it is raises some interesting questions for recapturing those kind of mitigation flows.

That's pretty much it.

KELLY WHITE: Jim O'Laughlin?

JIM O'LAUGHLIN: Jim, J-I-M, O, apostrophe

L-A-U-G-H-L-I-N, Sunol resident.

The one issue I mentioned previously would be what impact is there going to be on the groundwater levels, especially below the pit, to release them out in Niles Canyon in terms of the immediate Sunol area.

A second is related to the reclamation plan. It would be interesting to see if there's a way of providing an acceleration of the reclamation plan for that pit at the time that is -- that the use of the pit is being substantially changed and not have to wait another 26 years before they start talking about that. It would be a real plus for, I think, everyone who has to go by there and especially local people who have to live close by if there could be some reclamation accelerated in that area.

The whole question of what is -- what historically has been required in terms of release, what previous commitments were and how exactly -- exactly how those previous commitments, especially legal commitments, are going to be impacted by this project. And we talked about that a bit tonight, but it still, I think, would be in everyone's interest to have that sort of crystal clear, so that we really do know what was the commitment and what is going to be the new commitment.

I think everyone would agree that the goal would be to have all the water coming down the creek all the time. But the real question is what has to happen, not what we'd like to see.

The question in terms of the cost and specifically how much electricity would be used to, you know, pump this water.

And that's all my questions.

KELLY WHITE: Thanks.

I didn't see any other filled-out cards. Anyone? Going once?

BOB FOSTER: I have a question. I'll fill out the card. I was waiting.

KELLY WHITE: Do you need a minute or --

STEVEN SMITH: If you want to just state your name --

BOB FOSTER: I wanted to hear what other people were asking because a lot of these things are commonsense questions that would be evoked by this process.

Bob Foster, B-O-B, F-O-S-T-E-R.

My question has to do with the cost, what is this project costs; how is it going to be financed; what effect will it have on our rates, these kinds of things.

The other question I have is I suspect that this project is the result of a lot of conversations, something that -- influenced by what has gone before, which you tried to explain. But I don't really understand the historical agreement. But I can read about that in your materials.

I will be curious as to what alternatives did you turn down for whatever reason. It seems that there are -- if we're trying to take care of the ecology of that flow of water to permit ancestral fish to be able to move up, that the further on down, the closer to sea that you start process of reclaiming water that has come down, the less danger there is of simply having things happen that you can't -- we don't -- we simply don't know enough.

And I'm not a hydrologist, but that challenge of -- of figuring out, "Well, if we take this out, what is going to happen here, here and here and here?" The devil is in the details. And when we start to mess with systems, we try to do our best to figure out, "Well, what is going to happen?"

And it seems like when you start removing water from a system that has existed for millennia, can you really predict what's going to happen? In other words, can you write an EIR that is complete enough so that we can make a good decision about whether to support this or not to support it?

So it would be nice for whoever is going to do the research to prepare us to be able to have us be able to see there's some credibility here.

What has happened before? Are there other places that have done this kind of thing? What has happened there? Because right now, I'm overwhelmed with the amount of ignorance I have on -- I mean, I understand financially and in terms of the business sense why SFPUC's interested in doing this. You have a resource, and you're counting on being able to maintain the resource for your customers.

But I don't know. I'm -- I'm waiting to really see the EIR before I can be any better in asking the right questions.

CONNIE DeGRANGE: I don't have a card. Connie C-O-N-N-I-E, D-E, capital G-R-A-N-G-E. And I recall that, when the City of San Francisco bought the Spring Valley Water Company and then for several years after that, that there were -- I think there were about 32 wells in the area that were drawing down the water table.

And wasn't there an agreement reached that San Francisco would stop pumping out of the valley and

stop drawing down the water table? And when I look at this project, it appears to be just one giant well pumping the groundwater.

So I think I'd like to hear more about the same thing that Jeff was talking about and Jim was talking about, the impacts of the draw-down, of pumping from that giant well, which is, you know, a quarry.

STEVEN SMITH: Anyone else?

JIM O'LAUGHLIN: I assume that -- I saw in one of your documents that you will look at some alternatives. And I guess my question is will you carefully look at the alternative of doing nothing except what you are legally responsible to do based on current historical agreements?

And then what would -- and then part of that would be, well, what would be the impact? Supposedly what would be the negative impact which would rule that out?

STEVEN SMITH: Anybody else?

(No response)

STEVEN SMITH: This information here is how can you go about submitting your written comments -- we also have materials up there you're welcome to take with you -- by e-mail, fax.

KELLY WHITE: It's on the comment card. Even if you don't want to fill it out tonight, all of the information for submitting written comments is on the comment card as well as at the end of the NOP.

STEVEN SMITH: Right. You can drop off a comment tonight, if you like.

Well, thank you very much, everybody. We really appreciate you coming tonight. I'll formally close the hearing. And just want to say staff will be around for a little while, if there's any other follow-up questions you want to pose. And then as well, I think I've got some -- feel free to contact me particularly for anything related to the environmental review process. And Kelly Capone is a great contact if you have questions specific to the project. Thank you again, everybody.

(Whereupon, the proceedings concluded at 7:05 o'clock p.m.)

STATE OF CALIFORNIA)
) ss.
COUNTY OF MARIN)

I, DEBORAH FUQUA, a Certified Shorthand Reporter of the State of California, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 30th day of July, 2015.

DEBORAH FUQUA
CSR NO. 12948

APPENDIX D

Comments Received During EIR Scoping Process

From: Hendrickson, Beth@DOC [mailto:Beth.Hendrickson@conservation.ca.gov]
Sent: Monday, July 20, 2015 3:00 PM
To: Smith, Steve (CWP)
Cc: Goodwin, Joshua@DOC; james.gilford@acgov.org
Subject: RE: Alameda Creek Recapture Project

Hi Steve,

Thanks for your help. I was able to determine that the mine in question has a CA Mine ID #91-01-0013. They have been reporting "active" with no production since 2007; which means that technically they are abandoned. In any case, the reclamation plan for the mine will need to be amended to account for this new end use. Alameda County would be the lead agency for the reclamation plan amendment. Since SF doesn't have any mines you may be unaware of the requirements under the Surface Mining and Reclamation Act of 1975 (SMARA), and I just wanted to make sure that SMARA requirements are also met during this project.

Thank you,

Beth Hendrickson
Manager, Environmental Services Unit
Office of Mine Reclamation
801 K St. MS 09-06
Sacramento, CA 95814
(916) 445-6175
fax 445-6066

From: Smith, Steve (CWP) [mailto:steve.smith@sfgov.org]
Sent: Monday, July 20, 2015 2:25 PM
To: Hendrickson, Beth@DOC
Subject: RE: Alameda Creek Recapture Project

Hi Beth – the quarry pit in question, Pit F2, was previously the site of an aggregate mining operation under Surface Mining Permit 24. The current owner/operator is Hanson Aggregates in the vicinity, though it's possible a different owner operated the site when it was actively mined. I believe the mining work at Pit F2 ended around 2006.

Let me know if you have any additional questions.

Thanks,
Steve

Steven H. Smith, AICP
Senior Environmental Planner

Planning Department | City and County of San Francisco
1650 Mission Street, Suite 400, San Francisco, CA 94103
Direct: 415-558-6373 | Fax: 415-558-6409
Email: steve.smith@sfgov.org
Web: www.sfplanning.org

From: Hendrickson, Beth@DOC [mailto:Beth.Hendrickson@conservation.ca.gov]
Sent: Monday, July 20, 2015 8:31 AM
To: Smith, Steve (CWP)
Subject: Alameda Creek Recapture Project

Hello,

I'm trying to determine whether the quarry to be used in this project was ever operated under the Surface Mining and Reclamation Act of 1975. Do you have any more information about it?

Thank you,

Beth Hendrickson
Manager, Environmental Services Unit
Office of Mine Reclamation
801 K St. MS 09-06
Sacramento, CA 95814
(916) 445-6175
fax 445-6066

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
P.O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 286-5528
FAX (510) 286-5559
TTY 711
www.dot.ca.gov

Serious Drought.
Help save water!

July 23, 2015

SFGEN025
ALA-680-R 11.04
SCH# 2015062072

Mr. Steve Smith
Planning Division
City and County of San Francisco
1650 Mission Street, Suite 400
San Francisco, CA 94103

SFPUC Alameda Creek Recapture Project – Notice of Preparation

Dear Mr. Smith:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the project referenced above. Our comments seek to promote the State's new mission, vision, and smart mobility goals for sustainability, livability, economy, safety and health. We have reviewed the Notice of Preparation and have the following comments to offer.

Project Understanding

The Alameda Creek Recapture Project (Project) is located on San Francisco Public Utilities Commissions (SFPUC's) Alameda watershed lands in unincorporated Alameda County. Recaptured water will be released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam during future operation of Calaveras Reservoir. The Project is a component of the SFPUC's Water System Improvement Program. It will allow the SFPUC to maintain its historic water diversions from the Alameda watershed system and avoid loss of regional water system yield. Water would be recaptured from a quarry pit in the Sunol Valley located an approximate one half mile south of the Interstate 680 (I-680) / State Route 84 interchange.

State Route 84 – Niles Canyon Road Safety Improvements

Please be advised that proposed safety improvements on State Route 84, including the signalization of the State Route 84/Paloma Way/Pleasanton-Sunol Road/Temple Road intersection, are part of the Niles Canyon Safety Improvement Project under Caltrans State Highway Operation and Protection Program for Alameda County. The environmental document should consider possible overlapping of construction operations and traffic impacts, and should coordinate with Caltrans, if necessary. Please see the following website for more information: http://www.dot.ca.gov/dist4/nilescanyon/.

Transportation Impact Study

During construction or starting "opening day," this project may generate traffic at volumes sufficient to impact the operations of nearby State highway facilities at I-680 and State Route 84. It may be necessary to prepare a Transportation Impact Study (TIS). If it is found that a TIS is not required, please provide a verifiable explanation for this finding. The following criteria are among those that may be used to determine whether a TIS is warranted:

1. The project will generate over 100 peak hour trips assigned to a State highway facility.
2. The project will generate between 50 and 100 peak hour trips assigned to a State highway facility, and the affected highway facilities are experiencing noticeable delay; approaching unstable traffic flow (level of service (LOS) "C" or "D") conditions.
3. The project will generate between one to 49 peak hour trips assigned to a State highway facility, and the affected highway facilities are experiencing significant delay; unstable or forced traffic flow (LOS "E" or "F") conditions.

We are in the process of updating our *Guide for the Preparation of Traffic Impact Studies* (TIS Guide) for consistency with SB 743, but meanwhile recommend using the Caltrans TIS Guide for determining which scenarios and methodologies to use in the analysis, available at: http://dot.ca.gov/hq/tpp/offices/ocp/igr_ceqa_files/tisguide.pdf.

Transportation Management Plan

A Transportation Management Plan (TMP) or construction TIS may be required of the City for approval by Caltrans prior to construction where traffic restrictions and detours affect State highways. TMPs must be prepared in accordance with California *Manual on Uniform Traffic Control Devices.* Please ensure that such plans are also prepared in accordance with the transportation management plan requirements of the corresponding jurisdictions. For further TMP assistance, please contact the Office of Traffic Management Plans/Operations Strategies at 510-286-4579. TMP information is also available at the following webpage: http://www.dot.ca.gov/hq/traffops/engineering/mutcd/pdf/camutcd2014/Part6.pdf.

Transportation Permit

Project work that requires movement of oversized or excessive load vehicles on State roadways requires a transportation permit that is issued by Caltrans. To apply, a completed transportation permit application with the determined specific route(s) for the shipper to follow from origin to destination must be submitted to: Caltrans Transportation Permits Office, 1823 14th Street, Sacramento, CA 95811-7119. See the following website for more information: http://www.dot.ca.gov/hq/traffops/permits.

Encroachment Permit

Please be advised that any work or traffic control that encroaches onto the State Right-of-way

(ROW) requires an encroachment permit that is issued by Caltrans. Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating State ROW must be submitted to the following address: David Salladay, District Office Chief, Office of Permits, California Department of Transportation, District 4, P.O. Box 23660, Oakland, CA 94623-0660. See the following website for more information: http://www.dot.ca.gov/hq/traffops/developserv/permits.

Mitigation Responsibility
As the lead agency, the City and County of San Francisco is responsible for identifying and ensuring the coordinated implementation of all project mitigations. The project's fair share contribution, financing, scheduling, implementation responsibilities associated with planned improvements on Caltrans ROW should be listed, in addition to identifying viable funding sources per General Plan Guidelines.

Should you have any questions regarding this letter or require additional information, please contact Sherie George at (510) 286-5535 or by email at: sherie.george@dot.ca.gov.

Sincerely,

PATRICIA MAURICE
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN JR., Governor
DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUL 13 2015

Mr. Steve Smith, Project Manager
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, California 94103-2479

Notice of Preparation of Environmental Impact Report for Alameda Creek Recapture Project
Alameda County

Dear Mr. Smith:

We have reviewed your submittal entitled Notice of Preparation of Environmental Impact Report (NOP) for the above referenced project which describes the construction of:

- Four anchored barge-mounted floating pumps
- Four flexible discharge pipelines and manifold
- Ancillary electrical instrumentation

No above ground barrier will be constructed according to our conversation with you on July 7, 2015. Therefore, this project as described is not subject to State jurisdiction for dam safety.

As defined in Sections 6002 and 6003, Division 3 of the California Water Code, dams 25 feet or higher with a storage capacity of more than 15 acre-feet, and dams higher than 6 feet with a storage capacity of 50 acre-feet or more are subject to State jurisdiction. Dam height is defined as the vertical distance measured from the maximum possible water storage level to the downstream toe of the barrier.

If the design of the proposed project changes such that it includes a jurisdictional dam, it will become subject to State jurisdiction for dam safety upon construction. In the event the proposed project is under State jurisdiction, a construction application, together with plans, specifications, and the appropriate fees must be filed with this Division. All dam safety related issues must be satisfactorily addressed prior to our approval of the application. Additionally, all design and construction work must be performed under the direction of a Civil Engineer registered in California.

If you have any questions or need additional information, you may contact Office Engineer Roberto Cervantes at (916) 227-4601 or me at (916) 227-4604.

Sincerely,

[signature] for YDE

Y-Nhi D. Enzler, Regional Engineer
Northern Region
Field Engineering Branch
Division of Safety of Dams

cc: Ms. Nadell Gayou, Resources Agency Project Coordinator
Environmental Review Section
Division of Statewide Integrated Water Management
901 P Street
Sacramento, California 95814

Governor's Office of Planning and Research
State Clearinghouse
Post Office Box 3044
Sacramento, California 95812-3044

CALIFORNIA
Water Boards

Edmund G. Brown Jr., Governor
Matthew Rodriquez, Secretary for Environmental Protection

San Francisco Bay Regional Water Quality Control Board

Sent via electronic mail: No hard copy to follow

July 22, 2015
CIWQS Place ID No. 816770

City and County of San Francisco
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco CA 94103-2479

Attn.: Steve Smith (steve.smith@sfgov.org)

Subject: Notice of Preparation for the San Francisco Public Utilities Commission Alameda Creek Replacement Project, Draft Environmental Impact Report. SCH No. 2015062072

Dear Mr. Smith:

San Francisco Bay Regional Water Quality Control Board (Water Board) staff has reviewed the Notice of Preparation for the San Francisco Public Utilities Commission Alameda Creek Replacement Project, Draft Environmental Impact Report. The San Francisco Public Utilities Commission (SFPUC) is proposing to implement the Alameda Creek Recapture Project (Project) on SFPUC Alameda watershed lands in unincorporated Alameda County. The Project would recapture an annual average of up to 9,820 acre-feet per year (or 3,200 million gallons per year) of water that will be released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam during future operation of Calaveras Reservoir. Water would be recaptured from a quarry pit, Pit F2, in the Sunol Valley located approximately 6 miles downstream of Calaveras Reservoir and 0.5-mile south of the I-680/State Route 84 interchange. Water Board staff have the following comments on areas of potential impacts that should be assessed in the

Comment 1. Establishing water rights to water taken from Pit F2.

The SFPUC is planning to extract water from Pit F2 to compensate for water that will be released from Calaveras Reservoir or bypassed around the Alameda Creek Diversion Dam in order to enhance habitat in Alameda Creek for salmonids. Quarry Pit F2 receives water that infiltrates through the bed of Alameda and into Pit F2. Please include a discussion of water rights in the Draft Environmental Impact Report (DEIR) for the Project. The DEIR should describe how the SFPUC will establish water rights to water that infiltrates into Pit F2.

Comment 2. Assessing the impact of the Project on overall infiltration of water through the bed of Alameda Creek.

The extraction of water from Pit F2 will lower the local groundwater elevation and increase the driving force for water infiltrating through the bed of Alameda Creek in the vicinity of the Project. It is possible that the Project will result in greater rates of infiltration to adjoining quarry pits, as well as into Pit F2. The DEIR should assess the impact of the extraction of water from Pit F2 on increasing the regional rate of infiltration through the bed of Alameda Creek, and reducing the quantity of flow that remains in Alameda Creek. This assessment should include potential impacts to fish passage in response to increased rates of infiltration.

Please contact me at (510) 622-5680 or brian.wines@waterboards.ca.gov if you have any questions.

Sincerely,

Brian Wines
Water Resource Control Engineer

Attachment

cc: State Clearinghouse (state.clearinghouse@opr.ca.gov)
San Francisco Public Utilities Commission, Kelley Capone (kcapone@sfwater.org)

BAWSCA
Bay Area Water Supply & Conservation Agency

July 27, 2015

Ms. Sarah B. Jones
Environmental Review Officer
Alameda Creek Recapture Project EIR Scoping Comments
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103

Subject: **Case No. 2015-004827ENV – Response to Notice of Preparation (NOP) of an EIR for the SFPUC Alameda Creek Recapture Project**

Dear Ms. Jones,

Thank you for the opportunity to provide the following comments from the Bay Area Water Supply & Conservation Agency (BAWSCA). BAWSCA represents the interests of 25 cities and water districts, an investor-owned utility, and a university, that purchase water wholesale from the San Francisco Regional Water System. These agencies, in turn, provide water to 1.7 million people, businesses and community organizations in Alameda, Santa Clara and San Mateo Counties. These comments are in response to the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Alameda Creek Recapture Project (Project) dated June 24, 2015. They are intended as input to the scope and focus of the Project EIR.

1. **General Comment**

   Any information derived from the *Final Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program* (certified October 30, 2008) for this EIR should be confirmed and/or updated where necessary.

2. **Project Objectives (page 5)**

   The EIR should provide the basis for understanding the target recapture amount (an annual average of up to 9,820 ac ft/yr) in the context of the future, long-range operation of the Calaveras Reservoir. This will demonstrate the sufficiency of the target amount to completely satisfy the Water System Improvement Program level of service goals and objectives related to water supply during both non-drought and drought periods.

3. **Project Components (pages 5-6)**

   The EIR should provide information supporting the assumption that the water quality in Pit F2 would be adequate and that pretreatment would not be required prior to conveying the water to the Sunol Valley Water Treatment Plant or the San Antonio Reservoir.

4. **Proposed Operations (page 6)**
The EIR should provide information about the mechanism of natural infiltration into Pit F2 and the associated volume as it relates to various hydrologic conditions. As water also enters/exits Pit F2 through other means (e.g., precipitation and evaporation) all factors contributing to the understanding of the recapture amount under various conditions should be discussed.

Thank you for the opportunity to provide these comments on the NOP dated June 24, 2015 regarding the Alameda Creek Recapture project. If you have any questions, please contact me at (650) 349-3000.

Sincerely,

Michael B. Hurley
Water Resources Manager

cc: Nicole M. Sandkulla, BAWSCA
Allison Schutte, Hanson Bridgett
File

ACWD
ALAMEDA COUNTY WATER DISTRICT

43885 SOUTH GRIMMER BOULEVARD • FREMONT, CALIFORNIA 94538
(510) 668-4200 • FAX (510) 770-1793 • www.acwd.org

July 27, 2015

Sarah B. Jones
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103

Dear Ms. Jones:

Subject: Comments on the Notice of Preparation of an Environmental Impact Report for the Alameda Creek Recapture Project

Thank you for the opportunity to provide comments on the proposed Alameda Creek Recapture Project (ACRP) during the project scoping phase. The Alameda County Water District (ACWD) acknowledges the significant accomplishments of the SFPUC to date in the implementation of the Water Supply Improvement Program (WSIP) since ACWD is a customer and, therefore, a beneficiary of the water supply reliability improvements that the SFPUC is achieving through its implementation.

That said, ACWD has a strong interest in protecting and preserving water quality and water supply in Alameda Creek and the Alameda Creek Watershed. ACWD is particularly concerned with potential impacts that the ACRP may have on ACWD's water supplies as well as ongoing projects related to fisheries restoration in Alameda Creek. With a service area located downstream of the proposed project location, ACWD uses water from the Alameda Creek watershed for drinking water supply to over 344,000 people in the cities of Fremont, Newark, and Union City. ACWD relies on adequate flow in Alameda Creek for groundwater recharge and its subsequent use as a potable drinking water supply. Additionally, ACWD, together with the SFPUC and other watershed stakeholders, is actively involved in the ongoing steelhead restoration efforts to restore the steelhead run in the Alameda Creek Watershed.

<u>ACWD's Understanding of the ACRP</u>

The ACRP is intended to recapture flows released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam as part of the future operations plan described in the Calaveras Dam Replacement Project Biological Opinion. The ACRP will rely on the slow and steady percolation of surface water from Alameda Creek, into the Sunol Groundwater Basin, and into Pit-F2 from where it will be captured and pumped to surface storage or treatment. Pit-F2 will effectively act as a sump for southern Sunol Valley and the dewatering of Pit-F2 could, in theory, facilitate recapture by increasing the potential head needed to increase percolation out of Alameda Creek.

As indicated in the Notice of Preparation (NOP), the volume of water that the ACRP intends to recapture is approximately equal to the average annual water to be released or bypassed. However, while annual totals may be the same, the actual daily rate of releases or bypass flows will be quantifiably different from the recapture rate provided by the ACRP. Real-time releases and bypasses will be on the order of tens to thousands of cubic feet per second (cfs), while the real time recapture rate will likely be on the order of ones to tens of cfs. Thus, when releases or bypasses are high, a substantial amount of the actual flows will exit Sunol Valley rather than percolate into the ground. Conversely, when releases or bypasses are low, the ACRP may continue to *capture* flows from Alameda Creek that are neither releases nor bypasses. The disparity in the release and recapture rates may have impacts in a variety of areas of concern and will need to be analyzed in sufficient detail for potential impacts to be understood and ultimately mitigated if necessary.

Since much of the releases and bypass flows will exit Sunol Valley, in order to make the annual average volume of yield from the ACRP equal the volume released or bypassed, the ACRP must "make-up" additional water. Some release or bypass water will be recaptured; however, additional water originating from sources other than Calaveras Reservoir and the Diversion Dam, such as Welch Creek, may be captured, pumped, and delivered to storage or treatment as a result of the ACRP. Due to this mechanism of operations, it is difficult to define the ACRP as strictly a 'recapture' facility. Rather, the ACRP will act as an alternative water supply or management system to compensate for lost yield from Calaveras Dam and Alameda Creek Diversion Dam.

It is with this understanding that the following comments are provided.

<u>ACWD Comments</u>

The Environmental Impact Report (EIR) must adequately address issues associated with protection of Alameda Creek, and the Alameda Creek Watershed as well as address potential impacts to downstream agencies. ACWD requests the EIR include sufficient detail to address the following areas of concern:

1. <u>Rigor of Analysis</u>

Surface water and groundwater interactions are complex and dynamic physical processes. The Alameda System Daily Hydrologic Model (ASDHM) cited in the NOP is an empirically derived surface water model developed to analyze surface water flow rates under existing and future conditions. By design, the proposed ACRP will influence the surface water and groundwater interaction in a manner different from existing conditions. Therefore this empirical model will need to be substantially modified and may prove to be insufficient to fully analyze the impacts of

operation of the ACRP. The EIR should consider using a more robust, physically based hydrological model capable of estimating the impact on stream flows throughout the project area, in Niles Canyon, and out to the San Francisco Bay. Alternatively, as is often the case with surface water and groundwater interactions, controlled physical tests could be conducted and would likely be more conclusive.

The following information should be considered as part of the analysis:

a) Evaluation of the groundwater seepage and surface water recharge from Alameda Creek and San Antonio Creek into Pit F2.

b) Quantify the amount of release and bypass water that will actually percolate into the Sunol Valley Groundwater Basin (including water captured at the existing infiltration gallery) that can actually be defined as "recapture."

c) Description of the origin of water other than the "recapture" that will be pumped out of Pit F2 at the various times of operation (*i.e.*, surface water or groundwater).

2. <u>Hydrologic, Biological, and Water Supply Impacts</u>

a) The EIR should provide sufficient detail to analyze impacts associated with the differing rates of release and recapture on the following:
   - Anadromous fish passage in the Alameda Creek Flood Control Channel, Niles Canyon and Sunol Valley.
   - Aquatic and riparian habitat in Niles Canyon and Sunol Valley.
   - ACWD groundwater recharge operations and water supply.

b) The potential impacts of the ACRP will likely vary significantly between dry, average, and wet year conditions. The EIR analysis should address these separate hydrologic year types.

3. <u>Inconsistency with the WSIP Programmatic EIR</u>

Previous environmental reporting described a recapture facility with capacity of up to 6,300 AF/year. The proposed ACRP capacity has been increased to 9,820 AF/year. The EIR should address this discrepancy and any additional environmental impacts from the increased capacity.

4. <u>Water Rights</u>

The EIR should identify the alternative water supply that is being captured as a result of the ACRP and include an analysis of the impact to both surface water and groundwater rights in the affected area.

5. Past, Present, and Future Work on Fisheries Projects

The NOP states that the EIR will evaluate potential cumulative impacts resulting from implementation of the ACRP in combination with other projects in the vicinity. This cumulative impacts analysis should include projects that are being pursued by the Alameda Creek Fisheries Workgroup including; ACWD/Alameda County Flood Control and Water Conservation District's Joint Fish Passage Projects, Alameda County Flood Control's projects in the lower Alameda Creek, SFPUC's projects in Niles Canyon, and PG&E's plans to address fish passage in Sunol Valley.

6. Permits and Approvals

a) The NOP states that no federal permits are anticipated. ACWD encourages the SFPUC to evaluate the potential impacts to "waters of the United States" and permit requirements under the Clean Water Rule published on June 29, 2015, in the Federal Register (80 FR 37054). The final rule becomes effective on August 28, 2015, modifying the definition of waters of the United States under 40 C.F.R. 230.3.

b) The NOP does not indicate that notification of California Department of Fish and Wildlife is required under Fish and Game Code section 1602. This determination in the environmental impact report should take into account the recent holding in the case *Siskiyou County Farm Bureau v. Department of Fish and Wildlife* C.D.O.S. 5632, No. C073735 (June 4, 2015) that notification is required even if there is no disturbance of a streambed or bank.

7. Infrastructure Concerns

Pit-F2 lies adjacent to the South Bay Aqueduct (SBA), which supplies water to the Zone 7 Water Agency, ACWD, and the Santa Clara Valley Water District. Recent studies indicate the section of the SBA located adjacent to Pit F2 is at an increased risk of failure under seismic events.Given these findings, ACWD requests that the EIR evaluate whether cycling water levels in Pit F2 will have the potential to compromise the integrity and stability of soils in this area.

8. Considerations for the Alternatives Analysis

As stated in the NOP, the California Environmental Quality Act (CEQA) requires an evaluation of alternatives to the project. ACWD, being both a downstream agency and wholesale customer of the SFPUC, believes that there is a potential to coordinate in the scoping and assessment of some project alternatives, including operational alternatives of the proposed project, and welcomes discussions with the SFPUC on ways in which our two agencies can achieve the goals of enhancing environmental conditions within the Alameda Creek watershed while minimizing impacts to water supply reliability for both of our agencies.

Thank you again for the opportunity to comment during the project scoping phase. Should you have any questions about these comments or about ACWD's Alameda Creek water supply and downstream operations, please feel free to contact Steven Inn, Manager of Water Resources, at (510) 668-4441. We look forward to coordinating further with you on this project.

Sincerely,

Robert Shaver
General Manager

tn/tf
cc: Steven Inn, ACWD
Michael Carlin, SFPUC
Steve Ritchie, SFPUC

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, ZONE 7
100 NORTH CANYONS PARKWAY • LIVERMORE, CA 94551 • PHONE (925) 454-5000 • FAX (925) 454-5727

August 4, 2015

San Francisco Planning Department
1650 Mission Street
San Francisco, CA 94103
Attn.: Steven Smith

Re: *Comments on Notice of Preparation (NOP) for Alameda Creek Recapture Project*

Steven,

Zone 7 Water Agency (Zone 7) has reviewed the referenced NOP in the context of Zone 7's mission to provide drinking water, non-potable water for agriculture/irrigated turf, flood protection, and groundwater and stream management within the Livermore-Amador Valley. We have the following comments for your consideration:

- The EIR should assess the groundwater sustainability impacts from the proposed project. "Recapturing" the entire quantity of "water released or bypassed at Calaveras Dam and Alameda Creek Diversion Dam– an average of 3.2 billion gallons a year…" from the "natural" seepage into quarry Pit F2 is not likely to have an insignificant effect on groundwater supplies. It is not logical to assume that all of the water released or bypassed to Alameda Creek will end up in Pit F2. There will be water losses associated with the artificial flows, such as: evapo-transpiration; surface water outflow; soil moisture and bank storage increases; and migration of stream percolate to parts of the groundwater basin where it may become unrecoverable or non-beneficial. Consequently, one should conclude that some of the volume planned to be pumped from Pit F2 will come from "natural" groundwater supplies if SFPUC pumps the same volume it releases or bypasses.

- The EIR should also include plans to monitor groundwater levels at key locations around the groundwater basin to make sure on a periodic basis that the impact of ACRP operations are truly not having an unacceptable impact on groundwater supplies. Associated with the monitoring of groundwater levels, the EIR should present a contingency plan with established trigger levels for the case that groundwater levels become unsustainable because of the ACRP operations. As an added note, the construction or destruction of any groundwater well or soil boring >10 feet in depth within Sunol Valley requires a well construction permit from Zone 7.

We appreciate the opportunity to comment on this project. If you have any questions on this letter, please feel free to contact me at (925) 454-5005 or via email at erank@zone7water.com .

Sincerely,

Elke Rank
Elke Rank

cc: Carol Mahoney, Matt Katen, file

DIRECTORS
THOMAS PICCOLOTTI, PRESIDENT
JOSHUA COSGROVE, VICE-PRESIDENT
ANNE DE JARNATT
RON ASH
JACK BURGETT

2400 Francisco Blvd.
P.O. Box 1039, Pacifica, CA 94044
www.nccwd.com

North Coast County WATER DISTRICT
SINCE 1944

STAFF
CARI LEMKE
GENERAL MANAGER

SCOTT DALTON
SUPERINTENDENT

Phone (650) 355-3462
Fax (650 355-0735

June 25, 2015

The Planning Department
City and County of San Francisco
1650 Mission Street
San Francisco CA 94103-2414

RE: Name Correction

Please correct your files. Kevin O'Connell retired from the North Coast County Water District approximately 5 years ago. The new General Manager is Cari Lemke.

Thank you for your attention to this matter. If you have any questions, please feel free to call me at (650) 355-3462 extension 234.

Sincerely,

Janice D. Zavala-Clark
Janice D. Zavala-Clark
Management Analyst II

Attachment

S:\users\Forms\Name Changes\ccsf_planningdept_ko to cl_06-25-15.doc

Alameda Creek Alliance

P.O. Box 2626 • Niles, CA • 94536
Phone: (510) 499-9185
E-mail: alamedacreek@hotmail.com
Web: www.alamedacreek.org

July 14, 2015

Sarah B. Jones
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103

Sent via e-mail to Sarah.B.Jones@sfgov.org, Steve.Smith@sfgov.org, KCapone@sfwater.org and TRamirez@sfwater.org

ACA Scoping Comments on Alameda Creek Recapture Project, 2015-004827ENV

These are the scoping comments of the Alameda Creek Alliance on the proposed SFPUC Alameda Creek Recapture Project, Case No. 2015-004827ENV.

Improvements over Previous Project Designs

Previous design proposals for the Alameda Creek Recapture Project included construction of an inflatable rubber dam or installing an in-stream infiltration gallery under Alameda Creek in the Sunol Valley, to recapture water released from or bypassed at Alameda Creek Diversion Dam and Calaveras Dam. Both of these recapture approaches would have required construction of infrastructure in Alameda Creek which could have had impacts on fish migration, water quality, in-stream habitat, spread of invasive species, and riparian vegetation. The project as currently proposed, with the water recapture location moved to an off-stream quarry pit, removes those potential impacts from the project.

Potential Impacts of Groundwater Mining On Surface Flows in Alameda Creek

The proposed project will "recapture" Alameda Creek groundwater that flows subsurface and infiltrates into quarry Pit F2. The Environmental Impact Report should describe the origin of this water, the hydrologic connections between the groundwater that infiltrates into Pit F2 and the Sunol Valley groundwater basins, and the hydrologic connections between this water and surface water flows in Alameda Creek above, adjacent to and below the project reach. The EIR should analyze the impacts of mining up to 9,820 acre-feet of groundwater annually from Pit F2, on groundwater resources in the Sunol Valley and downstream in Niles Canyon, on surface water flows in Alameda Creek through the Sunol Valley and downstream through Niles Canyon, and any potential impacts on fisheries and other aquatic resources, including habitat alteration or impairment of fish migration corridors. If there are impacts to surface flow in Alameda Creek from the project, appropriate avoidance and mitigation measures should be incorporated.

Concern about "Recapture" of In-Stream Flows Intended for Fish Migration

The Alameda Creek Alliance has concerns about the precedent of "recapturing" bypass and release flows that are intended to benefit migration of anadromous steelhead trout throughout the length of Alameda Creek from below the Alameda Creek Diversion Dam downstream to San Francisco Bay.

The Water System Improvement Program adopted in 2008 by the SFPUC anticipated, discussed and evaluated recapturing only 6,300 acre-feet of flow releases from Calaveras Dam annually, as part of the "Alameda Creek Fishery Enhancement Project" – now the proposed Alameda Creek Recapture Project. This recapture was to be of summer flows released from Calaveras Reservoir intended to enhance rearing habitat in upper Alameda Creek from the confluence with Calaveras Creek downstream to the vicinity of the Sunol Water Treatment Plant. The lower end of this reach is characterized by permeable gravels that result in a lack of surface flow in Alameda Creek during summer and fall months. Thus the Calaveras flow releases would enhance about 5 miles of upper Alameda Creek from the confluence with Calaveras Creek downstream to the vicinity of the water treatment plant, providing cold water flows for improved rearing of juvenile trout. Recapturing these summer rearing flows on the downstream end of the release reach would have no impact on trout rearing conditions or trout migration, and the Alameda Creek Alliance has no objection to recapturing these flows or an equivalent amount of water.

However, the current project proposes to increase the water recapture to an average of 9,820 acre-feet annually, including water bypassed at the Alameda Creek Diversion Dam that is specifically intended to benefit upstream and downstream migration of adult and juvenile trout along the length of Alameda Creek from the Alameda Creek Diversion Dam downstream to San Francisco Bay.

The proposed project would essentially recapture equivalent surrogate flows, not recapture the actual flow releases and bypass flows from Calaveras Reservoir and the Alameda Creek Diversion Dam. Our objection is philosophical, since the fall, winter and spring flows bypassed at the ACDD will actually continue downstream to either infiltrate into the Sunol groundwater basin or flow down Alameda Creek through the Sunol Valley and Niles Canyon. The current SFPUC project proposes to mine an equivalent amount of groundwater from the Sunol Valley Pit F2, from May to October, mostly outside of the trout migration season and from an off-stream location.

Our concerns relate to the precedent of "recapturing" surrogate flows or offsetting flow releases and bypass flows which are intended to continue downstream to improve stream flows for trout migration. To benefit steelhead migration, these flows must reach San Francisco Bay or contribute significantly to natural flows in Alameda Creek and flows from other portions of the watershed that reach the bay, to allow adequate hydrologic connection for adult steelhead to migrate all the way upstream past the ACDD, or for juvenile steelhead to migrate from the ACDD reach downstream to the Bay.

The final EIR for the Calaveras Dam Replacement Project (Jan 5, 2011) characterized ACDD bypass flows as only intended to enhance trout spawning in Alameda Creek from the diversion dam downstream only to the confluence with Calaveras Creek, not to provide migration flows. The FEIR states: "Implementation of the proposed bypass flows at the ACDD is intended to improve spawning habitat for resident trout and future steelhead and would provide a more natural base-flow hydrology within approximately 16,000 linear feet of habitat in Alameda Creek above the confluence with Calaveras Creek." (p 9-36)

Yet the March 5, 2011 Biological Opinion ("BO") by the National Marine Fisheries Service for the Calaveras Dam Replacement Project explicitly anticipated (pp 49-52) that bypass flows at the Alameda Creek Diversion Dam would provide suitable migration conditions for steelhead trout from Alameda Creek below the ACDD *all the way downstream through Niles Canyon and Lower Alameda Creek to San Francisco Bay*. The BO stated (p 52) that "CDRP minimum flows from the southern watershed when combined with flows from the northern watershed (at the confluence with the Arroyo de la Laguna) through Niles Canyon are expected to provide suitable conditions for adult upstream migration and smolt downstream migration. These flows will arrive at the upstream end of the Alameda Creek Flood Control Channel and ACWD will provide bypass flows at their water diversion facilities for fish passage through the Flood Channel."

Sincerely,

Jeff Miller
Director, Alameda Creek Alliance

Kerry Kriger, Ph.D.
Executive Director
415-878-6525

PO Box 78758
Los Angeles, CA 90016 USA
E-mail: kerry@savethefrogs.com

savethefrogs.com

The Impact of the Proposed Alameda Creek Recapture Project (ACRP: 2015-004827ENV) on California's Native Amphibians

7/29/2015

To: Sarah B. Jones
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103

Dear Ms. Jones:

On behalf of the SAVE THE FROGS! community, I would like to thank you for allowing me this opportunity to comment on the San Francisco Public Utilities Commission's (SFPUC) proposed Alameda Creek Recapture Project (ACRP), Case No. 2015-004827ENV. As California's native amphibians face a multitude of threats in the 21st century, SAVE THE FROGS! wants to ensure that the SFPUC includes all relevant amphibian and aquatic reptile conservation issues in the environmental review of this project. Amphibians and reptiles arrived in California long before the first human settlers, and they have an inherent right to exist. Plus they are incredibly valuable to our ecosystems and kids love them – so it is up to all of us to protect them for future generations of Californians.

Below, we list issues and questions we would like to see fully analyzed in the Draft Environmental Impact Report.

1. Cumulative Impacts.

The SFPUC's environmental review process must consider any potential impacts of ACRP to stream-dwelling amphibians and aquatic reptiles in relation to the cumulative impacts of the Calaveras Dam Replacement Project (CDRP) and projects directly associated with CDRP. These adverse effects include: (a) the loss of stream habitat for amphibians in Arroyo Hondo once Calaveras Reservoir is fully inundated; (b) the loss of amphibian breeding habitat at the site of the Alameda Creek Diversion Dam (ACDD) fish ladder; (c) future disruption to amphibian breeding by a new sluicing schedule for ACDD; (d) the loss of habitat in Little Yosemite due to proposed construction of weirs; (e) the loss of shallow slow habitat due to higher summer base flows along the reach of Alameda Creek from the confluence with Calaveras Creek to the ACRP; (f) the potential to spread infectious diseases if any amphibians are transported from their current breeding sites; and (g) the effects of predicted colder water temperatures on survival, growth, and development of amphibians[1] and reptiles[2] when hypolimnetic releases from Calaveras Reservoir commence.

2. Comprehensive species review needed.

The SFPUC has paid much attention to balancing the needs of providing drinking water with restoring anadromous salmonids to Alameda Creek. We hope that the needs of the system's diverse herpetofauna will similarly be considered when evaluating the effects of this project. We urge the SFPUC to uphold its Environmental Stewardship Policy, which states that it will "protect and restore native fish *and wildlife* downstream of SFPUC dams and water diversions" (emphasis added). Unfortunately the scoping document (on page 10) excludes two special-status taxa which are extant in the ecosystem and currently undergoing review by the US Fish and Wildlife Service for listing under the federal Endangered Species Act. SAVE THE FROGS! expects that potential impacts on these stream dwellers, the foothill yellow legged frog (*Rana boylii*), and the Western pond turtle (*Emys marmorata*), will be fully addressed in the EIR. In addition to sensitive and special status taxa, the potential impacts of the ACRP on non-native taxa known to have detrimental effects on native species should also be included in the review. Because protecting ecosystem function also encompasses the goal of keeping common species common, we hope that all amphibians in the creeks will be assessed for potential impacts. These include the Western toad, the Pacific chorus frog, and the California newt.

Foothill Yellow-legged Frog (Rana boylii) in Alameda Creek, 2014.

[1] Catenazzi, A. and S. J. Kupferberg. 2013. The importance of thermal conditions to recruitment success in stream-breeding frog populations distributed across a productivity gradient. Biological Conservation. 168: 40–48.

[2] Ashton, D. T., J. B. Bettaso, and H. H. Welsh, Jr. *In press*. Changes across a decade in growth, size, and body condition of western pond turtles (*Actinemys* [*Emys*] *marmorata*) on free-flowing and regulated forks of the Trinity River in northwest California. Copeia

3. Potential Impacts of Groundwater Extraction on Surface Flows and Aquatic Habitats

The proposed project is meant to "recapture" Alameda Creek groundwater that flows below the surface of the streambed and contributes to the water in quarry Pit F2. The ACRP will use water that percolates into the ground from surface water flows into the Sunol Groundwater Basin and Pit F2. A central question is: Will de-watering Pit F2 create a cone of depression that might adversely alter surface water flows in Alameda Creek and San Antonio Creek at times of year critical for amphibians, turtles, and snakes? Although the intent of the ACRP is to extract a volume of water that 'correlates with' the average *annual* amount to be released from Calaveras Reservoir or bypassed at the Alameda Creek Diversion Dam, we are concerned that the *daily* extraction rate may be out of synchrony with the seasonal timing of surface water flow events. In other words, during peak flood events and other periods when flows, releases, and bypasses are high, most water will flow downstream and not re-charge the groundwater. When instream flows are receding or low, on the other hand, the ACRP might extract water that did not originate as a dam release or a bypass flow, and further impair the flow regime.

We question the degree to which ACRP will extract water from the hyporheic flow under the alluvium in San Antonio Creek. According to documents received via Public Records Act request, California red-legged frog (*Rana draytonii*) adults, juveniles, and egg masses have been observed in San Antonio Creek less than 0.5 mile from the ACRP site. The EIR should assess how the magnitude, timing, and duration of surface flows in lower San Antonio Creek and Alameda Creek may be changed by ground water harvesting. Will the recession rate of flows in late spring be affected in the vicinity of ACRP? Will amphibian eggs be at increased risk of stranding? We are concerned that there are no releases from Turner Dam/San Antonio Reservoir to maintain adequate surface flow for native amphibians and compensate for groundwater harvested by ACRP operations.

California newt (Taricha torosa) embryos stranded (left) and successfully hatching California red-legged frog (Rana draytonii) tadpoles (right) in Alameda Creek, Spring 2015.

4. Impacts on Riparian Trees.

Our understanding is that the proposed ACRP project will harvest groundwater year round, including from May to October when there is usually no precipitation. In addition to this being the breeding and rearing season for amphibian larvae and young turtles, this is also the period when the riparian trees are leafed out and require groundwater supplies. Given that most precipitation falls in the winter in the Alameda Creek watershed, vegetation must find deep sources of moisture to survive the dry summer[3]. There are extant and historic/impacted sycamore woodlands in close proximity to ACRP. Approximately half of the historically occurring Sycamore Alluvial Woodland has already been destroyed or altered in southern Alameda County due to gravel mining, and the creation of Del Valle and San Antonio reservoirs contributed heavily to that loss.[4] What will be the effects on the remnant sycamore groves and the recruitment of young riparian trees when there is summer groundwater harvesting? Recent advances in stable isotope research[5] may provide tools for determining which sources of water are supporting the extant trees and whether they will be placed at risk by the project.

5. Piecemeal Review – ACRP inextricably linked to Little Yosemite Fish Passage and the Calaveras Dam Replacement Projects, yet reviewed separately

The ACRP proposes to increase the total amount of water SFPUC will recapture (average of 9,820 acre-feet annually compared to the 6,300 acre-feet enumerated in the 2008 Water System Improvement Program of 2008). This volume of water includes flows bypassed at the Alameda Creek Diversion Dam (ACDD) and releases from Calaveras Reservoir that were intended to facilitate the movement of anadromous fish along the length of Alameda Creek[6]. It is worrisome that the scoping document states on page 6 that the ACRP will be operated "in a manner that would assure the amounts recaptured **correlate** [emphasis added] with amounts released and/or bypassed" rather than **equivalent** to the amount released or bypassed. To what extent will groundwater extraction exceed releases and bypasses, and how can this be reviewed outside the original EIR for CDRP? In the Little Yosemite reach, SFPUC has also proposed to construct weirs across three pool features with the intent of facilitating upstream passage of anadromous fish. All these projects are intricately connected. Holistic, rather than separate, evaluation is needed and inconsistencies need to be resolved.

The feasibility of water recapture in the Sunol Valley is directly relevant to decision making regarding flows and fish passage structures further upstream. For the Little Yosemite Fish Passage Project, there is considerable uncertainty about whether the boulders may be passable at high flows[7]. Given this uncertainty and the likely harms[8] to resident native amphibians by the weir construction, SAVE THE FROGS! questions the necessity of modifying the natural channel in Little Yosemite to make it passable at mid-range flow volumes. If operation of the Recapture project can compensate the overall water supply for lost storage opportunities when flows bypass the ACDD, would it be possible to bypass enough water to make Little Yosemite passable to steelhead without weirs? Such alternatives analyses should be included in an EIR that encompasses *both* the ACRP and the Little Yosemite Fish Passage Project. It appears that these two projects are inextricably linked and each should be reviewed in light of the other. The California Environmental Quality Act forbids piece-mealing of environmental review. By issuing a Mitigated Negative Declaration for the Little Yosemite Project yet proposing to produce an EIR for the Recapture Project, SFPUC is splitting the review of two linked projects; both are directly driven by the flow schedule of the Alameda Creek Diversion Dam. Splitting the environmental review compromises the breadth and completeness of the alternatives analysis required by CEQA.

CONCLUSION

Given the ACRP's potential to cause negative hydrologic and biological impacts, SAVE THE FROGS! expects that scientifically rigorous studies will be completed as part of this project's Environmental Impact Report. The report should (1) describe in detail the flow paths of water that recharge the groundwater basin and provide summer baseflows to San Antonio Creek and Alameda Creek; (2) quantify what percent of bypass and release flows will actually enter the groundwater and clearly illustrate whether this project is truly recapturing flows or simply mining groundwater in excess of amounts released and bypassed; (3) evaluate the impacts of groundwater extraction on riparian flora and fauna under various climate change scenarios which may exacerbate fluctuations

[3] Shafroth, P. B., J. C. Stromberg, and D. T. Patten. 2000. Woody riparian vegetation response to different alluvial water table regimes. Western North American Naturalist, 66-76.

[4] See Figure 1 of Gillies, E. L. 1998. Effects of regulated streamflows on the Sycamore Alluvial Woodland riparian community. MS Thesis, California State University, San Jose.

[5] Oshun, J., Dietrich, W. E., Dawson, T. E., Rempe, D. M., and I. Y. Fung. 2013, December. Isotopic 'fingerprinting' of distinct water reservoirs in the critical zone and their exploitation by different tree species. In *AGU Fall Meeting Abstracts* Vol. 1, p. 0385.

[6] National Marine Fisheries Service Biological Opinion (dated March 5, 2011, pp. 49-52) stated that bypass flows at ACDD would provide suitable migration conditions in Alameda Creek **all the way to San Francisco Bay**. Specifically, "CDRP minimum flows from the southern watershed when combined with flows from the northern watershed (at the confluence with the Arroyo de la Laguna) through Niles Canyon are expected to provide suitable conditions for adult upstream migration and smolt downstream migration. These flows will arrive at the upstream end of the Alameda Creek Flood Control Channel and ACWD will provide bypass flows at their water diversion facilities for fish passage through the Flood Channel."

[7] SFPUC 2010. Assessment of fish upstream migration at natural barriers in the upper Alameda Creek sub-watershed. Technical Memorandum prepared by URS and HDR. Several statements highlight the uncertainty. For boulder feature 9 (page 4-7): "Potential passage routes through spaces between submerged boulders could have been obscured, however, and quantitative measurements of those features could not be obtained". For feature 10 (page 4-15): "It is unknown whether this feature poses a barrier to upstream migration at flows higher than 98 cfs". For feature 11(page 4-15): "…the ability to evaluate passage opportunities along the left bank channel was limited."

[8] See SAVE THE FROGS! appeal of the mitigated negative declaration.

between series of extremely wet and extremely dry years; and (4) detail the likely impacts on amphibians and reptiles, as described above. Because the dynamic interactions among surface water, ground water, and rock moisture are extremely complex, we would like to see direct observations and controlled physical tests made to trace water sources and address our questions about impacts on in-stream flow conditions.

SAVE THE FROGS! thanks the SFPUC for the opportunity to comment during the scoping phase of the project. We look forward to reviewing the DEIR when it is released. Kindly add our organization to the distribution list so we may receive direct notification of the document's completion.

Sincerely,

Kerry Kriger

Kerry Kriger, Ph.D.
SAVE THE FROGS! Founder, Executive Director & Ecologist

This letter was sent via e-mail to:
Sarah.B.Jones@sfgov.org
Steve.Smith@sfgov.org
KCapone@sfwater.org
TRamirez@sfwater.org

Western pond turtles (Emys marmorata) in Alameda Creek, spring 2015.

From: Pat & Jim O'Laughlin [mailto:jtopol3@comcast.net]
Sent: Monday, July 27, 2015 9:35 AM
To: Jones, Sarah (CPC)
Cc: Smith, Steve (CWP)
Subject: Alameda Creek Recapture Project

Dear Ms. Jones:
As a resident of Sunol,CA, I would like to submit the following comments and questions for consideration in the process of preparing an Environmental Impact Report for the Alameda Creek Recapture Project. (Case No.: 2015-004827ENV)

My comments and questions are based on the information presented at the Public Scoping Meeting held in Sunol on July 9,2015.

My first general comment, and question, is related to why this recapture project is needed. It may seem apparent that recovering water for future use is a good idea, especially at the time of a drought. But is it really necessary or a cost effective process?The average recapture of 9,820 acre-feet per year is a lot of water, but when put in perspective it is not really significant. This is especially true when the Calaveras Dam project will increase the capacity of the current reservoir by 60,000 acre feet.The permitting process ,as I understand it, provided for the release of the water that you propose to recover, for the purpose of improving the environment for endangered steelhead. If this is the case, should there not be a contribution to this significant environmental improvement by the agency that will benifit the most. Since this local watershed is only 13% of the total SFPUC source of water the recovered amount is really not as important, or essential, to meet the goals for the system as presented at your meeting. It would seem appropriate for the agency to contribute to the restoration of the environment for the steelhead that was damaged at a time when EIR's were not available to protect the environment. I would hope that there is strong consideration to look at the overall issue from this perspective and perhaps not proceed with the project.

It would also seem appropriate to focus on the management of the watershed in such a manner that an equal, or greater, amount of water would be conserved within the watershed and be available for use. This could be done by applying the principles of permaculture which are being used around the world for just such goals. The research and practices of noted authorities such as Geoff Lawton of the Permaculture Research Institute, Bill Mollison, Mark Shepard, and others could achieve much more in terms of environmental improvement and water resource utilization than this proposed project.

I also have a question related to flow schedule and recapture schedule. It seems that the plan is to recover the water during the driest time of the year instead of the wettest time of the year. Would it not be more efficient to recover the water in the winter months? Since the whole project is based on multi year averages and the relationship to the total system, it would seem the the goal should be to get the water into the system, and when it occurs during a given year would not be critical. Certainly the system would have the capacity to receive and store the water at any time during the year. Would it not? If all capacity was at 100%, then that is all the more reason not to be recapturing since there would not be a real need during that year. Your yield goals could be met on a yearly basis.

Under your proposed project, would the release schedule and volume meet the needs of steelhead restoration? This was not clear at your presentation.

There needs to be a real focus on the potential negative impacts of this project on the groundwater of the valley. Recapturing during the driest period of the year increases the possibility of such negative impact. As was stated that there is no hard date to show that there will not be a negative impact. This need to be thoroughly investigated and if there is a negative impact the project should not proceed.

Visual impact should also be looked at. The current pit has not been reclaimed and the SFPUC has granted a waiver to such action for another 24 years. This ugly encroachment on the environment should be corrected as a part of this project. Adding the various components of the project will just intensify the industrialization
look of the abandoned quarry pit. This would be a good time to clean it up and restore it. Since the SFPUC granted the quarry operator the right to do nothing for the next 24 years, they should assume the responsibility for the necessary action. I am sure that the SFPUC can work with the quarry operator to correct this condition.

Additional questions that were not covered in the presentation are:
- What is the cost of the project?
- How much electricity be used and what would it cost?
- Does the existing Pump Station Pipeline take water out of the South Bay Aquaduct ? How much?
- What approvals will Alameda County have to provide for this project?
- Exactly what is required of the SFPUC in regards to increased flow into Alameda Creek for steelhead habitat ? This was not clear in the presentation.

In summary, I would like to see the analysis that justifies the need for the project and the impacts of not doing the project. I would also like to see an aggressive focus on a management program for the watershed based on permaculture principles that would more than achieve the goals of this project. Of most importance is to insure that the groundwater of the valley , the visual environment and the environment for the steelhead are protected and enhanced.

Thank you for the opportunity to comment and ask questions related to the preparation of the Environmental Impact Report.

Sincerely,
Jim O'Laughlin

Pat & Jim O'Laughlin
PO Box 400
Sunol, CA 94586
925-862-2550
jtopol3@comcast.net

APPENDIX WSIP

WSIP PEIR Mitigation Measures, Applicability to the Proposed Project

SFPUC Alameda Creek Recapture Project (Environmental Planning Case No. 2015-004827ENV)

The Alameda Creek Recapture Project (ACRP or proposed project) was analyzed under its former name—the Alameda Creek Fishery Enhancement Project—at a program-level in the Water System Improvement Program (WSIP) Program Environmental Impact Report (PEIR)[1] as one of the facility improvement projects under the WSIP. The PEIR identified programmatic mitigation measures, and under Resolution No. 08-200, the San Francisco Public Utilities Commission (SFPUC) adopted the WSIP Mitigation Monitoring and Reporting Program that identifies programmatic mitigation measures applicable to the WSIP facility improvements projects, including the ACRP. This ACRP Environmental Impact Report (EIR) provides a detailed, project-level analysis of the proposed project based on site-specific and up-to-date information developed subsequent to the preparation of the PEIR. This section lists the WSIP PEIR programmatic mitigation measures identified for the Alameda Creek Fishery Enhancement Project and describes how these measures now apply to the ACRP based on the current project-level impact analysis.

Table C-1 lists all the programmatic mitigation measures identified in the WSIP PEIR in the first column. The second column indicates with a "Y" or "N" whether or not the PEIR identified the programmatic mitigation measure to be applicable to the Alameda Creek Fishery Enhancement project. The third column discusses if and how these measures apply to the ACRP based on the project-level analysis in this EIR. For the programmatic mitigation measures that are applicable, the table identifies the comparable project-level mitigation measure identified in the ACRP EIR that either relies on the programmatic measures or identifies an equivalent or better site-specific mitigation measure to replace the programmatic mitigation measure. The table also provides an explanation for those programmatic mitigation measures that are not applicable to the proposed project.

[1] San Francisco Planning Department, *Final Program Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*, San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.

TABLE C-1
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Land Use and Visual Resources		
Measure 4.3-2, Facility Siting Studies: Conduct project-specific facility siting studies for non-SFPUC land and implement these studies' recommendations to avoid or minimize impacts on existing land uses.	N	ACRP facilities would be located entirely within Alameda watershed lands owned by the CCSF so that there would be no impact on existing land uses and this PEIR measure does not apply to the ACRP.
Measure 4.3-4a, Architectural Design: Design permanent new, aboveground facilities to be compatible with existing visual character of the site and surrounding area.	Y	The proposed aboveground facilities, including the overhead power lines, electrical control building, and electrical transformer, would have a similar appearance as the surrounding SFPUC water supply facilities and buildings such that no supplemental design measures would be required. Further, existing topography and vegetation would provide partial screening of the proposed aboveground facilities that would reduce potential visual impacts of the project facilities. Although project implementation would require some vegetation removal during project construction, Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation) includes provisions to address vegetation removal impacts so that the aboveground facilities would be compatible with the existing visual character of the site and surrounding area and this PEIR measure does not apply to the ACRP.
Measure 4.3-4b, Landscaping Plans: Prepare and implement landscaping plans to restore (recontour, revegetate, landscape) sites to preconstruction conditions. Monitor landscape plantings.	Y	See Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation). The project-level mitigation measure for biological resources requires site restoration with naturally occurring vegetation similar to surrounding habitats or to their site potential, as feasible, and monitoring of restored areas and replacement plantings. This mitigation measure replaces the requirement for preparation and implementation of a landscaping plan in accordance with the PEIR mitigation measure.
Measure 4.3-4c, Landscape Screens: Include new plantings and landscape berms to screen views of new structures and equipment from scenic roads.	Y	The proposed aboveground facilities would be similar in appearance as other SFPUC water infrastructure facilities in the Sunol Valley and would be partially screened from Calaveras Road by intervening vegetation and topography. Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation) includes provisions for tree replacement to address tree removal impacts on scenic roads. The aboveground project improvements would not require additional screening.
Measure 4.3-4d, Minimize Tree Removal: Minimize or avoid the removal of trees that screen existing and proposed WSIP facility sites; implement tree replacement plan.	Y	See Mitigation Measures M-BI-1a (General Protection Measures) and M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation).

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Land Use (cont.)		
Measure 4.3-4d (cont.)		The project-level mitigation measures require implementation of protective measures to avoid or minimize impacts on mature native trees during construction, and if removal is necessary, to plant replacement trees at or in close proximity to the removal sites to the extent feasible. If replanting trees on the same location is not feasible or could result in damage to the proposed improvements, the SFPUC in consultation with the applicable resource agencies shall designate a suitable planting site elsewhere in the project vicinity.
Measure 4.3-5, Reduce Lighting Effects: Use cut-off shields and nonglare fixture design, direct lighting onsite and downward, prevent use of highly reflective building materials or finishes.	Y	As part of the proposed project and in accordance with the Alameda Watershed Management Plan (WMP), nighttime lighting at the new electrical control building would be motion-activated, and directed downward and shielded so it is not highly visible or obtrusive. No mitigation is necessary. See Impact AE-3, The proposed project would not create a new permanent source of substantial light and glare, so this PEIR measure does not apply to the ACRP.
Geology		
Measure 4.4-1, Quantified Landslide Analysis: Avoid sites with landslide hazards; where they cannot be avoided, conduct site-specific slope stability analyses and implement recommendations.	Y	The proposed project includes construction within the slope of quarry Pit F2 and along the earthen berm containing the Department of Water Resources (DWR) South Bay Aqueduct. A slope stability analysis at Pit F2 was prepared as part of the project-specific geotechnical report. The results of the slope stability analysis indicate the quarry pit slopes are stable under static conditions. The construction contractor(s) would be required to implement the recommendations made in the ACRP Final Geotechnical Evaluation Report to ensure that construction activities within and adjacent to the quarry pit do not cause it to become unstable during construction. The ACRP Final Geotechnical Evaluation Report confirmed that, based on the subsurface conditions at the site, jack-and-bore tunneling methods would be an acceptable means of crossing the South Bay Aqueduct and would not result in slope instability or affect the integrity of the South Bay Aqueduct. See Impact GE 1: The project would not be located on a geologic unit that could become unstable as a result of project construction. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.4-4, Subsidence Monitoring Program: Monitor subsidence and implement corrective actions as warranted.	N	Not applicable; the project does not involve tunneling.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Geology (cont.)		
Measure 4.4-9, Characterize Extent of Expansive and Corrosive Soil: Characterize the presence of expansive/corrosive soils; implement recommendations.	Y	The presence of expansive and corrosive soils was evaluated as part of the project-specific geotechnical report. Soils in the project area generally exhibit a low to high shrink/swell potential. The proposed project would result in minor modifications to the soils in the project area associated with site clearing, grading, paving and backfilling, but it would not alter the properties of the soils. Implementation of the project would not cause or worsen the risks associated with expansive or corrosive soils; therefore, there would be no change regarding substantial risks to life or property due to expansive or corrosive soils compared to existing conditions. In addition, all of the aboveground project improvements would be designed per the recommendations of the ACRP Final Geotechnical Evaluation Report. See Impact GE-10: The project would not create substantial risks to life or property due to expansive or corrosive soils. Therefore, this PEIR measure does not apply to the ACRP.
Hydrology		
Measure 4.5-2, Site-Specific Groundwater Analysis and Identified Measures: Conduct project-specific analysis of dewatering and implement measures to ensure that groundwater resources and the beneficial uses of groundwater are not adversely affected.	N	Not necessary. Any project-related effects of construction dewatering on the shallow groundwater table would be temporary in nature, as dewatering would be required only during certain phases of construction, and only if groundwater is encountered. See Impact HY-1: Project construction would not substantially degrade water quality as a result of dewatering effluent discharges, increased soil erosion and sedimentation of downstream water bodies, or an accidental release of hazardous chemicals; and Impact HY-2: Operation of the ACRP would not substantially alter the movement of subsurface water or substantially affect groundwater recharge in the Sunol Valley such that it would affect the production rate of pre-existing nearby wells. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.5-4a, Flood Flow Protection Measures: Preclude exposure of stockpiled soils, hazardous materials, and construction materials to flood flows.	Y	No mitigation is necessary based on project-specific design. The detailed project information indicates staging areas would be located outside of the designated 100-year FEMA flood hazard zone and would therefore not be exposed to flood flows. In addition, the ACRP would be subject to the National Pollutant Discharge Elimination System (NPDES) Construction General Permit requirements and would require preparation of a Stormwater Pollution Protection Plan (SWPPP). Preparation and implementation of a SWPPP would avoid significant water quality impacts during and after project construction activities and would require that the construction contractor implement site-specific BMPs to protect water quality during project construction activities. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Hydrology (cont.)		
Measure 4.5-4b, Site-Specific Flooding Analysis and Identified Measures: Implement design measures to preclude projects from causing flooding or damage from redirected flood flows.	Y	No mitigation is necessary based on project-specific design. The project-level analysis determined the ACRP would have no effect on flood hazards because it would have no effect on the size of floods produced by storms over the watershed, the size of floods caused by dam failure, or on water levels in the area subject to flooding, and would comply with the San Francisco Floodplain Management Ordinance. See Impact HY-4: Operation of the ACRP would not alter flood hazards. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.5-5, **Stormwater Treatment and Groundwater Monitoring:** If treated stormwater is used to maintain Lake Merced water levels, monitor surface water and groundwater quality in the vicinity of Lake Merced. Identify and implement corrective actions (e.g., treatment).	N	Not applicable; this PEIR measure applies only to Groundwater Projects in the San Francisco that have the potential to affect water levels in or near Lake Merced.
Measure 4.5-6, Appropriate Source Controls and Site Design Measures: For projects located in areas not covered by a municipal stormwater permit and disturbing less than one acre of land during construction, implement appropriate source control and site design measures. These measures will ensure compliance with applicable water quality criteria and goals and protect the beneficial uses of the receiving water.	N	Not applicable; the proposed project would result in more than 1 acre of construction disturbance and would be subject to the NPDES Construction General Permit requirements. The proposed project would require development and implementation of a SWPPP that includes site-specific best management practices (BMPs) to prevent discharges of nonpoint-source pollutants in construction-related stormwater runoff into downstream water bodies, including Alameda and San Antonio Creeks. See Impact HY-1: Project construction would not substantially degrade water quality as a result of dewatering effluent discharges, increased soil erosion and sedimentation of downstream water bodies, or an accidental release of hazardous chemicals.
Biology		
Measure 4.6-1a, Wetlands Assessment: Wetland scientist will determine whether wetlands could be affected by the project, and, if so, perform a wetland delineation and develop mitigation.	Y	See Mitigation Measures M-BI-1a (General Protection Measures), M-BI-1b (Worker Training and Awareness Program), M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation) and M-BI-2 (Avoidance and Protection Measures for Riparian Habitats and Wetlands). A wetlands assessment performed for an adjacent project determined that the seasonal wetland just south of, and outside of, the southeastern corner of Pit F2, wetland tributary in San Antonio Creek, and instream wetlands within Alameda Creek are assumed to be federally protected wetlands, replacing the need to perform a wetland delineation. Project-level mitigation measures to address impact to wetlands discussed as part of Impact BI-3 will require avoidance, worker training, revegetation and restoration activities for impacts to upland areas, and fencing to avoid water quality impacts during construction activities. This PEIR measure applies to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Biology (cont.)		
Measure 4.6-1b, Compensation for Wetlands and Other Biological Resources: If a WSIP project will affect jurisdictional wetlands, implement avoidance measures, restoration procedures, and compensatory creation or enhancement to ensure no net loss of wetland extent or function. Compensate for sensitive riparian and upland habitats supporting key special-status species. Obtain permits for each project and comply with applicable regulations addressing sensitive habitats and species. The Habitat Reserve Program is an alternative for implementing offsite habitat compensation.	Y	See Mitigation Measure M-BI-2: Avoidance and Protection Measures for Riparian Habitats and Wetlands; Mitigation Measures M-BI-1a, 1b, and 1e (General Protection Measures, Worker Training and Awareness Program, Vegetation Restoration Plan and Compensatory Mitigation); and Mitigation Measure M-BI-6a, 6b, and 6c (Baseline riparian habitat mapping, Annual riparian habitat monitoring and reporting, Habitat enhancement, Subreaches B and C1 to achieve no net loss of tree-supporting riparian alliances,) These project-level mitigation measures require avoidance of wetlands and protection of wetlands that cannot be avoided, and site restoration with naturally occurring vegetation similar to surrounding habitats or to their site potential, as feasible, and monitoring of restored areas and replacement plantings for construction-related impacts. For operational impacts on riparian habitats, the project-level mitigation measures require baseline mapping, annual monitoring and reporting, and habitat enhancement as appropriate. These mitigation measures are consistent with the PEIR mitigation measure and is specific to the project requirements.
Measure 4.6-2, Habitat Restoration/Tree Replacement: Restore temporarily affected sensitive habitats. Replace trees designated as heritage trees (or similar local designation) consistent with requirements of local ordinances. Minimize loss of sensitive habitats by coordinating WSIP projects.	Y	See Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation). The project-level measure is consistent with the PEIR measure and provides additional details that define the trees to be avoided/protected and tree replacement requirements.
Measure 4.6-3a, Protection Measures During Construction for Key Special-Status Species and Other Species of Concern: Where key special-status species and other species of concern are potentially present, implement general practice measures (preconstruction surveys, worker awareness program, environmental inspector, minimization of habitat loss).	Y	See Mitigation Measures M-BI-1b (Worker Training and Awareness Program), M-BI-1c (Prevent Movement of Sensitive Wildlife Species through the Work Areas), Mitigation Measure M-BI-1d (Preconstruction Surveys and Construction Monitoring and Protocols for California Tiger Salamander, California Red-Legged Frog, and Alameda Whipsnake), Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation), Mitigation Measure M-BI-1f (Measures to Minimize Disturbance to Western Burrowing Owl), Mitigation Measure M-BI-1g (Measures to Minimize Disturbance to Special-Status Bird Species), Mitigation Measure M-BI-1h (Conduct Preconstruction Surveys for Special-Status Bats Found and Implement Avoidance and Minimization Measures), and Mitigation Measure M-BI-1i (Avoidance and Minimization Measures for American Badger). The project-level measures are consistent with the PEIR measure and provide additional site- and project-specific details where key special-status species and other species of concern are potentially present. An environmental inspector in not required, but a biological monitor is required under Mitigation Measure M-BI-1c and Mitigation Measure M-BI-1d.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)		Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Biology (cont.)			
Measure 4.6-3b, Standard Mitigation Measures for Key Special-Status Plants and Animals: Implement measures to reduce impacts on key special-status species. *See below for specific species and corresponding sub-PEIR mitigation number.*			
Invertebrates			
Valley Elderberry Longhorn Beetle	I.1	N	Species not identified in project vicinity.
Vernal Pool Crustaceans (Vernal Pool Fairy Shrimp; Conservancy Fairy Shrimp; Vernal Pool Tadpole Shrimp)	I.2	N	Species not identified in project vicinity.
Bay Checkerspot Butterfly; Callippe Silverspot Butterfly	I.3	N	Species not identified in project vicinity.
Fish			
Central Valley Fall- and Late-Fall-Run DPS Chinook Salmon; Central Valley DPS Steelhead; Green Sturgeon Southern District DPS; Central Coast DPS Steelhead; Rainbow Trout	F.1	Y	No mitigation is necessary based on project-specific design. Species not present under construction scenario, and construction would not degrade the quality of habitat in Alameda Creek or interfere with the movement of common native fish species (See Impact BI-10). Based on hydrologic modeling that has been conducted to conservatively simulate operational effects to Alameda Creek surface water flows, analysis of historical flow data, and analysis of surface and subsurface water interactions long-term operation of the proposed ACRP is not anticipated to result in substantial changes to winter and spring flows or associated aquatic habitat conditions for migrating steelhead in Alameda Creek. See Impact BI-12: Project operations would not substantially interfere with the movement or migration of special-status fish species, including CCC steelhead DPS. This PEIR measure does not apply to the ACRP.
Reptiles and Amphibians			
California Red-Legged Frog; Foothill Yellow-Legged Frog	RA.1	Y	See Mitigation Measures M BI 1b (Worker Training and Awareness Program), M-BI-1c (Prevent Movement of Sensitive Wildlife Species through the Work Areas), Mitigation Measure M-BI-1d (Preconstruction Surveys and Construction Monitoring and Protocols for California Tiger Salamander, California Red-Legged Frog, and Alameda Whipsnake), and Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation). The project-level measures are consistent with the PEIR measure and include site-specific protection measures for all special status species potentially present in the project area.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)			Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Biology (cont.)				
Measure 4.6-3b (cont.)	**Reptiles and Amphibians** (cont.)			
	California Tiger Salamander	RA.2	Y	See Mitigation Measures M BI 1b (Worker Training and Awareness Program), M-BI-1c (Prevent Movement of Sensitive Wildlife Species through the Work Areas), Mitigation Measure M-BI-1d (Preconstruction Surveys and Construction Monitoring and Protocols for California Tiger Salamander, California Red-Legged Frog, and Alameda Whipsnake), and Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation). The project-level measures are consistent with the PEIR measure and include site-specific protection measures for all special status species potentially present in the project area.
	San Francisco Garter Snake	RA.3	N	Species not identified in project vicinity.
	Alameda Whipsnake	RA.4	Y	See Mitigation Measures M BI 1b (Worker Training and Awareness Program), M-BI-1c (Prevent Movement of Sensitive Wildlife Species through the Work Areas), Mitigation Measure M-BI-1d (Preconstruction Surveys and Construction Monitoring and Protocols for California Tiger Salamander, California Red-Legged Frog, and Alameda Whipsnake), and Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation). The project-level measures are consistent with the PEIR measure and include site-specific protection measures for all special status species potentially present in the project area.
	Birds			
	Swainson's Hawk	B.1	N	Species not identified in project vicinity.
	Western Burrowing Owl	B.2 and B.3	Y	See Mitigation Measures M BI 1b (Worker Training and Awareness Program), M-BI-1c (Prevent Movement of Sensitive Wildlife Species through the Work Areas), Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation), and Mitigation Measure M-BI-1f (Measures to Minimize Disturbance to Western Burrowing Owl). The project-level measures are consistent with the PEIR measure and include site-specific protection measures for all special status species potentially present in the project area.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)		Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Biology (cont.)			
Measure 4.6-3b (cont.) **Birds** (cont.)			
Raptors (including Bald Eagle)	B.4	N	See Mitigation Measures M BI 1b (Worker Training and Awareness Program), M-BI-1c (Prevent Movement of Sensitive Wildlife Species through the Work Areas), Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation), and Mitigation Measure M-BI-1g (Measures to Minimize Disturbance to Special-Status Bird Species). The project-level measures are consistent with the PEIR measure and include site-specific protection measures for all special status species potentially present in the project area.
Least Bell's Vireo	B.5	N	Species not identified in project vicinity.
California Black Rail, California Clapper Rail	B.6	N	Species not identified in project vicinity.
Western Snowy Plover	B.7	N	Species not identified in project vicinity.
Mammals			
Salt Marsh Harvest Mouse	M.1	N	Species not identified in project vicinity.
San Joaquin Kit Fox	M.2	N	Species not identified in project vicinity.
Riparian Woodrat	M.3	N	Species not identified in project vicinity.
Plants			
Vernal Pool Plants (Succulent Owl's Clover; Hoover's Spurge; Colusa Grass; San Joaquin Valley Orcutt Grass; Greene's Tuctoria; Hairy Orcutt Grass)	P.1	N	Species not identified in project vicinity.
Riparian Plants			
Delta Button-Celery	P.2	N	Species not identified in project vicinity.
Large-Flowered Fiddleneck	P.3	N	Species not identified in project vicinity.
San Francisco Woolly Sunflower; Marin Western Flax; Fountain Thistle	P.4	N	Species not identified in project vicinity.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Biology (cont.)		
Measure 4.6-4, Pipeline and Water Treatment Plant Treated Water Discharge Restrictions: Design planned discharges from the WSIP pipelines and water treatment plants to natural water bodies to minimize impacts on riparian and aquatic resources and to avoid or minimize temperature effects on aquatic resources.	N	The project-level analysis determined that mandatory compliance with the requirements of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit and preparation of a Stormwater Pollution Protection Plan (SWPPP) would avoid significant water quality impacts during and after project construction activities and would require that the construction contractor implement site-specific BMPs to protect water quality during project construction activities. This would address impacts on riparian and aquatic resources. Therefore, this PEIR measure does not apply to the ACRP.
Cultural		
Measure 4.7-1, Suspend Construction Work if Paleontological Resource Is Identified: Suspend work and notify a qualified paleontologist when a paleontological resource is discovered at any of the project sites. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under CEQA criteria. Temporarily halt or divert excavation within 50 feet of a fossil find until the discovery is examined by a paleontologist. If avoidance is not feasible, the paleontologist will prepare an excavation plan.	Y	See Mitigation Measure M-GE-3 (Accidental Discovery of Paleontological Resources). The project-level measures are consistent with the PEIR measures and include measures specific to earthwork associated with the construction of the mooring piers.
Measure 4.7-2a, Archaeological Testing, Monitoring, and Treatment of Human Remains: Determine if implementation of an archaeological testing or archaeological monitoring program or both is the appropriate strategy for avoidance of potential adverse effects on significant archaeological resources. Review any requirements approved by the State Historic Preservation Officer. Prepare an archaeological testing plan, archaeological monitoring plan, final archeological resources report and, if applicable, an archaeological data recovery plan. The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity will comply with applicable state laws.	Y	See Mitigation Measure M-CUL-2 (Accidental Discovery of Human Remains). Although no known human burial locations have been identified within the project area, the EIR measure addresses the possibility of discovery during construction activities.
Measure 4.7-2b, Accidental Discovery Measures: Distribute archaeological resource "ALERT" sheet to contractors. If an archaeological resource may be present within the project site, an archaeological consultant will evaluate it and make a recommendation as to what action (e.g., preservation in situ) is warranted. The SFPUC will implement appropriate measures.	Y	See Mitigation Measure M-CUL-1 (Accidental Discovery of Archaeological Resources). Although no previously documented archaeological resources have been identified within the project area, the EIR measure addresses the possibility of discovery during construction activities.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Cultural (cont.)		
Measure 4.7-3, Protection of Historic Districts: A qualified historian will assess the city's water system facilities affected by WSIP facility projects for their potential contribution to a historic district. If a historic district would be affected by one or more proposed WSIP facility project(s), develop and implement mitigation measures for effects with attention to the potential district as a whole. If a historic district is identified at the project level, it should be recorded as such, using National/California Register criteria of significance. Document the district by completing the State of California Department of Parks and Recreation Form 523 and submit to the State Historic Preservation Officer.	N	There are no documented historical resources within the project area. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.7-4a, Alternatives Identification and Resource Relocation: Identify feasible project alternatives to eliminate or reduce the need for demolition or removal of a historic resource to the greatest extent possible. If preservation of the affected historical resource at the current site is determined to be infeasible, the structure will be stabilized and relocated to other appropriate nearby sites, if feasible. After relocation, the resource will be treated according to the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If the affected historic resource is to be demolished, consult with local historical societies and governmental agencies regarding salvage of materials for public information or reuse in other locations.	N	No historic resources would be demolished or removed as a result of the project. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.7-4b, Historical Resources Documentation: Prepare documentation of historic resources prior to any construction work associated with demolition or removal. The appropriate level of documentation will be selected by a qualified professional who meets the standards for history, architectural history, and/or architecture (as appropriate) set forth by the Secretary of the Interior's *Professional Qualification Standards* (36 CFR 61) in consultation with a preservation specialist assigned by the San Francisco Planning Department and the local jurisdiction, if deemed appropriate by the Planning Department.	N	No historic resources would be demolished or removed as a result of the project. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.7-4c, Secretary of the Interior's Standards for the Treatment of Historic Properties: Prepare materials describing and depicting the proposed project. Review the proposed project for compliance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If a project is determined to be inconsistent with the *Standards for the Treatment of Historic Properties*, pursue and implement redesign of the project such that consistency with the standards is achieved.	N	No historic properties would be altered as a result of project implementation. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Cultural (cont.)		
Measure 4.7-4d, Historic Resources Survey and Redesign: Undertake a historic resources survey to identify and evaluate potential historic resources that may exist in the project's area of potential effect. If a survey identifies one or more historical resources, assess the impact the project may have on those historical resources. If the project will cause a substantial adverse change to a historic resource, assign a preservation specialist to review the proposed project for compliance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If the project is determined to be inconsistent with those standards, pursue and implement redesign of the project such that consistency with the standards is achieved.	N	The field survey was conducted as part of background for the project and is documented in Section 5.5.1.4, Architectural Methods, Survey, and Results.
Measure 4.7-4e, Historic Resources Protection Plan: A qualified historian will prepare a plan that specifies procedures for protecting and monitoring historic resources during construction.	N	No historic properties would be altered as a result of project implementation. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.7-4f, Preconstruction Surveys and Vibration Monitoring: Include geotechnical investigations if vibration-related impacts could affect historic resources. Follow recommendations of the final geotechnical reports. Conduct a preconstruction survey of existing conditions and monitor the adjacent buildings for damage during construction, if recommended.	N	There are no documented historical resources within the project area. Therefore, this PEIR measure does not apply to the ACRP.
Traffic		
Measure 4.8-1a, Traffic Control Plan Measures: Elements of the traffic control plan could include: circulation and detour plans, designated truck routes, sufficient staging area, access to driveways, use of standard construction specifications for controlling construction vehicle movements, restrictions on truck trips during peak morning and evening commute hours, lane closure restrictions, maintenance of alternate one-way traffic flow, detour signing, pedestrian and bicycle access and circulation, equipment and materials storage, construction worker parking, roadside safety protocols, considerations for sensitive land uses, coordination with local transit service providers, roadway repair, and conformance with the state's *Manual of Traffic Controls for Construction and Maintenance Work Areas*.	N	The SFPUC Standard Construction Measures (traffic control measures) would be applicable to construction of the ACRP; this measure requires that all projects implement traffic control measures sufficient to maintain traffic and pedestrian circulation on streets affected by construction, including measures such as flaggers, construction warning signs, scheduling truck trips during non-peak hours, and coordinating with local emergency responder to maintain emergency access. Implementation of the standard construction measures would achieve the same objective as this PEIR measure.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Traffic (cont.)		
Measure 4.8-1b, Coordination of Individual Traffic Control Plans: In the event that more than one construction contract is issued for work along existing or new pipelines, and where construction could occur within and/or across multiple streets in the same vicinity, coordinate the traffic control plans in order to mitigate the impact of traffic disruption by including measures that address overlapping construction schedules and activities, truck arrivals and departures, lane closures and detours, and the adequacy of on-street staging requirements.	N	The SFPUC Standard Construction Measures (traffic control measures) would be applicable to construction of the ACRP. The limited number of truck trips (no more than one truck trip per hour) and construction worker vehicle trips (maximum of 68 per day) would not result in a substantial or cumulatively considerable contribution to potential cumulative traffic safety hazard impacts. Implementation of the standard construction measures would achieve the same objective as this PEIR measure.
Measure 4.8-4, Accommodation of Displaced Public Parking Supply for Recreational Visitors: Include an additional measure in the traffic control plans to accommodate any anticipated visitor parking demand that would be displaced by proposed projects at public recreational facilities.	N	No recreational parking would be displaced under the project. Therefore, this PEIR measure does not apply to the ACRP.
Air Quality		
Measure 4.9-1a, SJVAPCD Dust Control Measures: Include San Joaquin Valley Air Pollution Control District (SJVAPCD) Basic Control Measures in contract specifications for all construction sites. Include SJVAPCD Enhanced Control Measures in contract specifications when required to mitigate significant PM_{10} impacts. Include SJVAPCD Additional Control Measures in contract specifications for construction sites that are large in area, located near sensitive receptors, or which for any other reason warrant additional emissions reductions. Include SJVAPCD Rule 9510, Indirect Source Review, Section 6.1, Construction Equipment Emissions in contract specifications for any project subject to discretionary approval by a public agency that ultimately results in the construction of a new building, facility, or structure or reconstruction of a building, facility, or structure for the purpose of increasing capacity or activity and also involving 9,000 square feet of space.	N	The project is not located within the jurisdiction of the SJVAPCD. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.9-1b, SJVAPCD Exhaust Control Measures: Include SJVAPCD Exhaust Control Measures in contract specifications, where applicable, for heavy-duty equipment to limit exhaust emissions within the San Joaquin Region.	N	The project is not located within the jurisdiction of the SJVAPCD.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Air Quality (cont.)		
Measure 4.9-1c, BAAQMD Dust Control Measures: For projects in the Sunol Valley, Bay Division, Peninsula, and San Francisco Regions, include Bay Area Air Quality Management District (BAAQMD) Basic Control Measures in contract specifications for all construction sites. Include BAAQMD Enhanced Control Measures in contract specifications for sites over four acres. Include BAAQMD Optional Control Measures in contract specifications for sites that are large in area, located near sensitive receptors, or which for any other reason warrant additional emissions reductions.	Y	See Mitigation Measure M-AQ-1 (BAAQMD Basic Construction Measures). The project-level mitigation is consistent with the BAAQMD guidelines for assessing and mitigating air quality impacts.
Measure 4.9-1d, BAAQMD Exhaust Control Measures: For projects in the Sunol Valley, Bay Division, Peninsula, and San Francisco Regions, include BAAQMD Exhaust Control Measures to limit exhaust emissions, where applicable.	Y	See Mitigation Measure M-AQ-1 (BAAQMD Basic Construction Measures). The project-level mitigation is consistent with the BAAQMD guidelines for assessing and mitigating air quality impacts. For all projects, the BAAQMD recommends implementation of its Basic Construction Measures whether or not construction-related exhaust emissions exceed the applicable significance thresholds.
Measure 4.9-2a, Health Risk Screening or Use of Soot Filters: Complete a health risk screening if truck volumes associated with a particular project along a particular haul route exceed 40,000 truck trips over the entire construction period. If a potentially significant impact is indicated, complete a site-specific health risk assessment. Consider diesel particulate matter (DPM) emission rates in separate project-level analysis at the time of construction. Develop a mitigation program based on the site-specific health risk assessment implementing methods of reducing DPM emission or exposure to a less-than-significant level.	N	The health risk assessment conducted for the proposed project determined that construction emissions sources would be separated from the nearest sensitive receptors by a distance of 1,400 feet, which is greater than the 1,000-foot screening distance used by the BAAQMD for the application of its quantitative health risk thresholds. Exposure to TAC emissions over a relatively short exposure period of the 21-month construction duration with a buffer distance of at least 1,400 feet separating the emissions sources and nearest sensitive receptors would not expose nearby sensitive receptors to substantial pollutant concentration. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.9-2b, Vacate SFPUC Land Managers' Residences in Sunol Valley: Vacate the two SFPUC Land Managers' residences in the Sunol Valley during construction of the Calaveras Dam or SVWTP – Treated Water Reservoirs projects or complete a health risk screening (and, if warranted, a health risk assessment) to determine health risks at these residences from either of these two projects.	N	The health risk assessment conducted for the proposed project determined that construction emissions sources would be separated from the nearest sensitive receptors by a distance of 1,400 feet, which is greater than the 1,000-foot screening distance used by the BAAQMD for the application of its quantitative health risk thresholds. Exposure to TAC emissions over a relatively short exposure period of the 21-month construction duration with a buffer distance of at least 1,400 feet separating the emissions sources and nearest sensitive receptors would not expose nearby sensitive receptors to substantial pollutant concentration. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.9-3, Tunnel Gas Odor Control: Add water scrubbers and appropriate chemicals to tunnel ventilation systems if odorous gases become a nuisance odor problem (i.e., odor complaints are received).	N	The project does not include tunneling. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Noise/Vibration		
Measure 4.10-1a, Noise Controls: For all WSIP projects located within 500 feet of any noise-sensitive receptors, implement appropriate noise controls to reduce daytime construction noise levels to meet the 70-dBA daytime speech interference criterion to the extent feasible. For all WSIP projects involving nighttime construction and located within 3,000 feet of any noise-sensitive receptors, implement appropriate noise controls to maintain noise levels at or below any applicable ordinance nighttime noise limits or the 50-dBA nighttime sleep interference criterion to the extent feasible.	Y	No mitigation is necessary based on project-specific design. Construction-related daytime noise levels were determined to be less than significant. There would be no nighttime construction associated with the proposed project. See Impact NO-1: Construction of the project would not result in a substantial temporary increase in ambient noise levels at the closest residential receptors, and would not expose persons to substantial noise levels in excess of standards established in the Alameda County Noise Ordinance. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.10-1b, Vacate SFPUC Caretaker's Residence at Tesla Portal: Vacate caretaker's residence at Tesla Portal during construction of the Advanced Disinfection and Tesla Portal Disinfection Station projects as well as those portions of the San Joaquin Pipeline System and Rehabilitation of Existing San Joaquin Pipelines projects located at Tesla Portal.	N	The project is not located at the Tesla Portal. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.10-2a, Limit Hourly Truck Volumes: Haul and delivery truck routes for all WSIP projects will, to the extent feasible, avoid local residential streets and follow local designated truck routes. Total project-related haul and delivery truck volumes on any particular haul truck route will be limited to 80 trucks per hour.	N	Although two residences on Athenour Way and the SFPUC watershed keeper's residence on Andrade Road exist in the Sunol Valley, none of the construction access routes are located on residential streets. Construction-related haul and delivery trucks and worker vehicles would use Calaveras Road to access the site. Truck volumes would vary day to day and would not exceed 80 trucks per day. See Impact NO-1: Construction of the project would not result in a substantial temporary increase in ambient noise levels at the closest residential receptors, and would not expose persons to substantial noise levels in excess of standards established in the Alameda County Noise Ordinance. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.10-2b, Restrict Truck Operations: Prohibit haul and delivery trucks from operating within 200 feet of any residential uses during the nighttime hours. For receptors beyond 200 feet from a haul route, limit noise levels to the 50-dBA sleep interference criterion at the closest receptor.	N	Not applicable; project-related haul and delivery trucks would not operate along Calaveras Road during the nighttime or evening hours (10 p.m. to 7 a.m.).
Measure 4.10-2c, Vacate SFPUC Land Manager's Residence: Vacate Land Manager's residence adjacent to Alameda East Portal during offsite truck operations associated with the New Irvington Tunnel project, if truck operations occur during the nighttime hours (10 p.m. to 7 a.m.) and are estimated to exceed the 50-dBA sleep interference criterion at this residence.	N	Not applicable; project-related haul and delivery trucks would not operate along Calaveras Road during nighttime hours (10 p.m. to 7 a.m.).

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Noise/Vibration (cont.)		
Measure 4.10-3a, Vibration Controls to Prevent Cosmetic or Structural Damage: Incorporate restrictions into all contract specifications (primarily for sheetpile driving, pile driving, or tunnel construction activities), whereby surface vibration will be limited to 0.2 inch/second peak particle velocity (PPV) for continuous vibration (e.g., vibratory equipment and impact pile drivers) and 0.5 inch/second PPV for controlled detonations at the closest receptors to ensure that cosmetic or structural damage does not occur.	N	Not applicable; the project's vibration impacts were determined to be less than significant. See Impact NO-2: Construction activities would not result in excessive groundborne vibration.
Measure 4.10-3b, Limit Vibration Levels At or Below Vibration Perception Threshold: Maintain vibration levels at or below the vibration perception threshold at adjacent properties to the extent feasible during nighttime. If vibration complaints are received, operational adjustments will be made to reduce vibration annoyance effects.	N	Not applicable; the project's vibration impacts were determined to be less than significant. See Impact NO-2: Construction activities would not result in excessive groundborne vibration.
Measure 4.10-3c, Limit Tunnel-Related Detonation to Daylight Hours: Limit controlled detonation associated with tunnel construction to daylight hours, Monday through Saturday.	N	Not applicable; the project does not include tunneling.
Services/Utilities		
Measure 4.11-1a, Notify Neighbors of Potential Utility Service Disruption: Notify residents and businesses in project area of potential utility service disruption two to four days in advance of construction.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-1b, Locate Utility Lines Prior to Excavation: Locate overhead and underground utility lines prior to excavation work.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-1c, Confirmation of Utility Line Information: Find the exact location of underground utilities by safe and acceptable means. Confirm information regarding the size, color, and location of existing utilities before construction activities commence.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-1d, Safeguard Employees from Potential Accidents Related to Underground Utilities: While any excavation is open, protect, support, or remove underground utilities as necessary to safeguard employees.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Services/Utilities (cont.)		
Measure 4.11-1e, Notify Local Fire Departments: Notify local fire departments any time damage to a gas utility results in a leak or suspected leak, or whenever damage to any utility results in a threat to public safety.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-1f, Emergency Response Plan: Develop an emergency response plan in the event of a leak or explosion prior to commencing construction activities.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on project-specific design. The SFPUC would implement Standard Construction Measures pertaining to hazardous materials during project planning, construction, and operation. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-1g, Prompt Reconnection of Utilities: Promptly reconnect any disconnected utility lines.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-1h, Coordinate Final Construction Plans with Affected Utilities: Coordinate final construction plans and specifications with affected utilities.	Y	This mitigation was included in the PEIR, however no mitigation is necessary based on up-to-date information. This criterion is not included in the San Francisco Planning Department's August 2015 CEQA Checklist, and this issue is not evaluated in the ACRP EIR. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.11-2, Waste Reduction Measures: Incorporate into contract specifications for each WSIP project the requirement to obtain any necessary waste management permits prior to construction and to comply with conditions of approval attached to project implementation.	N	SFPUC estimates that roughly 90 percent of the waste generated during construction would be diverted by placing in the spoils area in the project area or through recycling of construction debris, which would meet or exceed the State of California's and Alameda County's waste diversion goals. See Impact UT-2: Project construction would not result in a substantial adverse effect related to compliance with federal, state, and local statutes and regulations pertaining to solid waste. Therefore, this PEIR measure does not apply to the ACRP.
Recreation		
Measure 4.12-1, Coordination with Golf Course/Recreational Facility Managers: Coordinate with managers of golf courses or other recreational facilities directly affected by pipeline construction to minimize adverse impacts on golfers and other recreational users.	N	The project would not affect golf courses or other designated recreational facilities. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.12-2, Appropriate Siting of Proposed Facilities: Locate WSIP project facilities on park and recreation properties in consultation with park planning staff to minimize the direct loss of recreation and play space and to minimize inconvenience to park and recreation users.	N	The project does not include construction on park or recreation properties. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Agriculture		
Measure 4.13-1a, Supplemental Noticing and Soil Stockpiling: For the San Joaquin Pipeline projects (San Joaquin System and Rehabilitation of Existing San Joaquin Pipeline), stockpile and replace topsoil in mapped areas of Prime and Unique Farmland and Farmland of Statewide Importance that would be temporarily disturbed by pipeline construction, unless other actions are required under specific agreements with individual landowners.	N	The project is not located in the San Joaquin Region. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.13-1b, Avoidance or Soil Stockpiling: Minimize any potential impacts on agricultural lands in the Sunol Valley by avoiding these resources wherever possible. Where this is not possible, stockpile, replace, and hydroseed topsoil to prevent erosion, unless other actions are required as a result of contracts affecting use of the property or under specific agreements with individual landowners.	Y	No mitigation is necessary based on project-specific information. However, although not specifically targeted at minimizing impacts on agricultural lands, Mitigation Measure M-BI-1e (Prepare and Implement a Vegetation Restoration Plan and Compensatory Mitigation) would restore disturbed lands to preconstruction conditions or better and would minimize spread of weeds. The project-level analysis determined that although the Permanent Spoils Site B is designated as Unique Farmland on the 2012 Farmland Mapping and Monitoring Program (FMMP) maps published in 2014, given that Permanent Spoils Site B has not been in agricultural production since 2012, it is anticipated that the Unique Farmland designation will be removed in future FMMP map updates. Use of this site for the permanent placement of spoils generated during construction of the proposed ACRP would not result in a change in the current use of the site nor affect future uses of the site.
Measure 4.13-2, Siting Facilities to Avoid Prime Farmland: Avoid areas identified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. If avoidance is not feasible, adopt a permanent set-aside for an equivalent acreage of similarly valued farmland in the area.	N	The project-level analysis determined that although the Permanent Spoils Site B is designated as Unique Farmland on the 2012FMMP maps, published in 2014, given that Permanent Spoils Site B has not been in agricultural production since 2012, it is anticipated that the Unique Farmland designation will be removed in future FMMP map updates. Use of this site for the permanent placement of spoils generated during construction of the proposed ACRP would not result in a change in the current use of the site nor affect future uses of the site. Therefore, this PEIR measure does not apply to the ACRP.
Hazards		
Measure 4.14-1a, Site Health and Safety Plan: For all projects where the site assessment indicates the potential to encounter hazardous materials, prepare a site health and safety plan identifying the chemicals present, potential health and safety hazards, monitoring, soil-handling methods, appropriate personnel protective equipment, and emergency response procedures.	N	The construction contractors would be required to implement the SFPUC standard construction measures for hazardous materials. If hazardous materials would be disturbed, the SFPUC would prepare and implement a plan for treating, containing, and/or removing the hazardous materials in accordance with any applicable local, State and federal regulations so as to avoid any adverse exposure to the material during and after construction. As part of the SFPUC standard construction requirements, protection measures would also be implemented to prevent the release of hazardous materials used during construction. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Hazards (cont.)		
Measure 4.14-1b, Materials Disposal Plan: For all projects where the site assessment indicates the potential to encounter hazardous materials in the soil, prepare a materials disposal plan that specifies the disposal method and approved disposal site for the soil.	N	The construction contractors would be required to implement the SFPUC standard construction measures for hazardous materials. If hazardous materials would be disturbed, the SFPUC would prepare and implement a plan for treating, containing, and/or removing the hazardous materials in accordance with any applicable local, State and federal regulations so as to avoid any adverse exposure to the material during and after construction. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.14-1c, Coordination with Property Owners and Regulatory Agencies: Based on regulatory agency file reviews, assess the potential to encounter unacceptable levels of hazardous materials at known environmental cases, for construction activities to cause groundwater plume migration or interfere with ongoing remediations at known environmental cases, and for increased water levels in reservoirs or lakes to inundate known environmental cases. Modify construction or remediation activities.	N	The project would not interfere with the investigation or remediation of a known environmental case. See Section 5.17.1.1, Hazardous Materials in Soil and Groundwater. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.14-2, Health Risk Screening and Airborne Asbestos Monitoring Plan: For tunneling projects where soil or rock may contain naturally occurring asbestos, conduct a health risk screening assessment to identify acceptable levels of asbestos in tunnel emissions. Prepare an airborne asbestos monitoring plan for approval by the BAAQMD.	N	The project would not disturb a rock unit or soil that contains naturally occurring asbestos. See Section 5.17.2.1, Federal and State Regulations. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.14-5, Hazardous Building Materials Surveys and Abatement: For all WSIP projects involving demolition or renovation of existing facilities, perform a hazardous building materials survey for each structure prior to demolition or renovation activities. If any friable asbestos-containing materials, lead-containing materials, or hazardous components of building materials are identified, implement adequate abatement practices prior to demolition or renovation.	N	The project would require demolition of an approximately 100-foot-long section of the existing Sunol Pump Station Pipeline, a concrete manhole, and the existing inactive 100-foot-long aboveground emergency intertie pipeline associated with the South Bay Aqueduct. In addition, a 300-foot segment of a 22-inch-diameter PG&E natural gas transmission pipeline needs to be removed before the electrical control building can be constructed. Impacts related to the inadvertent release of hazardous chemicals during project construction would be less than significant with implementation of the SFPUC standard construction measures for hazardous materials. The SFPUC would also implement Alameda WMP actions that pertain to spills of hazardous materials. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Energy		
Measure 4.15-2, Incorporation of Energy Efficiency Measures: Consistent with the Energy Action Plan II priorities for reducing energy usage, ensure that energy-efficient equipment is used in all WSIP projects. Prepare a repair and maintenance plan for each facility to minimize power use. Evaluate the potential for use of renewable energy resources.	Y	Applicable to the ACRP. See Mitigation Measure M-ME-4, which incorporates this PEIR measure verbatim into the project-level EIR.
Collective Impacts (These are considered cumulative mitigation measures in project-level CEQA documents)		
Measure 4.16-1a, Construction Coordination at Irvington Portal: If construction schedules of multiple WSIP projects occurring at and near Irvington Portal coincide or overlap, the SFPUC will coordinate with construction contractor(s) and neighbors to minimize disturbance of residents in the adjacent neighborhood to the extent practicable. Such coordination will need to balance the duration of construction with the magnitude of construction-related impacts on the same sensitive receptors.	N	The project is not located at the Irvington Portal.
Measure 4.16-4a, Bioregional Habitat Restoration Measures: Address the following bioregional effects and implement conservation principles when implementing habitat compensation mitigation required for individual WSIP facility projects: compound impacts on functional units of habitat as WSIP projects simplify vegetation structure and increase “edge” (the boundary between two different habitats); increased habitat impacts due to the spread of weedy, non-native plant species; genetic diversity impacts on small populations; impacts on wildlife movement due to habitat fragmentation; suppression of natural disturbance regimes; and reduced population recovery opportunities from stochastic events.	N	The project’s contribution to cumulative effects on biological resources would be mitigated with project-specific mitigation measures and therefore would not require implementation of bioregional habitat restoration measures. See Impact C-BI-1: Causation of contribution to cumulative impacts on terrestrial biological resources. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.16-4b, Coordination of Construction Staging and Access: Coordinate construction contractor(s) to minimize surface disturbance when construction schedules for WSIP projects affecting the same areas overlap.	N	SFPUC is already coordinating construction schedules, staging, and access issues for SFPUC projects in the Sunol Valley. Most of the other WSIP projects in the Sunol Valley have already been completed. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.16-6a, SFPUC WSIP Projects Construction Coordinator: Identify a qualified construction coordinator to coordinate project-specific traffic control plans; develop a public information campaign to inform the public of construction activities, detour routes, and alternate routes; and work with local and regional agencies to pursue additional traffic mitigation measures and incorporate such measures into the project-specific traffic control plans.	Y	The SFPUC Standard Construction Measures (traffic control measures) would be applicable to construction of the ACRP; this measure requires that all projects implement traffic control measures sufficient to maintain traffic and pedestrian circulation on streets affected by construction, including measures such as flaggers, construction warning signs, scheduling truck trips during non-peak hours, and coordinating with local emergency responder to maintain emergency access. The limited number of truck trips (no more than one truck trip per hour) and construction worker vehicle trips (maximum of 68 per day) would not result in a substantial or cumulatively considerable contribution to potential cumulative traffic safety hazard impacts. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Collective Impacts (cont.)		
Measure 4.16-6b, Combined San Joaquin Traffic Control Plan: Develop a San Joaquin Traffic Control Plan that coordinates the project-specific traffic control plans and identifies additional measures (consistent with the standards of San Joaquin County, Stanislaus County, and Caltrans) to minimize the combined impacts of multiple WSIP project construction traffic on I-580, Chrisman Road, and Vernalis Road.	N	The project is not located in San Joaquin County.
Measure 4.16-6c, Combined Sunol Valley Traffic Control Plan: Develop a Sunol Valley Traffic Control Plan that coordinates the project-specific traffic control plans and identifies additional measures (consistent with the standards of Alameda County and Caltrans) to minimize the impacts of construction traffic on Calaveras Road and I-680.	Y	The SFPUC Standard Construction Measures (traffic control measures) would be applicable to construction of the ACRP. The limited number of truck trips (no more than one truck trip per hour) and construction worker vehicle trips (maximum of 68 per day) would not result in a substantial or cumulatively considerable contribution to potential cumulative traffic safety hazard impacts. Furthermore, most WSIP projects in the Sunol Valley have already been completed. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.16-7a, Dust and Exhaust Control Measures for All WSIP Projects: Require implementation of Air Quality Measures 4.9-1a thru 4.9-1d for all WSIP projects to address collective construction-related air quality impacts.	Y	Specified air quality measures are already required under project-level Mitigation Measures M-AQ-1 (BAAQMD General Construction Measures).
Measure 4.16-7b, Health Risk Screening or Use of Soot Filters for All Projects in the San Joaquin and Sunol Valley Regions: Require Measure 4.9-2a for all WSIP projects in the San Joaquin and Sunol Valley Regions to address collective DPM impacts. When this requirement is applied to the New Irvington Tunnel project, it will be applied to both the Sunol Valley and Fremont tunnel portals, taking into account truck traffic from other WSIP projects in the vicinity of both portals.	Y	See Mitigation Measure M-AQ 1 (BAAQMD Basic Construction Measures). The project's contribution to cumulative impacts are addressed by Mitigation Measure M-AQ-1. With mitigation, the ACRP's contribution to cumulative air quality impacts related to criteria pollutants and precursor emissions during construction would not be cumulatively considerable.
Measure 4.16-7c, Vacate SFPUC Land Managers' Residences for All Projects in the Sunol Valley Region: Require Measure 4.9-2b for all WSIP projects in the Sunol Valley Region to address collective DPM impacts.	Y	No mitigation is necessary based on project-specific design. Vacation of the land manager's residence would not be required as a result of project-implementation because the project's contribution to cumulative DPM emissions would not be cumulatively considerable. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.16-8a, Limiting Hourly Truck Volumes and Restricting Truck Operations on Haul Routes for Multiple WSIP Projects: Apply Measures 4.10-2a and 4.10-2b to total haul and delivery truck volumes attributable to all WSIP projects on any particular haul truck route (including haul routes in the Tesla Portal, Irvington Portal, and Lower Crystal Springs Dam vicinities as well as haul routes in the San Francisco Region) to address collective truck-related noise impacts.	N	Based on project traffic volumes for all Sunol Valley projects and the proximity of sensitive receptors, cumulative impacts related to temporary noise disturbance along construction access routes would be less than significant. Therefore, this PEIR measure does not apply to the ACRP.

TABLE C-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE ALAMEDA CREEK RECAPTURE PROJECT

PEIR Mitigation Measure(s)	Applicable to Alameda Creek Fishery Enhancement Project in PEIR (Y/N)?	Applicability of Programmatic Mitigation Measure to ACRP
Collective Impacts (cont.)		
Measure 4.16-8b, Vacate Land Manager's Residence for All Projects in Sunol Valley Region: To address collective noise impacts, vacate Land Manager's residence adjacent to Alameda East Portal during construction truck operations associated with all WSIP projects in this region if collective daytime truck volumes exceed the 70-dBA speech interference criterion or nighttime truck volumes exceed the 50-dBA sleep interference criterion.	Y	No mitigation is necessary based on project-specific design. Based on project traffic volumes for all Sunol Valley projects and the proximity of the Land Manager's residence, noise levels from cumulative traffic on Calaveras Road would not exceed the 70-dBA speech interference criteria, and the proposed project would not include nighttime haul truck traffic. Therefore, this PEIR measure does not apply to the ACRP.
Cumulative Effects		
Measure 4.17-6, SFPUC WSIP Projects Construction Coordinator – Other Agencies: The SFPUC WSIP construction coordinator designated in accordance with Measure 4.16-6a will also consider the effects of any traffic generated by SFPUC maintenance activities and other SFPUC projects; and coordinate with Caltrans, other county agencies, and local jurisdictions regarding construction of other private and public development projects so as to minimize traffic impacts on local access roads.	Y	The SFPUC Standard Construction Measures (traffic control measures) would be applicable to construction of the ACRP. The limited number of truck trips (no more than one truck trip per hour) and construction worker vehicle trips (maximum of 68 per day) would not result in a substantial or cumulatively considerable contribution to potential cumulative traffic safety hazard impacts. Therefore, this PEIR measure does not apply to the ACRP.
Measure 4.17-8, Coordination of Truck Traffic on Local Streets: The SFPUC WSIP construction coordinator designated in Measure 4.17-6 will also be responsible for coordinating truck traffic generated on these same streets by SFPUC maintenance activities and other SFPUC projects so that SFPUC-related truck noise increases are maintained at or below threshold levels specified in Measures 4.10-2a and 4.10-2b to the extent feasible.	Y	The SFPUC Standard Construction Measures (traffic control measures) would be applicable to construction of the ACRP. The limited number of truck trips (no more than one truck trip per hour) and construction worker vehicle trips (maximum of 68 per day) would not result in a substantial or cumulatively considerable contribution to potential cumulative traffic safety hazard impacts. Therefore, this PEIR measure does not apply to the ACRP.

NOTES:

(a) See WSIP PEIR, Volume 4, Chapter 6, Table 6-2, for description of standard programmatic biological resources mitigation measures that correspond to each special status species.

APPENDIX AQ

Emissions Calculations for Air Quality and Greenhouse Gas Emissions Analyses

This page intentionally left blank

Alameda Creek Recapture Project

Construction - CAP and GHG Emissions

UNMITIGATED CONSTRUCTION EMISSIONS - AVERAGE DAILY CRITERIA AIR POLLUTANTS

Source	# of workdays	Average Daily Emissions (lbs/day)			
		ROG	NOx	PM-10	PM-2.5
Off-road construction equipment	284	4.48	46.23	1.87	1.75
On-road mobile sources		0.07	1.53	0.02	0.02
Total Project Average		4.55	47.75	1.89	1.77
BAAQMD Threshold		54	54	82	54
Significant?		No	No	No	No

ANNUAL GHG EMISSIONS FROM CONSTRUCTION - OFF ROAD + ON ROAD

Emissions Source	GHG Emissions (tons)				
	CO_2	CH_4	N_2O	CO_2e	
Offroad Construction Equipment	956.36	0.23	0.00	961.61	
Onroad Vehicles	66.36	0.01	0.00	66.97	
PROJECT TOTAL OVER ENTIRE CONSTRUCTION PERIOD	1,022.71	0.24	0.00	1,029	34.3

TOTAL GHG EMISSIONS

Project Component	OFF ROAD CONSTRUCTION EQUIPMENT				ONROAD VEHICLES		TOTAL	
	GHG Emissions (tons)				GHG Emissions (tons)		GHG Emissions (tons	
	CO_2	CH_4	N_2O	CO_2e	CO_2	CO_2e	CO_2	CO_2e
Component 1 - Turbine Pumps and Barge Flotation System	184.3	0.04	0.00	185.2	15.5	15.7	200	201
Component 2 - Mooring system	40.0	0.01	0.00	40.2	5.3	5.4	45	46
Component 3 - Electrical Control Building and Transformer	279.5	0.08	0.00	281.3	21.4	21.5	301	303
Component 4 - Pipeline Work	426.9	0.09	0.00	429.0	19.2	19.4	446	448
Component 5 - Spoils Disposal	25.7	0.01	0.00	25.9	4.9	4.9	31	31
PROJECT TOTAL OVER ENTIRE CONSTRUCTION PERIOD	956.4	0.23	0.00	961.6	66.4	67.0	1023	1029

Alameda Creek Recapture Project

Construction - CAP and GHG Emissions

Results of CalEEMod run for construction equipment

Component	# of workdays	CalEEMod Annual emissions (tons)							Daily Emissions (lb/day)			
		ROG	NOx	PM-10 (exhaust)	PM-2.5 (exhaust)	CO_2	CH_4	N_2O	ROG	NOx	PM-10 (exhaust)	PM-2.5 (exhaust)
Component 1 - Turbine Pumps and Barge Flotation System	60	0.12	1.32	0.05	0.05	168.76	0.03	0.00	3.90	43.95	1.66	1.57
Component 2 - Mooring system	24	0.04	0.27	0.01	0.01	34.69	0.01	0.00	3.59	22.77	1.12	1.08
Component 3 - Electrical Control Building and Transformer	96	0.19	2.02	0.08	0.07	258.11	0.08	0.00	3.89	42.08	1.64	1.51
Component 4 - Pipeline Work	80	0.28	2.81	0.12	0.11	407.65	0.09	0.00	6.90	70.21	2.96	2.77
Component 5 - Spoils Disposal	24	0.01	0.14	0.01	0.01	20.79	0.01	0.00	1.12	12.03	0.47	0.43
TOTAL	284	0.64	6.56	0.27	0.25	890.00	0.22	0.00	4.48	46.23	1.87	1.75

Summary of Onroad emissions from worker commute and material haul trips

Construction Period	# of workdays	EMFAC2014 Emissions (lb/day)				Estimated Emissions (tons) for entire project construction						
		ROG	NOx	PM-10 (exhaust)	PM-2.5 (exhaust)	ROG	NOx	PM-10 (exhaust)	PM-2.5 (exhaust)	CO_2	CH_4	N_2O
Total project	284	0.07	1.53	0.02	0.02	0.01	0.22	0.00	0.00	66.36	0.01	0.00

Alameda Creek Recapture Project

Construction - CAP and GHG Emissions

Overall construction timeline:	Fall 2017 to Summer 2019 (about 21 months)					
	No overlapping of phases					
Project Component	**Assumed Construction Year**	**# of workdays**	**workers/ day**	**Worker trips/day**	**Material delivery trips/day**	**Offsite haul trips/day**
Component 1 - Turbine Pumps and Barge Flotation System	2017	60	10	20	4	0
Component 2 - Mooring system	2018	24	6	12	4	0
Component 3 - Electrical Control Building and Transformer	2018	96	6	12	4	0
Component 4 - Pipeline Work	2018	80	8	16	4	0
Component 5 - Spoils Disposal	2018	24	4	8	0	4

Assumed one-way trip lengths

Worker trips	12.5
Material Delivery Trips	25
Offsite Haul Trips	25

Details of Onroad emissions estimation using EMFAC2014 factors

Component 1	miles/day	EMFAC2014 Emission Factors (g/mile)							Estimated Emissions (lbs/day)				Estimated Emissions (tons/day)		
		ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O	ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O
Worker trips - LDT1	250	0.06	0.21	0.00	0.00	357.59	0.20	0.02	0.03	0.12	0.00	0.00	0.09	0.00	0.00
Material Delivery Trips - T7	100	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.05	1.44	0.02	0.01	0.17	0.00	0.00
Offsite Haul Trips - T7	0	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Component 1 Onroad Daily Emissions									0.08	1.56	0.02	0.02	0.26	0.00	0.00

Component 2	miles/day	EMFAC2014 Emission Factors (g/mile)							Estimated Emissions (lbs/day)				Estimated Emissions (tons/day)		
		ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O	ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O
Worker trips	150	0.06	0.21	0.00	0.00	357.59	0.20	0.02	0.02	0.07	0.00	0.00	0.05	0.00	0.00
Material Delivery Trips	100	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.05	1.44	0.02	0.01	0.17	0.00	0.00
Offsite Haul Trips	0	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Component 2 Onroad Daily Emissions									0.06	1.51	0.02	0.02	0.22	0.00	0.00

Component 3	miles/day	EMFAC2014 Emission Factors (g/mile)							Estimated Emissions (lbs/day)				Estimated Emissions (tons/day)		
		ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O	ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O
Worker trips	150	0.06	0.21	0.00	0.00	357.59	0.20	0.02	0.02	0.07	0.00	0.00	0.05	0.00	0.00
Material Delivery Trips	100	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.05	1.44	0.02	0.01	0.17	0.00	0.00
Offsite Haul Trips	0	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Component 3 Onroad Daily Emissions									0.06	1.51	0.02	0.02	0.22	0.00	0.00

Component 4	miles/day	EMFAC2014 Emission Factors (g/mile)							Estimated Emissions (lbs/day)				Estimated Emissions (tons/day)		
		ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O	ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O
Worker trips	200	0.06	0.21	0.00	0.00	357.59	0.20	0.02	0.02	0.09	0.00	0.00	0.07	0.00	0.00
Material Delivery Trips	100	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.05	1.44	0.02	0.01	0.17	0.00	0.00
Offsite Haul Trips	0	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Component 4 Onroad Daily Emissions									0.07	1.54	0.02	0.02	0.24	0.00	0.00

Component 5	miles/day	EMFAC2014 Emission Factors (g/mile)							Estimated Emissions (lbs/day)				Estimated Emissions (tons/day)		
		ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O	ROG	NOx	PM-10	PM-2.5	CO_2	CH_4	N_2O
Worker trips	100	0.06	0.21	0.00	0.00	357.59	0.20	0.02	0.01	0.05	0.00	0.00	0.04	0.00	0.00
Material Delivery Trips	0	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite Haul Trips	100	0.21	6.54	0.07	0.07	1689.32	0.01	0.00	0.05	1.44	0.02	0.01	0.17	0.00	0.00
Component 5 Onroad Daily Emissions									0.06	1.49	0.02	0.02	0.20	0.00	0.00

NOTES:

CO2 on-road emission factors were derived using EMFAC2014 for 2017; CH4 and N2O emission factors are from TRC, 2015, Table 13.4.

0.00220462	Conversion from grams to pounds
1000000	Conversion from grams to tons
2000	Conversion from pounds to tons

ACRP - June 2016

Alameda County, Annual

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.1169	1.3184	0.7066	1.8000e-003	0.0000	0.0499	0.0499	0.0000	0.0472	0.0472	0.0000	168.7623	168.7623	0.0341	0.0000	169.4785
2018	0.5192	5.2459	3.0519	7.9300e-003	0.1445	0.2161	0.3607	0.0795	0.2016	0.2810	0.0000	721.2364	721.2364	0.1867	0.0000	725.1574
Total	**0.6361**	**6.5642**	**3.7585**	**9.7300e-003**	**0.1445**	**0.2660**	**0.4105**	**0.0795**	**0.2487**	**0.3282**	**0.0000**	**889.9987**	**889.9987**	**0.2208**	**0.0000**	**894.6359**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Turbine pumps and barge flotation system	Demolition	10/2/2017	12/9/2017	6	60	
2	Mooring System	Site Preparation	1/8/2018	2/3/2018	6	24	
3	Electrical Control Building and Transformer	Grading	3/5/2018	6/23/2018	6	96	
4	Pipeline work	Building Construction	7/9/2018	10/9/2018	6	80	
5	Spoils Disposal	Paving	11/5/2018	12/1/2018	6	24	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Turbine pumps and barge flotation system	Air Compressors	1	8.00	300	0.48
Turbine pumps and barge flotation system	Cranes	1	8.00	275	0.29
Turbine pumps and barge flotation system	Cranes	1	8.00	563	0.29
Turbine pumps and barge flotation system	Generator Sets	1	8.00	150	0.74
Turbine pumps and barge flotation system	Off-Highway Trucks	2	6.00	300	0.38
Mooring System	Bore/Drill Rigs	1	0.70	200	0.50
Mooring System	Cranes	1	0.70	250	0.29
Mooring System	Graders	1	6.00	265	0.41
Mooring System	Off-Highway Trucks	1	6.00	325	0.38
Mooring System	Off-Highway Trucks	3	0.13	400	0.38
Mooring System	Pumps	4	8.00	50	0.74
Electrical Control Building and Transformer	Excavators	1	4.00	372	0.38
Electrical Control Building and Transformer	Graders	1	4.00	265	0.41
Electrical Control Building and Transformer	Off-Highway Trucks	4	6.00	400	0.38
Electrical Control Building and Transformer	Rubber Tired Dozers	1	4.00	500	0.40
Pipeline work	Air Compressors	1	8.00	300	0.48
Pipeline work	Cranes	1	8.00	250	0.29
Pipeline work	Excavators	1	6.00	372	0.38
Pipeline work	Generator Sets	1	8.00	150	0.74
Pipeline work	Off-Highway Trucks	3	6.00	325	0.38
Pipeline work	Off-Highway Trucks	1	8.00	325	0.38
Pipeline work	Other Construction Equipment	1	4.00	50	0.42
Pipeline work	Other Construction Equipment	2	8.00	90	0.42
Pipeline work	Other Construction Equipment	1	8.00	400	0.42
Pipeline work	Tractors/Loaders/Backhoes	1	6.00	125	0.37
Pipeline work	Welders	1	8.00	250	0.45
Spoils Disposal	Off-Highway Trucks	2	6.00	325	0.38
Spoils Disposal	Tractors/Loaders/Backhoes	1	6.00	125	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Turbine pumps and barge flotation system	6	0.00	0.00	0.00	12.50	25.00	25.00	LD_Mix	HDT_Mix	HHDT
Mooring System	11	0.00	0.00	0.00	12.50	25.00	25.00	LD_Mix	HDT_Mix	HHDT
Electrical Control Building and	7	0.00	0.00	0.00	12.50	25.00	25.00	LD_Mix	HDT_Mix	HHDT
Pipeline work	14	0.00	0.00	0.00	12.50	25.00	25.00	LD_Mix	HDT_Mix	HHDT
Spoils Disposal	3	0.00	0.00	0.00	12.50	25.00	25.00	LD_Mix	HDT_Mix	HHDT

3.2 Turbine pumps and barge flotation system - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1169	1.3184	0.7066	1.8000e-003		0.0499	0.0499		0.0472	0.0472	0.0000	168.7623	168.7623	0.0341	0.0000	169.4785
Total	**0.1169**	**1.3184**	**0.7066**	**1.8000e-003**		**0.0499**	**0.0499**		**0.0472**	**0.0472**	**0.0000**	**168.7623**	**168.7623**	**0.0341**	**0.0000**	**169.4785**

3.3 Mooring System - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0431	0.2732	0.2025	4.2000e-004		0.0134	0.0134		0.0130	0.0130	0.0000	34.6884	34.6884	8.2400e-003	0.0000	34.8615
Total	**0.0431**	**0.2732**	**0.2025**	**4.2000e-004**	**0.0000**	**0.0134**	**0.0134**	**0.0000**	**0.0130**	**0.0130**	**0.0000**	**34.6884**	**34.6884**	**8.2400e-003**	**0.0000**	**34.8615**

3.4 Electrical Control Building and Transformer - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1445	0.0000	0.1445	0.0795	0.0000	0.0795	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1868	2.0198	1.1639	2.8300e-003		0.0789	0.0789		0.0726	0.0726	0.0000	258.1076	258.1076	0.0804	0.0000	259.7950
Total	**0.1868**	**2.0198**	**1.1639**	**2.8300e-003**	**0.1445**	**0.0789**	**0.2234**	**0.0795**	**0.0726**	**0.1520**	**0.0000**	**258.1076**	**258.1076**	**0.0804**	**0.0000**	**259.7950**

3.5 Pipeline work - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2759	2.8085	1.6013	4.4600e-003		0.1182	0.1182		0.1108	0.1108	0.0000	407.6522	407.6522	0.0917	0.0000	409.5767
Total	**0.2759**	**2.8085**	**1.6013**	**4.4600e-003**		**0.1182**	**0.1182**		**0.1108**	**0.1108**	**0.0000**	**407.6522**	**407.6522**	**0.0917**	**0.0000**	**409.5767**

3.6 Spoils Disposal - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0134	0.1444	0.0842	2.3000e-004		5.5900e-003	5.5900e-003		5.1500e-003	5.1500e-003	0.0000	20.7883	20.7883	6.4700e-003	0.0000	20.9242
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0134**	**0.1444**	**0.0842**	**2.3000e-004**		**5.5900e-003**	**5.5900e-003**		**5.1500e-003**	**5.1500e-003**	**0.0000**	**20.7883**	**20.7883**	**6.4700e-003**	**0.0000**	**20.9242**

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Alameda
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK
Alameda	2017	LDT1	Aggregated	Aggregated	GAS	52877.02684	1821823.792	320095.5267	0.055424141	0	0.390237936	0.362072213
Alameda	2017	LDT1	Aggregated	Aggregated	DSL	91.88094767	1897.433546	439.6441331	0.215806857	0	0	0
Alameda	2017	LDT1	Aggregated	Aggregated	ELEC	52.53572448	1797.96505	325.8087493	0	0	0	0.004883985
Alameda	2017	T7 single construction	Aggregated	Aggregated	DSL	633.1107399	53713.13277	0	0.20701989	1.478982196	0	0

ROG_RUNLOSS	ROG_RESTLOSS	ROG_DIURN	TOG_RUNEX	TOG_IDLEX	TOG_STREX	TOG_HOTSOAK	TOG_RUNLOSS	TOG_RESTLOSS	TOG_DIURN	CO_RUNEX
1.339958325	0.609030532	0.751575438	0.075663712	0	0.426993424	0.362072213	1.339958325	0.609030532	0.751575438	2.026928087
0	0	0	0.245681759	0	0	0	0	0	0	1.246155913
0	0.004020951	0.014405	0	0	0	0.004883985	0	0.004020951	0.014405	0
0	0	0	0.235676386	1.683708648	0	0	0	0	0	0.752275759

CO_IDLEX	CO_STREX	NOx_RUNEX	NOx_IDLEX	NOx_STREX	CO2_RUNEX	CO2_IDLEX	CO2_STREX	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW
0	5.237705937	0.211837379	0	0.299733044	357.5872158	0	79.31474323	0.003040444	0	0.004378947	0.008000002
0	0	1.302236072	0	0	393.6034646	0	0	0.170093891	0	0	0.008000002
0	0	0	0	0	0	0	0	0	0	0	0.008000002
5.889664867	0	6.542962041	31.44426428	0	1689.321419	3802.310764	0	0.070211827	0.151722909	0	0.03600001

PM10_PMBW	PM2_5_RUNEX	PM2_5_IDLEX	PM2_5_STREX	PM2_5_PMTW	PM2_5_PMBW	SOx_RUNEX	SOx_IDLEX	SOx_STREX
0.036750011	0.002801353	0	0.004037364	0.002000001	0.015750005	0.003603361	0	0.000886807
0.036750011	0.162735704	0	0	0.002000001	0.015750005	0.003757583	0	0
0.036750011	0	0	0	0.002000001	0.015750005	0	0	0
0.061740018	0.067174494	0.145159444	0	0.009000003	0.026460008	0.016116916	0.036275822	0

OPERATIONAL GHG EMISSIONS

Electricity requirement of the ACRP	3785740	kWh/year
No. of days of operation/year	121	days
Annual power requirement	1.3	MW

GHGs from Electricity Consumption

GHG	Emission Factor (lb/kWh)	Electricity Consumption kWhr	CO2e* (metric tons)
CO2	0.30700	3,785,740	527.18
CH4	0.00003112	3,785,740	1.12
N20	0.0000567	3,785,740	30.18
		Total =	558

NOTES:

1. The emission factor for CO2 was obtained from PG&E, 2015. Emission factors for CH4 and N2O are USEPA's eGRID2012 Annual Emissions Output Rates
2. Proposed electricity consumption estimate for project based on data provided by SFPUC based on 7,200 AFY average annual recapture volume.
3. *Global Warming Potential for CH4 = 21; GWP for N2O = 310 (CCAR, 2009).

SOURCES:

1. California Climate Action Registry (CCAR), 2009. General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, Version 3.1, January 2009. Tables C.3 and C.6.
2. Pacific Gas and Electric Company (PG&E), 2015. Greenhouse Gas Emission Factors - Guidance for PG&E Customers, November 2015
3. USEPA, eGRID2012 Annual Emission Output Rates. Available at http://www.epa.gov/sites/production/files/2015-10/documents/egrid2012_ghgoutputrates_0.pdf

APPENDIX BIO1

Terrestrial Biological Resources TM

This page intentionally left blank

BIO1a – USFWS Species List

U.S. Fish and Wildlife Service

Trust Resources List

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

Sacramento Fish and Wildlife Office
FEDERAL BUILDING
2800 COTTAGE WAY, ROOM W-2605
SACRAMENTO, CA 95825
(916) 414-6600

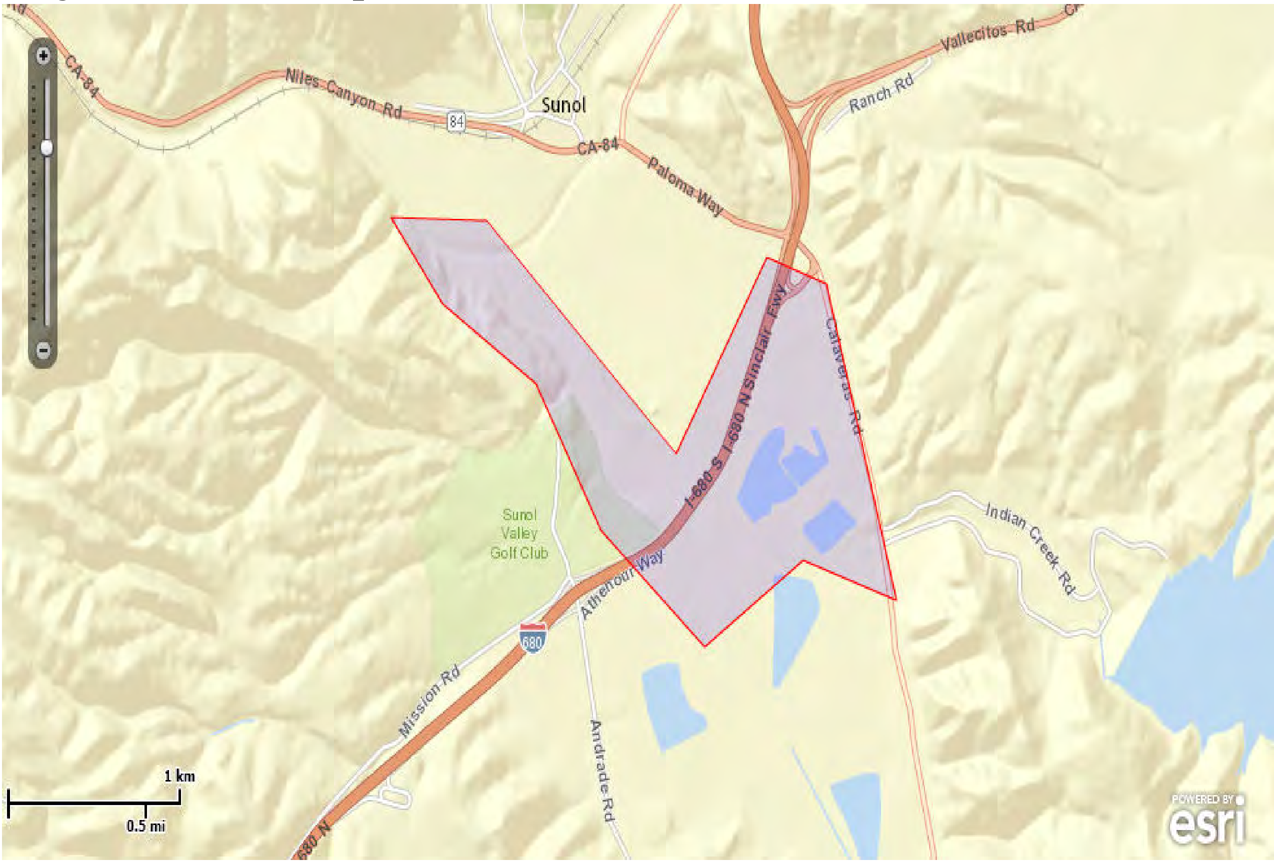
Project Name:

Alameda Creek Recapture Project

U.S. Fish and Wildlife Service

Trust Resources List

Project Location Map:



Project Counties:

Alameda, CA

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-121.8974773 37.5897819, -121.8911259 37.5896459, -121.8785946 37.5801235, -121.8725864 37.5881496, -121.8686382 37.5870613, -121.8640034 37.5741375, -121.8701832 37.5757701, -121.8767063 37.5722327, -121.8835728 37.5769945, -121.8878643 37.5829804, -121.8940441 37.5862452, -121.8974773 37.5897819)))

Project Type:

** Other **

Trust Resources List

Endangered Species Act Species List (USFWS Endangered Species Program).

There are a total of **13** threatened or endangered species on your 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 fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

Species that should be considered in an effects analysis for your project:

Amphibians	Status		Has Critical Habitat	Contact
California Tiger Salamander (*Ambystoma californiense*) Population: U.S.A. (CA - Sonoma County)	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
California red-legged frog (*Rana draytonii*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Birds				
California Least tern (*Sterna antillarum browni*)	Endangered	species info		Sacramento Fish And Wildlife Office
Crustaceans				
Conservancy fairy shrimp (*Branchinecta conservatio*) Population: Entire	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Vernal Pool fairy shrimp (*Branchinecta lynchi*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Vernal Pool tadpole shrimp (*Lepidurus packardi*) Population: Entire	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Fishes				
Delta smelt (*Hypomesus transpacificus*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office

Trust Resources List

steelhead (*Oncorhynchus (=salmo) mykiss*) Population: Northern California DPS	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Flowering Plants				
Contra Costa goldfields (*Lasthenia conjugens*)	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Insects				
Bay Checkerspot butterfly (*Euphydryas editha bayensis*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Mammals				
Salt Marsh Harvest mouse (*Reithrodontomys raviventris*) Population: U.S.A.(CA)	Endangered	species info		Sacramento Fish And Wildlife Office
San Joaquin Kit fox (*Vulpes macrotis mutica*) Population: U.S.A(CA)	Endangered	species info		Sacramento Fish And Wildlife Office
Reptiles				
Alameda whipsnake (*Masticophis lateralis euryxanthus*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office

Critical habitats within your project area:

There are no critical habitats within your project area.

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

Trust Resources List

FWS Migratory Birds (USFWS Migratory Bird Program).

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). 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)). The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. For more information regarding these Acts see: http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tool links in the Bird Conservation Tools section at: http://www.fws.gov/migratorybirds/CCMB2.htm.

For information about conservation measures that help avoid or minimize impacts to birds, please visit:
http://www.fws.gov/migratorybirds/CCMB2.htm.

Migratory birds of concern that may be affected by your project:
There are **26** birds on your Migratory birds of concern list. The underlying data layers used to generate the migratory bird list of concern will continue to be updated regularly as new and better information is obtained. User feedback is one method of identifying any needed improvements. Therefore, users are encouraged to submit comments about any questions regarding species ranges (e.g., a bird on the USFWS BCC list you know does not occur in the specified location appears on the list, or a BCC species that you know does occur there is not appearing on the list). Comments should be sent to the ECOS Help Desk.

Species Name	Bird of Conservation Concern (BCC)	Species Profile	Seasonal Occurrence in Project Area
Allen's Hummingbird (*Selasphorus sasin*)	Yes	species info	Breeding

Trust Resources List

Bald eagle (*Haliaeetus leucocephalus*)	Yes	species info	Year-round
Bell's Sparrow (*Amphispiza belli*)	Yes	species info	Year-round
Black Oystercatcher (*Haematopus bachmani*)	Yes	species info	Year-round
Black rail (*Laterallus jamaicensis*)	Yes	species info	Breeding
Black-chinned Sparrow (*Spizella atrogularis*)	Yes	species info	Breeding
Burrowing Owl (*Athene cunicularia*)	Yes	species info	Year-round
California spotted Owl (*Strix occidentalis occidentalis*)	Yes	species info	Year-round
Costa's Hummingbird (*Calypte costae*)	Yes	species info	Breeding
Fox Sparrow (*Passerella liaca*)	Yes	species info	Wintering
Lawrence's Goldfinch (*Carduelis lawrencei*)	Yes	species info	Breeding
Least Bittern (*Ixobrychus exilis*)	Yes	species info	Breeding
Lesser Yellowlegs (*Tringa flavipes*)	Yes	species info	Wintering
Lewis's Woodpecker (*Melanerpes lewis*)	Yes	species info	Wintering
Loggerhead Shrike (*Lanius ludovicianus*)	Yes	species info	Wintering
Long-Billed curlew (*Numenius americanus*)	Yes	species info	Wintering
Marbled Godwit (*Limosa fedoa*)	Yes	species info	Wintering
Nuttall's Woodpecker (*Picoides nuttallii*)	Yes	species info	Year-round
Oak Titmouse (*Baeolophus inornatus*)	Yes	species info	Year-round
Olive-Sided flycatcher (*Contopus cooperi*)	Yes	species info	Breeding
Peregrine Falcon (*Falco peregrinus*)	Yes	species info	Year-round

Short-billed Dowitcher (*Limnodromus griseus*)	Yes	species info	Wintering
Short-eared Owl (*Asio flammeus*)	Yes	species info	Wintering
Swainson's hawk (*Buteo swainsoni*)	Yes	species info	Wintering
tricolored blackbird (*Agelaius tricolor*)	Yes	species info	Year-round
Yellow-billed Magpie (*Pica nuttalli*)	Yes	species info	Year-round

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

Data Limitations, Exclusions and Precautions
The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Trust Resources List

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following wetland types intersect your project area in one or more locations:

Wetland Types	NWI Classification Code	Total Acres
Freshwater Emergent Wetland	PEM1C	0.5278
Freshwater Emergent Wetland	PEMC	7.3681
Freshwater Pond	PUBHx	2.1123
Riverine	R4SBAx	0.6109
Riverine	R3UBH	51.0402
Riverine	R4SBC	9.2907
Riverine	R3UBHx	2.3741
Riverine	R4SBA	4.3691
Riverine	R4SBCx	0.9333
Riverine	R3USC	1.2199
Riverine	R4USF	22.2653

BIO1b – CDFW CNDDB Wildlife Species List

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad is (La Costa Valley (3712157) or Niles (3712158))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Accipiter striatus sharp-shinned hawk	ABNKC12020	None	None	G5	S4	WL
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	None	G2G3	S1S2	SSC
Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Ardea herodias great blue heron	ABNGA04010	None	None	G5	S4	
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Bombus occidentalis western bumble bee	IIHYM24250	None	None	G2G3	S1	
Campanula exigua chaparral harebell	PDCAM020A0	None	None	G2	S2	1B.2
Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1	None	None	G3T2	S2	1B.1
Clarkia concinna ssp. automixa Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	Candidate Threatened	G3G4	S2	SSC
Delphinium californicum ssp. interius Hospital Canyon larkspur	PDRAN0B0A2	None	None	G3T3	S3	1B.2
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Extriplex joaquinana San Joaquin spearscale	PDCHE041F3	None	None	G2	S2	1B.2
Falco mexicanus prairie falcon	ABNKD06090	None	None	G5	S4	WL
Falco peregrinus anatum American peregrine falcon	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Laterallus jamaicensis coturniculus California black rail	ABNME03041	None	Threatened	G3G4T1	S1	FP

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G2G3	S2S3	
Masticophis lateralis euryxanthus Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2	
Melospiza melodia pusillula Alameda song sparrow	ABPBXA301S	None	None	G5T2?	S2?	SSC
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	AMAFF08082	None	None	G5T2T3	S2S3	SSC
Oncorhynchus mykiss irideus steelhead - central California coast DPS	AFCHA0209G	Threatened	None	G5T2T3Q	S2S3	
Puccinellia simplex California alkali grass	PMPOA53110	None	None	G2G3	S2S3	1B.2
Rana boylii foothill yellow-legged frog	AAABH01050	None	None	G3	S3	SSC
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
Stuckenia filiformis ssp. alpina slender-leaved pondweed	PMPOT03091	None	None	G5T5	S3	2B.2
Suaeda californica California seablite	PDCHE0P020	Endangered	None	G1	S1	1B.1
Sycamore Alluvial Woodland Sycamore Alluvial Woodland	CTT62100CA	None	None	G1	S1.1	

Record Count: 33

BIO1c – CDFW CNDDB Plant Species and Sensitive Natural Communities List

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Taxonomic Group is (Dune or Scrub or Herbaceous or Marsh or Riparian or Woodland or Forest or Alpine or Inland Waters or Marine or Estuarine or Riverine or Palustrine or Ferns or Gymnosperms or Monocots or Dicots or Lichens or Bryophytes or Fungi) and Quad is (Calaveras Reservoir (3712147) or Dublin (3712168) or Hayward (3712261) or La Costa Valley (3712157) or Livermore (3712167) or Milpitas (3712148) or Mountain View (3712241) or Newark (3712251) or Niles (3712158))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1	None	None	G2T2	S2	1B.2
Atriplex depressa brittlescale	PDCHE042L0	None	None	G2	S2	1B.2
Atriplex minuscula lesser saltscale	PDCHE042M0	None	None	G2	S2	1B.1
Balsamorhiza macrolepis big-scale balsamroot	PDAST11061	None	None	G2	S2	1B.2
Campanula exigua chaparral harebell	PDCAM020A0	None	None	G2	S2	1B.2
Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1	None	None	G3T2	S2	1B.1
Chloropyron maritimum ssp. palustre Point Reyes salty bird's-beak	PDSCR0J0C3	None	None	G4?T2	S2	1B.2
Chloropyron palmatum palmate-bracted salty bird's-beak	PDSCR0J0J0	Endangered	Endangered	G1	S1	1B.1
Chorizanthe robusta var. robusta robust spineflower	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
Clarkia concinna ssp. automixa Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
Delphinium californicum ssp. interius Hospital Canyon larkspur	PDRAN0B0A2	None	None	G3T3	S3	1B.2
Eryngium aristulatum var. hooveri Hoover's button-celery	PDAPI0Z043	None	None	G5T1	S1	1B.1
Extriplex joaquinana San Joaquin spearscale	PDCHE041F3	None	None	G2	S2	1B.2
Fritillaria liliacea fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
Helianthella castanea Diablo helianthella	PDAST4M020	None	None	G2	S2	1B.2
Hoita strobilina Loma Prieta hoita	PDFAB5Z030	None	None	G2	S2	1B.1
Holocarpha macradenia Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
Lasthenia conjugens Contra Costa goldfields	PDAST5L040	Endangered	None	G1	S1	1B.1
Malacothamnus arcuatus arcuate bush-mallow	PDMAL0Q0E0	None	None	G2Q	S2	1B.2

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Malacothamnus hallii Hall's bush-mallow	PDMAL0Q0F0	None	None	G2	S2	1B.2
Monolopia gracilens woodland woollythreads	PDAST6G010	None	None	G3	S3	1B.2
Navarretia prostrata prostrate vernal pool navarretia	PDPLM0C0Q0	None	None	G2	S2	1B.1
Northern Coastal Salt Marsh Northern Coastal Salt Marsh	CTT52110CA	None	None	G3	S3.2	
Plagiobothrys glaber hairless popcornflower	PDBOR0V0B0	None	None	GH	SH	1A
Polemonium carneum Oregon polemonium	PDPLM0E050	None	None	G3G4	S2	2B.2
Puccinellia simplex California alkali grass	PMPOA53110	None	None	G2G3	S2S3	1B.2
Senecio aphanactis chaparral ragwort	PDAST8H060	None	None	G3	S2	2B.2
Sidalcea malachroides maple-leaved checkerbloom	PDMAL110E0	None	None	G3	S3	4.2
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
Stuckenia filiformis ssp. alpina slender-leaved pondweed	PMPOT03091	None	None	G5T5	S3	2B.2
Suaeda californica California seablite	PDCHE0P020	Endangered	None	G1	S1	1B.1
Sycamore Alluvial Woodland Sycamore Alluvial Woodland	CTT62100CA	None	None	G1	S1.1	
Trifolium hydrophilum saline clover	PDFAB400R5	None	None	G2	S2	1B.2
Tropidocarpum capparideum caper-fruited tropidocarpum	PDBRA2R010	None	None	G1	S1	1B.1
Valley Needlegrass Grassland Valley Needlegrass Grassland	CTT42110CA	None	None	G3	S3.1	
Valley Sink Scrub Valley Sink Scrub	CTT36210CA	None	None	G1	S1.1	

Record Count: 36

BIO1d – CNPS Plant List

Plant List

51 matches found. *Click on scientific name for details*

Search Criteria

Rare Plant Rank is one of **[1A, 1B, 2A, 2B, 3, 4]**,
FESA is one of **[Endangered, Threatened, Species of Concern, Not Listed]**,
CESA is one of **[Endangered, Threatened, Rare, Not Listed]**, Found in 9 Quads around **37121E7**

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Rare Plant Rank	State Rank	Global Rank
Acanthomintha lanceolata	Santa Clara thorn-mint	Lamiaceae	annual herb	4.2	S4	G4
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	1B.2	S2?	G2?
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	4.2	S3S4	G5?T3T4
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	annual herb	1B.2	S2	G2T2
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	1B.2	S2	G3T2
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	annual herb	4.2	S3	G4T3
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	1B.2	S2	G2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	1B.1	S2	G2
Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	perennial herb	1B.2	S2	G2
Blepharizonia plumosa	big tarplant	Asteraceae	annual herb	1B.1	S2	G2
Boechera rubicundula	Mt. Day rockcress	Brassicaceae	perennial herb	1B.1	S1	G1
California macrophylla	round-leaved filaree	Geraniaceae	annual herb	1B.2	S3?	G3?
Calochortus umbellatus	Oakland star-tulip	Liliaceae	perennial bulbiferous	4.2	S4	G4

			herb			
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	Montiaceae	annual herb	1B.1	S2	G3G4T2
Campanula exigua	chaparral harebell	Campanulaceae	annual herb	1B.2	S2	G2
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	annual herb	1B.1	S2	G3T2
Chloropyron maritimum ssp. palustre	Point Reyes bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	1B.2	S2	G4?T2
Chloropyron molle ssp. hispidum	hispid bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	1B.1	S2	G2T2
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	1B.1	S1	G1
Clarkia breweri	Brewer's clarkia	Onagraceae	annual herb	4.2	S4	G4
Clarkia concinna ssp. automixa	Santa Clara red ribbons	Onagraceae	annual herb	4.3	S3	G5?T3
Deinandra bacigalupii	Livermore tarplant	Asteraceae	annual herb	1B.2	S1	G1
Delphinium californicum ssp. interius	Hospital Canyon larkspur	Ranunculaceae	perennial herb	1B.2	S3	G3T3
Eriophyllum jepsonii	Jepson's woolly sunflower	Asteraceae	perennial herb	4.3	S3	G3
Eryngium aristulatum var. hooveri	Hoover's button-celery	Apiaceae	annual / perennial herb	1B.1	S1	G5T1
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	1B.2	S2	G2
Fritillaria agrestis	stinkbells	Liliaceae	perennial bulbiferous herb	4.2	S3	G3
Fritillaria liliacea	fragrant fritillary	Liliaceae	perennial bulbiferous herb	1B.2	S2	G2
Helianthella castanea	Diablo helianthella	Asteraceae	perennial herb	1B.2	S2	G2
Lasthenia conjugens	Contra Costa goldfields	Asteraceae	annual herb	1B.1	S1	G1
Legenere limosa	legenere	Campanulaceae	annual herb	1B.1	S2	G2
Leptosiphon acicularis	bristly leptosiphon	Polemoniaceae	annual herb	4.2	S3	G3
Leptosiphon ambiguus	serpentine leptosiphon	Polemoniaceae	annual herb	4.2	S4	G4

Leptosyne hamiltonii	Mt. Hamilton coreopsis	Asteraceae	annual herb	1B.2	S2	G2
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	annual herb	3	S3?	G3?
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	perennial evergreen shrub	1B.2	S2	G2Q
Malacothamnus hallii	Hall's bush-mallow	Malvaceae	perennial evergreen shrub	1B.2	S2	G2
Mielichhoferia elongata	elongate copper moss	Mielichhoferiaceae	moss	4.3	S4	G5
Monardella antonina ssp. antonina	San Antonio Hills monardella	Lamiaceae	perennial rhizomatous herb	3	S1S3	G4T1T3Q
Myosurus minimus ssp. apus	little mousetail	Ranunculaceae	annual herb	3.1	S2	G5T2Q
Navarretia nigelliformis ssp. nigelliformis	adobe navarretia	Polemoniaceae	annual herb	4.2	S3	G4T3
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	1B.1	S2	G2
Plagiobothrys glaber	hairless popcornflower	Boraginaceae	annual herb	1A	SH	GH
Polemonium carneum	Oregon polemonium	Polemoniaceae	perennial herb	2B.2	S2	G3G4
Puccinellia simplex	California alkali grass	Poaceae	annual herb	1B.2	S2S3	G2G3
Sidalcea malachroides	maple-leaved checkerbloom	Malvaceae	perennial herb	4.2	S3	G3
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	Brassicaceae	annual herb	1B.2	S2	G2T2
Stuckenia filiformis ssp. alpina	slender-leaved pondweed	Potamogetonaceae	perennial rhizomatous herb	2B.2	S3	G5T5
Suaeda californica	California seablite	Chenopodiaceae	perennial evergreen shrub	1B.1	S1	G1
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	1B.2	S2	G2
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	1B.1	S1	G1

Suggested Citation

CNPS, Rare Plant Program. 2016. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed 09 March 2016].

BIO1e – Special-Status Species Considered Tables

TABLE 1
FULL LIST OF SENSITIVE WILDLIFE SPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING			
Animals			
Invertebrates			
Conservancy fairy shrimp *Branchinecta conservatio*	FE/--	Vernal pools.	**Absent.** No suitable habitat present within the survey area.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/--	Vernal pools.	**Absent.** No suitable habitat present within the survey area.
Bay checkerspot butterfly *Euphydryas editha bayansis*	FT/--	Serpentine or similar soils with its host plant dwarf plantain or purple owl's clover.	**Absent.** Outside of the known range of this species and no suitable habitat present within the survey area.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/--	Vernal pools.	**Absent.** No suitable habitat present within the survey area.
Amphibians			
California tiger salamander *Ambystoma californiense*	FT/ST	Occur in grasslands occupied by burrowing mammals; breed in ponds, vernal pools, and slow-moving or receding streams.	**High potential.** Numerous breeding locations are known within 1.2 miles of the survey area (CDFW, 2016). Additionally, several adults have been observed within 1 mile of the survey area. Non-native grassland with small mammal burrows within the survey area provide upland habitat.
California red-legged frog *Rana draytonii*	FT/SSC	Breed in stock ponds, pools, and slow-moving streams.	**High potential.** This species has been observed in Alameda Creek within the survey area, 3 miles upstream, and 0.2 mile downstream of the survey area, and from San Antonio Creek approximately 0.4 mile upstream of the survey area (CDFW, 2016; SFPUC, 2010a and 2015). Alameda Creek and San Antonio Creek provide habitat and species has potential to disperse through upland areas.
Reptiles			
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT/ST	Coastal scrub, grassland, open oak woodland. Prefers rocky openings for basking, foraging.	**Moderate potential.** This species has been documented within 5 miles of the survey area (CDFW, 2016). Core habitat is absent, but some foraging and dispersal habitat is present in the survey area.
Birds			
American peregrine falcon *Falco peregrinus anatum*	FD/SD/FP	Nests on cliffs, tall buildings, high bridges, and specially-designed towers.	**Low potential.** Suitable nesting habitat is absent from the survey area.
Bald eagle *Haliaeetus leucocephalus*	FD/SE/FP	Nest in mountainous habitats near reservoirs, lakes and rivers, usually in coniferous trees, close to permanent water.	**Low potential.** Suitable nesting habitat is absent from the survey area, although quarry pits could be used for foraging. Closest documented nesting site is 3 miles east of the survey area (SFPUC, 2011d).
California black rail Laterallus jamaicensis coturniculus	--/ST/FP	Freshwater marshes, wet meadows, and shallow margins of saltwater margins bordering larger bays; needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat	**Low potential.** While patches of freshwater marsh occur within Alameda Creek and a seasonal wetland occurs in the quarry area, large expanses of undisturbed suitable habitat are not present.

TABLE 1 (Continued)
FULL LIST OF SENSITIVE WILDLIFESPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING (cont.)			
Animals (cont.)			
Birds (cont.)			
California least tern *Sterna antillarum browni*	FE/SE/FP	Nest on beaches or open areas.	**Absent.** No suitable nesting habitat present. Survey area is outside the range of this species.
Mammals			
Townsend's big-eared bat *Corynorhinus townsendii*	--/SC	Roosts in caves, mines, buildings or other human-made structures for roosting. Forages in open lowland areas. Sensitive to human disturbance	**Low potential.** No suitable undisturbed roosting habitat present in the survey area.
Saltmarsh harvest mouse *Reithrodontomys raviventris*	FE/SE/FP	Salt marsh habitat dominated by pickleweed.	**Absent.** No suitable habitat present. Survey area is outside the range of this species.
San Joaquin kit fox *Vulpes macrotis mutica*	FE/SE	Open grassland areas.	**Absent.** Survey area is outside the range of this species.
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN			
Animals			
Amphibians			
Foothill yellow-legged frog *Rana boylii*	--/SSC	A year-round resident of cobble-lined streams; breeds in spring months after high water subsides.	**Low potential.** Based on habitat assessment survey, suitable habitat is absent from the survey area. This species is limited to perennial, moderate- to high-gradient portions of Alameda Creek that occur several miles upstream from the survey area.
Reptiles			
Western pond turtle *Emys marmorata*	--/SSC	Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands.	**High potential.** This species is known from Alameda Creek and San Antonio Creek (CDFW, 2016; ESA, 2009a; SFPUC, 2015). Western pond turtle may be found in quarry pits, riparian areas, and uplands.
Coast horned lizard *Phyrnosoma coronatum*	--/SSC	Sandy areas and river washes, as well as riparian woodland clearings, chaparral, and alkali flats.	**Low to moderate potential.** Alameda Creek provide suitable river wash habitat for this species. Documented within 5 miles of the survey area (SFPUC, 2010a).
Birds			
Cooper's hawk *Accipiter cooperii*	--/3503.5	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also in live oaks.	**Moderate potential.** Riparian, oak, and eucalyptus trees within the survey area provide suitable nesting habitat for this species. Nearest CNDDB occurrence is approximately 2.7 miles west of survey area (CDFW, 2016).
Sharp-shinned hawk *Accipiter striatus*	--/3503.5	A common migrant and winter resident in California. Nests in dense, even-aged, single-layered forest canopy.	**Low potential.** Dense oak woodland nesting habitat is not present within the survey area. Nesting is documented from hills surrounding Sunol Valley, with the nearest known occurrence approximately 2.9 miles south of the survey area (SFPUC, 2015).

TABLE 1 (Continued)
FULL LIST OF SENSITIVE WILDLIFESPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)			
Animals (cont.)			
Birds (cont.)			
Tricolored blackbird *Agelaius tricolor*	--/SSC	A colonial nester; nests in dense freshwater emergent vegetation.	**Moderate potential.** Breeding is known from the Sunol Valley and large flocks have been observed in the survey area (CDFW, 2016; SFPUC, 2015). Potential breeding habitat is present in the survey area.
Golden eagle *Aquila chrysaetos*	--/CDFW Fully Protected	Nests in open areas on cliffs and in large trees.	**Moderate potential.** Larger trees near Alameda and San Antonio Creeks provide potential nesting habitat. Several occurrence records in the vicinity of the survey area (SFPUC, 2015).
Short-eared owl *Asio flammeus*	--/SSC	Nests in grasslands, usually on the ground.	**Moderate potential.** Grasslands within the site provide nesting habitat for short-eared owl. Known nesting site along southeastern San Antonio Reservoir (SFPUC, 2010a).
Burrowing owl *Athene cunicularia*	--/SSC	Nests and forages in low-growing grasslands that support burrowing mammals.	**Moderate potential.** Grasslands and ruderal habitat with ground squirrel burrows within the survey area provide suitable habitat for this species. This species has been documented within 5 miles of the survey area (SFPUC, 2010a).
Ferruginous hawk *Buteo regalis*	--/3503.5	Uncommon winter resident and migrant. Nests in foothills or prairies, on low cliffs, cut banks, shrubs, trees, or other natural or manmade elevated structures. Nest tree often isolated or in transition zones.	**Low potential.** Although there is a 1987 breeding record within 5 miles of the survey area (SFPUC, 2010a), the survey area is outside of the typical breeding range of this species and this species has low potential to breed within the survey area.
Northern harrier *Circus cyaneus*	--/SSC	Nests in coastal freshwater and saltwater marshes, nests and forages in grasslands.	**Moderate potential.** Limited nesting habitat is available adjacent to quarry pits because of site disturbance, but potential to nest in along Alameda Creek.
White-tailed kite (nesting) *Elanus leucurus*	--/CDFW Fully Protected	Nests near wet meadows and open grasslands in dense oak, willow or other large tree stands.	**Moderate potential.** Potential nesting habitat is present in trees adjacent to Alameda and San Antonio Creeks.
Prairie falcon *Falco mexicanus*	--/3503.5	Uncommon permanent resident. Usually nests on cliffs overlooking open areas.	**Low potential.** Nesting habitat is absent from the survey area. The closest documented CNDDB breeding location is approximately 3.9 miles south southeast of the survey area (Brian Acord, pers. comm., 2015).
Loggerhead shrike *Lanius ludovicianus*	--/SSC	Scrub, open woodlands, and grasslands.	**High potential.** Potential nesting habitat present in grasslands, shrubs, and trees throughout the survey area.
Alameda song sparrow *Melospiza melodia pusillula*	--/SSC	Tidal salt marsh.	**Absent.** Nesting habitat is absent from the survey area.
Osprey *Pandion haliaetus*	--/3503.5	Nest on large sturdy treetops, cliffs, or human-built platforms near water.	**Low potential.** Although the quarry pits may provide some suitable foraging habitat, disturbance from quarry operations would likely preclude nesting on-site. SFPUC occurrence record in the survey area vicinity is from a resident, not breeding, bird (SFPUC, 2010a).

TABLE 1 (Continued)
FULL LIST OF SENSITIVE WILDLIFESPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)			
Animals (cont.)			
Birds (cont.)			
American white pelican *Pelecanus erythrorhynchos*	--/SSC	Breed on islands in lakes or wetlands.	**Low potential.** The survey area is outside of the breeding range of this species. SFPUC occurrence record in the survey area vicinity is from a wintering, not breeding bird (SFPUC, 2010a). Low potential to use the quarry pits during wintering.
Mammals			
Pallid bat *Antrozous pallidus*	--/SSC	Day roosts are mainly in caves, crevices and mines; also found in buildings and under bark. Forages in open lowland areas.	**Moderate potential.** Potential roosting habitat is available in large diameter trees.
Tule elk *Cervus elaphus nannodes*	--/--/Local protection	The San Antonio elk herd is a resident herd from hills surrounding the San Antonio Reservoir.	**Low potential.** Tule elk are present on the slopes east of Calaveras Road, but would not be expected to cross the fenced road into the survey area.
San Francisco dusky-footed woodrat *Neotoma fuscipes*	--/SSC	Occur in forests with established understory. Construct nests from woody debris.	**High potential.** This species is known to nest within the vicinity of the survey area (CDFW, 2016), suitable habitat is present in the Alameda Creek corridor and one woodrat nest was observed during the 2011 reconnaissance survey.
American badger *Taxidea taxus*	--/SSC	Grasslands, savannas, deserts, timberline mountain meadows.	**Moderate potential.** Documented 1 mile east of the survey area (SFPUC, 2010a). Some potential habitat present in grassland within the survey area.

STATUS CODES:

FEDERAL ENDANGERED SPECIES ACT (FESA)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FD = Federally Delisted

CALIFORNIA ENDANGERED SPECIES ACT (CESA)/CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW)
SE = Listed as Endangered by the State of California
ST = Listed as Threatened by the State of California
SC = State Candidate for Listing as Endangered
SD = State Delisted
SSC = California Species of Special Concern
FP = California Fully Protected
3503.5 = Section 3503.5 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

SOURCES:

Acord, Brian, 2015. Personal communication with CDFW's Biogeographic Data Branch regarding suppressed location data in the vicinity of the survey area. April 28, 2015.
CDFW, California Natural Diversity Database. Rarefind 5 printout and GIS database for the Niles and La Costa Valley 7.5 minute topographic quadrangles. Accessed March 30, 2016.
SFPUC, 2010a. GIS data relating to sensitive species and other biological resources, supplied by SPFUC for the project vicinity. Shapefiles entitled "SSAnimals_pt" and "SSAnimals_py"
SFPUC, 2011d. Email from Karen Frye, San Francisco Public Utilities Commission, regarding eagle sightings. May 2, 2011.
SFPUC, 2015. Special Status Animals GIS data for the SFPUC Alameda Watershed (includes file 'SSAnimals.shp' and '2000-2014 CNDDB spreadsheet.xlsx'. Data from J. Lukins, SFPUC-NRD, 9/9/15.
USFWS, 2015. Resource List of Federal Endangered and Threatened Species that Occur in or may be Affected by the Alameda Creek Recapture Project. Retrieved April 27, 2015.

TABLE 2
SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Distribution	Blooming Period
FEDERAL AND STATE-LISTED SPECIES OR PROPOSED FOR LISTING					
Palmate-bracted bird's-beak *Chloropyron palmatum*	E/E/1B.1	Chenopod scrub, valley and foothill grassland, alkaline soils	15-500 feet	ALA, COL, FRE, GLE, MAD, SJQ*, YOL	May-October
Robust spineflower *Chorizanthe robusta* var. *robusta*	E/--/1B.1	Cismontane woodland, coastal bluff scrub, coastal dunes; sandy terraces and bluffs or in loose sand	5-1000 feet	Currently known from only six extended occurrences. Nearest record is an extirpated site on Oakland East quad. ALA*, MNT, MRN?, SCL*, SCR, SFO, SMT*	April-September
Livermore tarplant *Deinandra bacigalupi*	CE/--/1B.2	Meadows and seeps in alkaline soils	490-610 feet	Known only from the Springtown Area of Livermore; ALA	June-October
Contra Costa goldfields *Lasthenia conjugens*	FE/–/1B.1	Cismontane woodland, playas, valley and foothill grassland; vernal pools, swales and low depressions in open grassy areas.	0-1600 feet	Nearest records are in Fremont baylands and Don Pedro Wildlife Refuge. Range: ALA, CCA, MEN, MNT, MRN, NAP, SBA, SCL, SOL, SON.	March – June
California seablite *Suaeda californica*	E/--/1B.1	Meadows and swamps; coastal salt marsh	0-50 feet	Largely extirpated from the Bay Area salt marshes; ALA*, CCA*, SCL*, SFO*, SLO	July-October
OTHER PLANT SPECIES OF CONCERN					
Santa Clara thorn-mint *Acanthomintha lanceolata*	--/--/4.2	Chaparral, cismontane woodland and coastal scrub, generally on serpentinite.	260-4000 feet	Nearest records are from Calaveras Dam and Sunol Regional Wilderness. Range: ALA, FRE, MER, MNT, SBT, SCL, SJQ, STA.	March-June
California androsace *Androsace elongata* ssp. *acuta*	--/--/4.2	Chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grassland; meadows and seeps. Highly localized and often overlooked.	490-4000 feet	Nearest record is in the headwaters of Arroyo del Valle. Range: ALA, CCA, COL, FRE, GLE, KRN, LAX, MER, RIV, SBD, SBT, SCL, SDG, SIS, SJQ, SLO, SMT, STA, TEH.	March-June
Bent-flowered fiddleneck *Amsinckia lunaris*	--/--/1B.2	Coastal bluff scrub, cismontane woodland, valley and foothill woodland;	5-1700 feet	Many records in ALA, CCA, COL, LAK, MRN, NAP, SVT, SCL, SCR, SMT, SON, YOL	March-June
Alkali milk-vetch *Astragalus tener* var*. tener*	--/--/1B.2	Vernal pools, valley and foothill grassland, playas; adobe clay in vernally moist places; low ground flooded lands	3-200 feet	Historic record in Milpitas. Many records in ALA, CCA*, MER, MNT, NAP, SBT*, SCL*, SFO*, SJQ*, SOL, SON*, STA*, YOL, with many populations extirpated.	March-June
Heartscale *Atriplex cordulata* var*. cordulata*	--/--/1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland; sandy, saline or alkaline sites	0-1900 feet	Nearest records are in Springtown Area of Livermore; ALA, BUT, CCA, COL, FRE, GLE, KRN, MAD, MER, SJQ*, SLO, SOL, STA*, TUL, YOL*	April-October

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Crownscale *Atriplex coronata* var. *coronata*	--/--/4.2	Chenopod scrub, valley and foothill grassland, vernal pools; alkaline, often clay soils	3-2000 feet	ALA, CCA, FRE, GLE, KNG, KRN, MER, MNT, SJQ*, SLO, SOL, STA	March-October
Brittlescale *Atriplex depressa*	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools; alkaline, vernally moist clay soils	3-1100 feet	Nearest records are in Springtown and Don Edwards NWR; ALA, CCA, COL, FRE, GLE, KRN, MER, SOL, STA, TUL, YOL	April-October
Lesser saltscale *Atriplex minuscula*	--/--/1B.1	Chenopod scrub, playas, valley ahd foothill grassland; alkaline, sandy soils	40-700 feet	Many sites extirpated by agriculture. Nearest records are from Don Edwards NWR, Altamont Pass areas; ALA, BUT, FRE, KRN, MAD, MER, STA*, TUL	May-October
Big-scale balsamroot *Balsamorhiza macrolepis*	--/--/1B.2	Chaparral, cismontane woodland, valley and foothill grassland, sometimes on serpentinite or metamorphics	290-5200 feet	Nearest record is in Tesla Road area; ALA, AMA, BUT, COL, ELD, LAK, MAR, NAP, PLA, SCL, SHA, SOL, SON, TEH, TUO	March-June
Big tarplant *Blepharizonia plumosa*	--/--/1B.1	Valley and foothill grassland, usually on clay, more frequent after wildfires, often on slopes	90-1700 feet	Nearest record is west of Tesla; ALA, CCA, SJQ, SOL*, STA	July-October
Mt. Day rockcress *Boechera rubicundula*	--/--/1B.1	Chaparral on rocky slopes	+/- 4000 feet	Known from only one occurrence on Mt. Day; SCL	April-May
Round-leaved filaree *California macrophylla*	--/--/1B.1	Cismontane woodland, valley and foothill grassland; often on rich, low soils	40-4000 feet	Nearest records are in Altamont Pass area; ALA, BUT*?, CCA, COL, FRE, GLE, KNG, KRN, LAK, LAS, LAX, MER, MNT, NAP, RIV, SBA, SBT, SCL, SCZ*, SDG, SJQ, SLO, SMT, SOL, SON, STA, TEH, TUL, VEN, YOL	March-May
Oakland star-tulip *Calochortus umbellatus*	--/--/4.2	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland; often on serpentinite	320-2300 feet	ALA, CCA, LAK, MRN, SCL, SCR*, SMT, STA	March-May
Santa Cruz Mountains pussypaws *Calyptridium parryi* var. *hesseae*	--/--/1B.2	Chaparral, cismontane woodland; sandy or gravelly openings	1000-5100 feet	Nearest record is Black Mountain in the Mt. Hamilton Range. MNT, SCL, SCR, SLO, STA	May-August
Chaparral harebell *Campanula exigua*	–/–/1B.2	Rocky, usually serpentinite chaparral habitats; on talus slopes; sometimes in coastal scrub or chaparral, at edges of blue oak and gray pine; vernally moist areas, often very open or barren.	900-4100 feet	Nearest record is a general locality near Sunol. Most localities are south of the Alameda watershed. Range: ALA, CCA, SBT, SCL, STA.	May – June

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	–/–/1B.2	Alkaline valley and foothill grassland, probably in low areas with high residual soil moisture.	0-750 feet	Reported in 2009 from vicinity of Andrade Road; also known from Irvington District in Fremont. Range: ALA, CCA, MNT, SCL, SLO, SMT.	May – October, uncommonl y in November
Pt. Reyes bird's-beak *Chloropyron maritimum* ssp. *palustre*	--/--/1B.2	Marshes and swamps; coastal salt marsh	0-40 feet	Nearest record is near Alviso; ALA*, HUM, MRN, SCL*, SFO, SMT*, SON	June-October
Hispid bird's-beak *Chloropyron molle* spp*. hispidum*	--/--/1B.1	Meadows and seeps, playas, valley and foothill grassland; alkaline meadows and alkali sinks with saltgrass (Distichlis)	3-510 feet	Nearest record is Springtown area of Livermore; ALA, FRE, KRN, MER, PLA, SOL	June-September
Brewer's clarkia *Clarkia breweri*	--/--/4.2	Chaparral, cismontane woodland, coastal scrub, often on serpentinite	700-3700 feet	ALA, FRE, MER, MNT, SBT, SCL, STA	April-June
Santa Clara red ribbons *Clarkia concinna* ssp*. automixa*	–/–/4.3	Chaparral and cismontane woodland.	290-5000 feet	Nearest records are from Niles Canyon and Ohlone Regional Wilderness. Range: ALA, SCL	May – June, uncommonl y in April and July
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	–/–/1B.2	Chaparral, cismontane woodland; wet, boggy meadows, openings in soft chaparral habitat, woodland in canyons; shaded gullies, sometimes in thick undergrowth.	750-3600 feet	Nearest records are Williams Gulch and near Arroyo Mocho. Range: ALA, CCA, MER, SBT, SCL, SJQ, SBT.	April – June
Jepson's woolly sunflower *Eriophyllum jepsonii*	--/--/4.3	Chaparral, dry oak woodland and coastal scrub, sometimes on serpentine.	650-3400 feet	Nearest records are east of Del Valle Reservoir, with several occurrences along Mines Road. Range: ALA, CCA, KRN, MNT, SBT, SCL, STA, VEN	April -- June
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*	--/--/1B.1	Vernal pools, alkaline depressions, roadside ditches and other wet places near the coast	5-150 feet	Nearest records are along the edge of the South Bay; ALA, SBT, SCL (*?), SDG, SLO	June-August
San Joaquin spearscale *Extriplex joaquiniana*	–/–/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; seasonal wetlands or alkali sink scrub.	0-2750 feet	Nearest records are from Warm Springs in Fremont and Livermore area. Range: ALA, CCA, COL, FRE, GLE, MER, MNT, NAP, SBT, SCL* SJQ*, SLO, SOL, TUL*?, YOL	April – October
Stinkbells *Fritillaria agrestis*	--/--/4.2	Chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland. Clay substrate, sometimes on serpentinite. Most populations small.	30-5200 feet	Nearest record is in Mines Road area, with several additional localities along Tesla Road. Range: ALA, CCA, FRE, KRN, MEN, MER, MNT, MPA, PLA, SAC, SBA, SBT, SCL, SCR, SLO, SMT, STA, TUP, VEN, YUB	March -- June

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Fragrant fritillary *Fritillaria liliacea*	--/--/1B.2	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland; clay soils, often on serpentinite	5-1400 feet	Nearest record is Alum Rock Park in San Jose; ALA, CCA, MNT, MRN, SBT, SCL, SFO, SMT, SOL, SON	February-April
Diablo helianthella *Helianthella castanea*	–/–/1B.2	Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill woodland; openings or outcrops in scrub or forest; often in soils formed on sandstone.	200-4300 feet	Recent studies have concluded that species present in the Alameda watershed is California helianthella. Range: ALA, CCA, MRN, SFO, SMT; most localities in CCA	March – June
Legenere *Legenere limosa*	--/--/1B.1	Vernal pools	3-2900 feet	Many historical sites extirpated; ALA, LAK, MNT, NAP, PLA, SC, SCL, SHA, SJQ, SMT, SOL, SON, STA*, TEH, YUB	April-June
Bristly leptosiphon *Leptosiphon acicularis*	--/--/4.2	Grassy areas in woodland and chaparral; mostly coastal distribution.	170-5300 feet	Nearest occurrences are very old and general collections from Hayward and unspecified location in Alameda County. Range: ALA, BUT, HUM, LAK, MRN, MEN, NAP, SMT, SON	April -- May
Serpentine leptosiphon *Leptosiphon ambiguus*	--/--/4.2	Cismontane woodland, coastal scrub, valley and foothill grassland, usually on sparse serpentinite substrate., SMT, STA	390-3800 feet	Nearest records are in the Goat Rock area in upper Alameda Creek watershed. Range: ALA, CCA, MER, SBT, SCL, SCR, SJQ	March-June
Mt. Hamilton coreopsis *Leptosyne hamiltonii*	–/–/1B.2	Cismontane woodland; rocky sites; steep shale talus with open southwestern exposure	1800-4300 feet	Nearest record is Cedar Mountain Ridge in the Mt. Hamilton Range; ALA, SCL, STA	March-May
Woolly-headed lessingia *Lessingia hololeuca*	--/--/3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland; clay, serpentinite soils	40-1100 feet	ALA, MNT, MRN, NAP, SCL, SM, SOL, SON, YOL	June-October
Arcuate bush-mallow *Malacothamnus arcuatus*	–/–/1B.2	Chaparral and cismontane woodland; in gravelly alluvium	40-1200 feet	Nearest record is Alum Rock Park, San Jose; SCL, SCR, SMT	April-September
Hall's bush-mallow *Malacothamnus hallii*	–/–/1B.2	Chaparral and coastal scrub; some populations on serpentinite	30-2500 feet	Nearest record is along Alviso Slough; CCA, LAK, MEN, MER, SCL, SMT, STA	May-October
San Antonio Hills *Monardella antonina* ssp. *antonina*	–/–/3	Chaparral, cismontane woodland.	1700-3300 feet	Nearest records are from McGuire Peaks, Sunol Regional Wilderness, Palomares Canyon. Range: ALA?, CCA?, MNT, SBT?, SCL?	June – August
Little mousetail *Myosurus minimus* ssp. *apus*	--/--/3.1	Valley and foothill grassland, vernal pools; alkaline substrate	60-2100 feet	ALA, CCA, COL, LAK, MER, RIV, SBD, SDG, SOL, TUL, YOL	March-June

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Adobe navarretia *Navarretia nigelliformis* ssp. *Nigelliformis*	--/--/4.2	Valley and foothill grassland, sometimes vernal pools; vernally mesic sites on clay, sometimes serpentinite	320-3300 feet	ALA, BUT, CCA, COL. FRE, KRN, MER, MNT, PLA, SUT, TUL	April-June
Prostrate vernal pool navarretia *Navarretia prostrata*	–/–/1B.1	Coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools; alkaline, vernally moist sites	5-4000 feet	Nearest records are at Don Edwards NWR and Dublin; ALA, FRE, LAX, MER, MNT, ORA, RIV, SBD*?. SBT, SCL, SDG, SLO	April-July
Hairless popcornflower *Plagioborhtys glaber*	–/–/1A	Meadows and seeps, marshes and swamps; alkaline or coastal salt marsh sites	40-600 feet	Last confirmed sighting in 1954; ALA*, MRN*, SBT; SCL*	March-May
Oregon polemonium *Polemonium carneum*	–/–/2B.2	Coastal prairie, coastal scrub, lower montane coniferous forest	0-6100 feet	Approximate record on Stonybrook Creek is nearest known occurrence; ALA, DNT, HUM, MRN, SFO, SIS, SMT, SON; OR, WA	April-September
California alkali grass *Puccinellia simplex*	--/--/1B.2	Meadows and seeps, saline flats; chenopod scrub, valley and foothill grasslands, vernal pools. Nearest record is 5 miles south of Livermore in Vallecitos area. Range: ALA, BUT, CCA, COL, GLE, KRN, KNG, LAK, LAX, FRE, MAD, MER, NAP, SCL, SCR, SOL, STA, SBD, SLO, YOL.	0-3050 feet	**Not observed.** Alkaline soils, vernal pools, and chenopod scrub are unknown from the project area; species not found during suitably-timed focused surveys.	March-May
Maple-leaved checkerbloom *Sidalcea malachroides*	--/--/4.2	Broadleafed upland forest, coastal prairie, coastal scrub, North Coast coniferous forest, riparian woodland; often on disturbed areas	0-2400 feet	Nearest record is from Alum Rock Park in San Jose; many localities in DNT, HUM, MEN, MNT, SCL, SCR, SON	March-April
Most beautiful jewel-flower *Streptanthus albidus* ssp.*peramoenus*	–/–/1B.2	Chaparral, coastal scrub woodland, and grassland; outcrops and barren areas on south- and west-facing exposures on ridges and slopes; serpentine soils.	300-3300 feet	Nearest records are from Sunol Regional Wilderness, Goat Rock, and east of Calaveras Reservoir. Range: ALA, CCA, SCL, MNT, SLO.	April – September, uncommonly in March and October
Slender-leaved pondweed *Stuckenia filiformis* ssp. *alpina*	–/–/2B.2	Shallow freshwater marshes and swamps., SOL, AZ, NV, OR, +	980-7050 feet	Record from Niles quadrangle is from Alameda Creek Area in Fremont. Range: ALA, BUT, CCA, ELD, LAS, MER, MON, MOD, MPA, PLA, SCL* SIE, SHA, SMT, SON	May – July
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Marshes and swamps, valley and foothill grassland, vernal pools; mesic, alkaline sites	0-1000 feet	Nearest records are from Alviso, Don Edwards NWR and Springtown in Livermore; ALA, CCA, COL?, LAK, MNT, NAP, SAC, SBT, SCL, SCR, SJQ, SLO, SMT, SOK, SON, YOL	April-June

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Capter-fruited tropidocarpum *Tropidocarpum capparideum*	–/–/1B.1	Valley and foothill grassland; alkaline hills	3-1500 feet	Thought to be extinct, then rediscovered in 2000 on Ft. Hunter Liggett; ALA*, CCA*, FRE, GLE*, MNT, SCL*, SJQ*, SLO	March-April

STATUS CODES:

FEDERAL ENDANGERED SPECIES ACT (FESA)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FC = Candidate to become a *proposed* species.

CALIFORNIA ENDANGERED SPECIES ACT (CESA)/ CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW)
CE = Listed as Endangered by the State of California.
CT = Listed as Threatened by the State of California.
CC= Candidate to become a *proposed* species.
CSC = California Species of Special Concern.

California Rare Plant Rank (Formerly known as CNPS List):
1A = Plants presumed extinct in California.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed.
4 = Plants of limited distribution.

An extension reflecting the level of threat to each species is appended to each CRPR as follows:
.1 – Seriously threatened in California.
.2 – Moderately threatened in California.
.3 – Not very threatened in California.

[b] Distribution range is based on County codes, as follows:

County abbreviations: AMA--Amador; BUT-- Butte; CAL-- Calaveras; CCA--Contra Costa; COL—Colusa; DNT--Del Norte; ELD—El Dorado; FRE—Fresno; GLE—Glenn; HUM—Humboldt; KRN—Kern; LAK—Lake; LAS—Lassen; LAX--Los Angeles; MAD—Madera; MOD—Modoc; MEN—Mendocino; MER—Merced; MNT—Monterey; MPA—Mariposa; MRN—Marin; NEV—Nevada; ORA—Orange; PLA—Placer; PLU—Plumas; RIV—Riverside; SAC—Sacramento; SBA--Santa Barbara; SBD--San Bernardino; SBT--San Benito; SCL--Santa Clara; SCR--Santa Cruz; SCT--Santa Catalina Island; SCZ--Santa Cruz Island; SDG--San Diego; SFO--San Francisco; SHA—Shasta; SIE—Sierra; SIS—Siskiyou; SJQ--San Joaquin; SMI--San Miguel Island; SMT--San Mateo; SNI--San Nicolas Island; SOL—Solano; SON—Sonoma; SRO--Santa Rosa Island; TEH—Tehama; TRI—Trinity; TUL—Tulare; VEN—Ventura; YOL—Yolo; YUB—Yuba
* indicates species presumed extirpated from county; ? indicates questionable record

SOURCES:

California Department of Fish and Wildlife (CDFW), California Natural Diversity Database (CNDDB) Rarefind version 5 printout and GIS database for plants, Niles, La Costa Valley, Calaveras Reservoir, Milpitas, Newark, Hayward, Mountain View, Livermore, and Dublin 7.5 minute topographic quadrangles. Accessed April 27, 2015 and March 9, 2016.

California Native Plant Society (CNPS) Rare Plant Program Inventory of Rare and Endangered Plants (online edition, v8-02). Nine-quad search centered on La Costa Valley 7.5-minute topographic quadrangles. California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org (Initially accessed 10 May 2015; subsequently accessed on March 9, 2016).

Consortium of California Herbaria, collection records for plants listed in table, http://ucjeps.berkeley.edu/consortium/, information retrieved May 7, 2015.

U.S. Fish and Wildlife Service, Resource List of Federal Endangered and Threatened Species that Occur in or may be Affected by the Alameda Creek Recapture Project. Data initially retrieved April 27, 2015.

May & Associates, Inc., 2008. 2008 Botanical Survey Report, San Antonio Backup Pipeline Project, Final Draft. San Francisco. November.

San Francisco Planning Department (SF Planning Dept.), 2009. New Irvington Tunnel Draft Environmental Impact Report Volumes 1 and 2. San Francisco. May.

San Francisco Public Utilities Commission (SFPUC). 2008. GIS data relating to special-status species and other biological resources, supplied by SFPUC for the project vicinity.

San Francisco Public Utilities Commission (SFPUC). 2010. Email communication with Kimberly Stern, Environmental Project Manager. January 7.

This page intentionally left blank

BIO1f – Terrestrial Biological Resources Report

SAN FRANCISCO PUBLIC UTILITIES COMMISSION
ALAMEDA CREEK RECAPTURE PROJECT

Terrestrial Biological Resources Report

Prepared for
San Francisco Public Utilities
Commission and San Francisco
Planning Department

November 2016

Prepared by Environmental Science Associates
and Orion Environmental Associates

SAN FRANCISCO PUBLIC UTILITIES COMMISSION ALAMEDA CREEK RECAPTURE PROJECT

Terrestrial Biological Resources Report

Prepared for
San Francisco Public Utilities Commission and San Francisco Planning Department

November 2016

Prepared by Environmental Science Associates and Orion Environmental Associates

350 Frank H. Ogawa Plaza
Suite 300
Oakland, CA 94612
510.839.5066
www.esassoc.com

Los Angeles

Orlando

Palm Springs

Petaluma

Portland

Sacramento

San Diego

San Francisco

Santa Cruz

Seattle

Tampa

Woodland Hills

TABLE OF CONTENTS

San Francisco Public Utilities Commission Alameda Creek Recapture Project Terrestrial Biological Resources Report

Page

Appendices

Page

List of Figures

List of Tables

CHAPTER 1
Introduction

1.1 Background and Purpose for the Terrestrial Biological Resources Report

This Terrestrial Biological Resources Report documents sensitive natural communities and special-status species potentially occurring within the project area[1] for the San Francisco Public Utilities Commission (SFPUC) Alameda Creek Recapture Project (ACRP or proposed project). The intent and scope of this report is to identify the habitat types present in the project area and in any areas where indirect project impacts could occur (hereafter referred to as the terrestrial biological resources survey area or survey area), describe in detail any habitat types considered to be sensitive terrestrial natural communities, and assess the likelihood for special-status wildlife and plant species to occur within the survey area. The report also includes the results of focused surveys conducted to determine the presence/absence of special-status plant species within the survey area. Special-status fish species and aquatic resources within Alameda Creek will be addressed in a separate technical memorandum.

The ACRP is the last of several key regional facility improvement projects of the SFPUC's Water System Improvement Program (WSIP) to be implemented. All of the key regional projects are needed to meet established level of service goals and system performance objectives for the SFPUC regional water system (San Francisco Planning Department, 2008a).

1.2 Project Location

The proposed ACRP is in unincorporated Alameda County, south of the Interstate 680 (I-680)/ State Route 84 (SR 84) interchange and west of Calaveras Road. The proposed facilities would be in the Sunol Valley[2] on the east side of Alameda Creek, approximately 6 miles north of Calaveras Reservoir and 1 mile west of San Antonio Reservoir. The ACRP is located within SFPUC Alameda watershed lands[3] owned by the City and County of San Francisco (CCSF).

Existing SFPUC facilities within the Sunol Valley include numerous transmission facilities (the Alameda Siphons, Coast Range Tunnel, Irvington Tunnel, Alameda East Portal, Alameda West Portal, Calaveras Pipeline, San Antonio Pipeline, San Antonio Backup Pipeline, Sunol Pump

---

1 Project area refers to the general area within which all construction-related disturbance would occur.
2 The Sunol Valley is a north-south trending valley that extends approximately 5 miles from the confluence of Alameda and Welch Creeks in the south to Niles Canyon in the north. The Sunol Valley is drained by Alameda Creek.
3 The Alameda watershed refers to lands owned by the CCSF and managed by the SFPUC as part of the SFPUC regional water system; the Alameda watershed lands are located within the much larger hydrologic boundary of the Alameda Creek watershed.

Station Pipeline, Sunol Pump Station, and San Antonio Pump Station); water treatment facilities (Sunol Valley Water Treatment Plant [SVWTP]), Sunol Valley Chloramination Facility, a fluoride facility, and a chemical facility); the Hetch Hetchy Water & Power (HHWP) Calaveras Substation; and the California Department of Water Resources (DWR) South Bay Aqueduct. Other land uses in the project vicinity include commercial gravel quarries, commercial nurseries, the Pacific Gas & Electric Company (PG&E) Sunol Substation, several private residences, grazing land, and regional open space. Commercial gravel quarries exist along Alameda Creek at the north end of Sunol Valley, between the Alameda Siphons to the south and the confluence with Arroyo de la Laguna to the north. A commercial gravel quarry operated by Hanson Aggregates under Surface Mining Permit 24 (SMP-24) is partially within the project area (see **Figure 1**). Oliver De Silva operates a quarry under Surface Mining Permit 30 (SMP-30) that is located immediately south of the project area. A third quarry operated by Hanson Aggregates under Surface Mining Permit 32 (SMP-32) is located north of I-680. Most of the SMP-24 area and all of the SMP-30 and SMP-32 areas are on SFPUC Alameda watershed lands that are leased from the CCSF. As a result of the aggregate processing facilities and large quarry pits in the Sunol Valley, this reach of Alameda Creek is referred to as the Quarry Reach.[4]

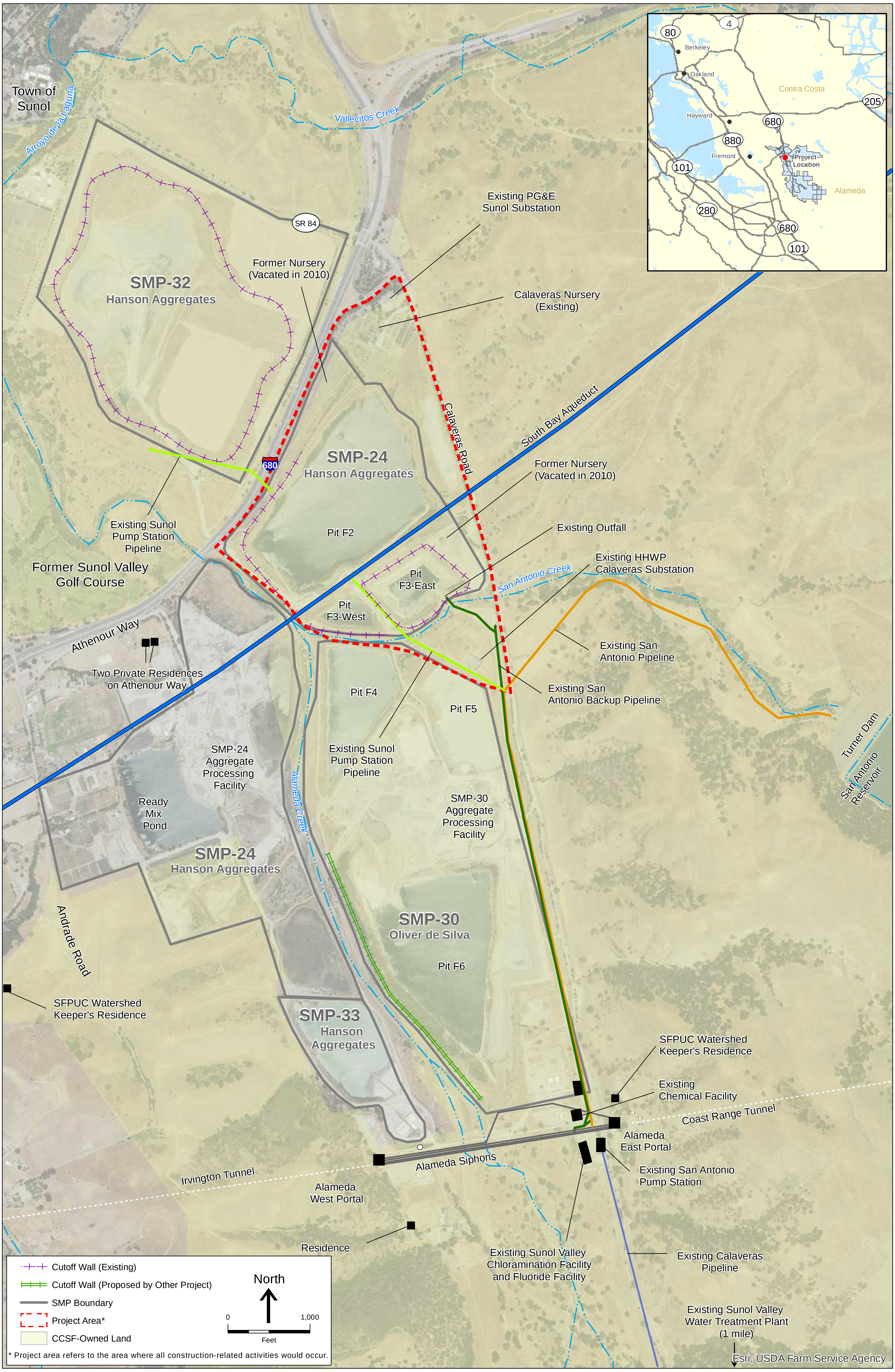
The nearest urban areas are the unincorporated town of Sunol (approximately 1 mile northwest of the project area) and the city of Fremont (approximately 4 miles to the west). Regional access to the project area is provided by I-680 and SR 84; local access is provided by Calaveras Road.

1.3 Project Summary

The purpose of the ACRP is to recover a portion of the water that the SFPUC will release from Calaveras Reservoir or bypass around the Alameda Creek Diversion Dam (ACDD), pursuant to the future operations plan for Calaveras Reservoir under the Calaveras Dam Replacement project (CDRP). Through the permitting process for the CDRP, the SFPUC, in coordination with the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS), agreed to two in-stream flow schedules that satisfy requirements of the Federal Endangered Species Act and provisions of the California Fish and Game Code. These flow schedules will be implemented as part of Calaveras Reservoir's future operations plan to enhance spawning, rearing, and migration habitat for steelhead in Alameda and Calaveras Creeks below the Alameda Creek Diversion Dam and Calaveras Dam, respectively. The ACRP would recover water from Alameda Creek and convey the water into the SFPUC regional water system.

The primary goal of the ACRP is to recapture water that the SFPUC will release from Calaveras Reservoir and bypass around the ACDD when the SFPUC implements the instream flow schedules required as part of the regulatory permits for future operations of Calaveras Reservoir. The recaptured water would maintain the historical contribution from the Alameda Watershed to the SFPUC regional water system, in accordance with the CCSF existing water rights. The project-specific objectives of the ACRP are as follows:

4 The Quarry Reach of Alameda Creek extends from the Alameda Siphons in the south to I-680 in the north. Sand and gravel mining is a predominant land use along this reach.



SOURCE: ESA, 2015; Date of aerial photo is 2014.

SFPUC Alameda Creek Recapture Project

Figure 1

Project Vicinity Map

This page intentionally left blank

- Recapture the water that would have otherwise been stored in Calaveras Reservoir due to the release and bypass of flows from Calaveras Dam and the ACDD, respectively, to meet instream flow requirements, thereby maintaining the historical annual transfers from the Alameda Watershed system to the SFPUC regional water system.
- Minimize impacts on water supply during drought, system maintenance, and in the event of water supply problems or transmission disruptions in the Hetch Hetchy system.
- Maximize local watershed supplies.
- Maximize the use of existing SFPUC facilities and infrastructure.
- Provide a sufficient flow to the SVWTP to meet its minimum operating requirements.

1.4 Survey Area, Survey Dates, and Surveying Personnel

The survey area for this habitat assessment is comprised of the project area as well as the Alameda Creek riparian corridor extending between its confluence with San Antonio Creek and Arroyo de la Laguna, the boundaries of which are shown in **Figure 2**. The survey area encompasses the ACRP project area as well as all other areas where indirect effects could occur.

Environmental Science Associates (ESA) and Orion Environmental Associates biologists conducted reconnaissance-level biological surveys in support of this analysis on December 1, 2010; December 10, 2010; January 11, 2011; May 4, May 12, and October 23, 2015. Focused special-status botanical surveys were carried out on April 8 and May 13, 2011; and April 1, May 4, and May 12, 2015. The 2010 and 2011 surveys were conducted during planning phases for this project and included the existing project area, but did not include the Alameda Creek riparian corridor between I-680 and Arroyo de la Laguna. This area was covered in detail in 2015.

1.5 Methods

1.5.1 Definitions

Special-status species are defined as species that meet one or more of the following criteria:

- Listed, proposed, or candidate for listing as rare, threatened, or endangered by the (CDFW, 2015a, b) or the U.S. Fish and Wildlife Service (USFWS; USFWS 2015);
- Species designated by CDFW as species of special concern or fully protected species;
- Species protected by the federal Migratory Bird Treaty Act (MTBA) and California Fish and Game Code.
- Plants that appear as Rank 1 or 2 on lists of rare and endangered plants maintained by the California Native Plant Society (CNPS, 2015);
- Plants that appear on CNPS Rank 3 or 4 lists.

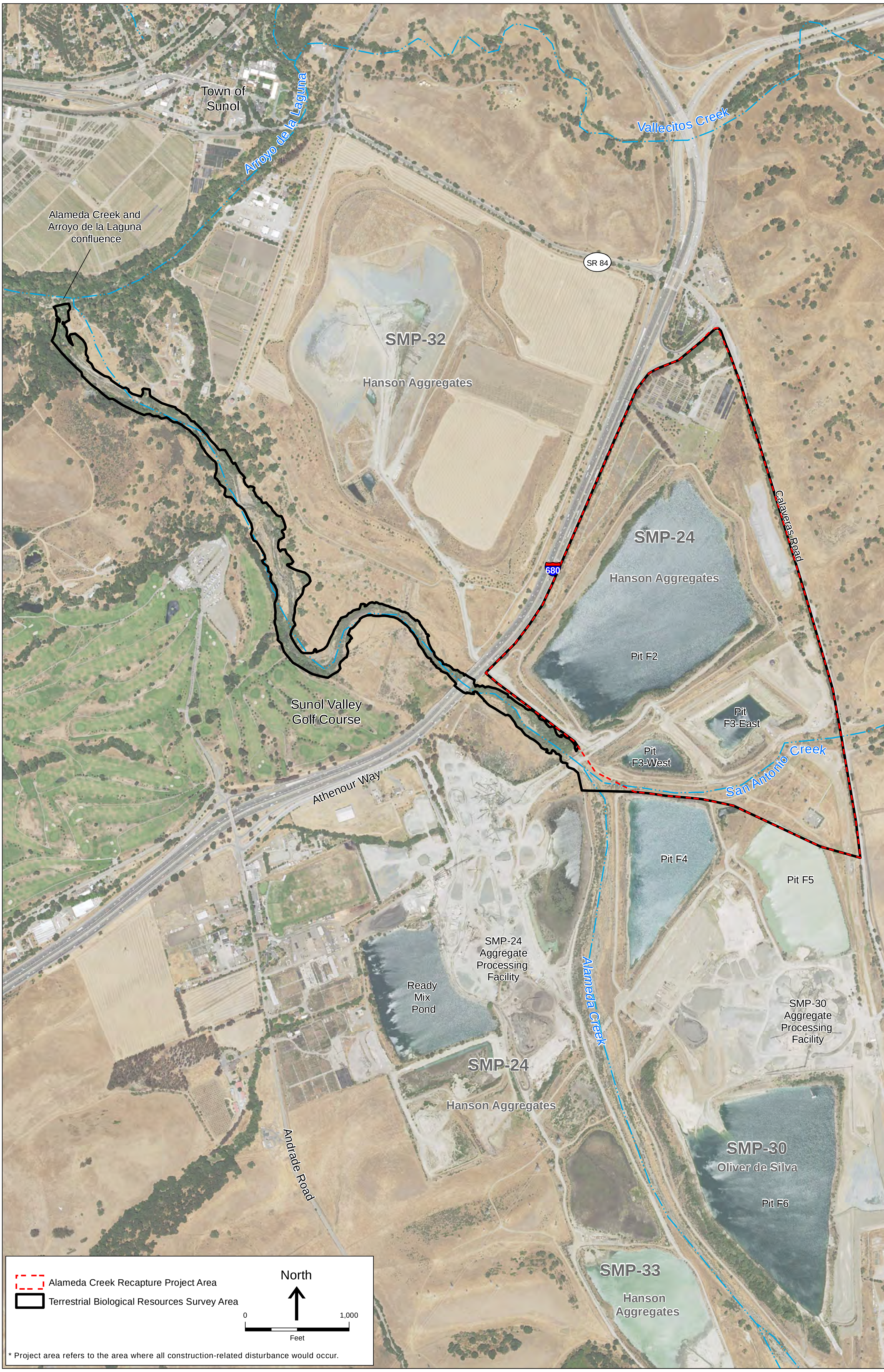
Potential to occur is an assessment based on study of the habitat and distribution of special-status species, investigation of known occurrence records, and familiarity with the survey area based on field surveys. An assessment of "present" means the species was either observed during project surveys or reliable observations have already been reported from the site. High potential to occur indicates that the survey area is within the known distribution of the species, occurrence records are nearby, and habitat found there appears suitable and of high quality. Moderate potential to occur indicates that the survey area is within the known distribution of the species and habitat may be suitable. Low potential to occur means the species is either outside the known geographic range of the species, suitable habitat was not seen during field surveys, or both.

Sensitive natural communities are defined as vegetation associations or alliances (CNDDB, 2015a, b) with a global (G) or state (S) rarity ranking of 1, 2 or 3. These are vegetation types considered to be rare and threatened throughout their range. For the purposes of identifying sensitive natural communities, definitions and membership rules follow Sawyer et al. (2009). Another criterion for a sensitive natural community under CEQA is any riparian habitat. The CEQA checklist, Question IV.b calls for an assessment of potential project 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 [Wildlife] or U.S. Fish and Wildlife Service.”

Habitat types are mapping units with distinct physical and vegetation characteristics found within the survey area. Where possible, the definitions match those of vegetation alliances as defined by Sawyer et al. (2009). Where broader categories were needed to match the scale of mapping, habitat types were consistent with the Draft Alameda Watershed Habitat Conservation Plan (SFPUC, 2010a). As will be discussed in the results section, a number of distinctive habitat types were found within the survey area that did not match these mapping units, either because they are essentially unvegetated; they are highly disturbed and a stable assemblage of vegetation has not yet developed; or vegetation has been intentionally established and maintained. In these instances, a descriptive name has been assigned to the habitat type and a definition is provided in the results section.

1.5.2 Review of Available Information

The California Natural Diversity Database (CNDDB) was consulted for records of sensitive biological resources in the project vicinity (CDFW, 2015a; 2015b) and an official species list of potential endangered or threatened species that may occur within the survey area was obtained from the USFWS (USFWS, 2015). For special-status wildlife species, the CNDDB was reviewed for a list of potential species that may occur within the La Costa Valley and Niles USFWS 7.5 minute quadrangles (CDFW, 2015a). **Appendix C** contains the full list of special-status wildlife species considered. For special-status plants, a nine-quadrangle query centered on the La Costa Valley quadrangle was conducted for both CNDDB records (CDFW, 2015b) and the California Native Plant Society Electronic Inventory (CNPS, 2015) was used to compile a list of considered special-status plant species. **Appendix D** contains the full list of special-status plant species considered. Additional biological data and sensitive species occurrence records were provided by the SFPUC as shapefiles in Geographic Information System (GIS) format (SFPUC, 2010b).



SOURCE: ESA, 2015; Date of aerial photo is 2014.

Figure 2
Terrestrial Biological Resources Survey Area

This page intentionally left blank

The primary sources for review of information about natural communities are CNDDB occurrence records (for sensitive natural communities); for natural vegetation, the primary sources are *A Manual of California Vegetation* (Sawyer et al., 2009) and the *Alameda Watershed HCP* (SFPUC, 2010a).

A number of surveys have been carried out in the vicinity of the ACRP for other WSIP projects. The following documents were reviewed for relevant information regarding biological resources in the project vicinity:

- *Initial Study/Mitigated Negative Declaration for the San Francisco Public Utilities Commission Alameda Siphons Seismic Reliability Upgrade Project* (San Francisco Planning Department, 2008b)
- *Alameda Siphons Seismic Reliability Upgrade Project Biological Assessment* (Irvington Partners Joint Venture, 2008)
- *Final Environmental Impact Report for the San Francisco Public Utilities Commission New Irvington Tunnel Project* (San Francisco Planning Department, 2009a)
- *Final Environmental Impact Report for the San Francisco Public Utilities Commission Sunol Valley Water Treatment Plant Expansion and Treated Water Reservoir Project* (San Francisco Planning Department, 2009b)
- *San Antonio Backup Pipeline Botanical Survey Report* (May and Associates, 2008)
- *Special-status Plant Surveys for San Antonio Backup Pipeline Project,* Memo from B.M. Leitner and M. Lowe (ESA+Orion, 2010a)
- *SFPUC San Antonio Backup Pipeline Project Terrestrial Habitat Assessment* (ESA, 2009a)
- *SFPUC Habitat Reserve Program: Alameda Watershed Biological Resources* (ESA+Orion, 2010b).

General information sources were also reviewed concerning the occurrence of special-status plants and sensitive natural communities in the SFPUC Alameda watershed and environs. These included the following:

- *Alameda Watershed Management Plan* (SFPUC, 2001)
- *Final Environmental Impact Report for the Alameda Watershed Management Plan* (San Francisco Planning Department, 2000*)*
- *Draft Alameda Watershed Habitat Conservation Plan* (SFPUC, 2010a)
- *Focused Rare Plant Survey Report, Alameda Watershed, Alameda and Santa Clara Counties, California* (Nomad Ecology, 2009)

A review of these information sources resulted in a list of 37 special-status wildlife species and 50 special-status plant species considered (see Appendices C and D). Occurrence records in CNDDB and other sources (Consortium of California Herbaria, 2015; Calflora, 2016; SFPUC, 2010b) were investigated for each of these species to provide familiarity with the details of their habitat, plant and wildlife associates, and other ecological details. Based on the review of existing information, this list was refined into a group of 25 wildlife species and 15 plant species that are either known from the region or have potential to occur within the survey area. These wildlife and plant species are discussed in Sections 2.3 and 2.4, respectively.

1.5.3 Field Surveys

Habitat mapping was carried out on various dates in 2010 and 2011 as part of project planning, and verified, revised, and expanded in 2015. During reconnaissance surveys conducted on May 4, May 12, and October 23, 2015, ESA and Orion biologists mapped habitats[5] and assessed the presence, location, quality and extent of sensitive natural communities and the potential presence of special-status plant and wildlife species based on habitats present in the survey area. The entire survey area was either walked or driven to the extent necessary to map and characterize habitats, and to assess the potential habitat for special-status plant and wildlife species. Habitats were mapped using the nomenclature used in the Draft Alameda Watershed Habitat Conservation Plan (SFPUC, 2010a), with slight modifications to reflect the scale of mapping. The habitats were mapped by hand on aerial photographs and the data digitized into GIS format. All plant and animal species encountered were noted and identified to the extent possible. Those plants not identifiable in the field were collected for identification. A list was compiled of wildlife and plant species observed and is presented in **Appendix E** and **F**, respectively.

A detailed characterization of riparian vegetation was carried out along Alameda Creek opposite Pit F2 within the survey area to describe current conditions, provide a basis to anticipate future baseline conditions and to analyze potential impacts of the project. Although initially conceived as a sampling effort using several belt transects, this approach was revised in favor of a method that would capture vegetation characteristics more comprehensively throughout this section of Alameda Creek. Large-scale 2014 Google Earth images shown at an elevation of 1,004 feet were printed at a scale of approximately 1"=50' and the dominant vegetation was mapped in this portion of the survey area. Mapping was field-verified on May 4 and 12, 2015. Every 25 feet, a transect was established perpendicular to the channel, and the extent of the dominant (i.e., tallest) riparian habitat type was measured on the airphotos. The large number of transects (n=47) thus sampled was concluded to be a better approach for characterizing the current extent of riparian habitat types.

Focused surveys were carried out on April 8, 2011; May 13, 2011; April 1, May 4, and May 12, 2015 for special-status plants. The surveys were timed to coincide with the period when the target species were most readily detectable. ESA and Orion biologists walked over all parts of the survey area, noting all species observed and giving particular attention to those areas with the most natural, undisturbed habitat and those with habitat similar to that known for the target species. Surveys were conducted in accordance with CNPS Botanical Survey Guidelines (CNPS, 2001), and California Department of Fish and Wildlife's guidelines for assessing the effects of proposed projects on rare, threatened and endangered plants and natural communities (CDFG,

[5] The terms “habitats” and “habitat types” are used here in lieu of “natural communities” for consistency with other surveys and with the Draft Alameda Watershed Habitat Conservation Plan (SFPUC, 2010a).

2009). Surveys were timed as much as possible to coincide with the periods of optimum detectability and identifiability of special-status species known from the region.

If any special-status plants were encountered, location, habitat and population data were collected sufficient to complete standardized field survey forms for submittal to CNPS and CNDDB.

This page intentionally left blank

CHAPTER 2
Habitat Types and Sensitive Biological Resources within the Survey Area

2.1 Environmental Setting

Sunol Valley is part of the San Francisco Bay Area sub-region of the California Floristic Province (Baldwin et al., 2012). Oriented in a north-south direction, the Sunol Valley is surrounded by numerous low-elevation ridges (less than 2,000 feet) that drain to Alameda Creek. Alameda Creek is the longest drainage in the greater Alameda Creek watershed, which in turn is the largest watershed in the San Francisco Bay Area, draining an approximately 688-square-mile area that ultimately empties into the southern portion of San Francisco Bay. The Sunol Valley has a Mediterranean climate with relatively mild, wet winters and warm, dry summers.

Much of the Sunol Valley floor is currently mined for sand and gravel. The surrounding hillsides are largely undeveloped and support cattle grazing within non-native grassland and oak woodland habitats. The hills, associated stock ponds, San Antonio Reservoir, Alameda Creek and other local creeks, and the Sunol Regional Wilderness Area provide habitat for a variety of sensitive species.

Alameda Creek flows from its headwaters near Mount Hamilton, through the Sunol Valley, and eventually to San Francisco Bay. In general, flow within Alameda Creek is flashy with high flows during the winter and spring and low flows during the summer and fall. However, the hydrology of Alameda Creek has changed in the past century from the addition of upstream reservoirs that reduce high flows.

In the Sunol Valley, including the survey area, Alameda Creek has a low gradient channel (average of 0.3 percent). The Alameda Creek channel in the Sunol Valley is generally broad and braided. In the upper parts of the watershed the creek includes some perennial reaches with pools that persist throughout the summer, but the reach in the Sunol Valley is intermittent because much of the water flows underground through the porous alluvial soils into the adjacent quarry pits or subsurface groundwater. The creek typically resurfaces downstream of the Arroyo de la Laguna confluence and Niles Canyon.

Upper San Antonio Creek is an intermittent drainage that originates approximately 9 miles east of Alameda Creek and flows westward into San Antonio Reservoir, which is formed by James Turner Dam (Turner Dam). From the base of Turner Dam, the San Antonio Creek channel continues west, eventually joining Alameda Creek within the survey area. The cone valve at the base of Turner Dam is operated only infrequently for maintenance and emergency releases from the reservoir, and to release quality-impaired Hetch Hetchy water out of the regional water system via a connection between the cone valve and the San Antonio Pipeline. For most of the year, flow in San Antonio Creek below Turner Dam is limited to seepage from San Antonio Reservoir that is continually released into the creek via two drain pipes at a rate of approximately 20 gallons per minute (gpm) (Camp Dresser McKee Inc., 2007). Despite the seepage flows, San Antonio Creek is typically dry in the reach downstream of Calaveras Road that includes the survey area.

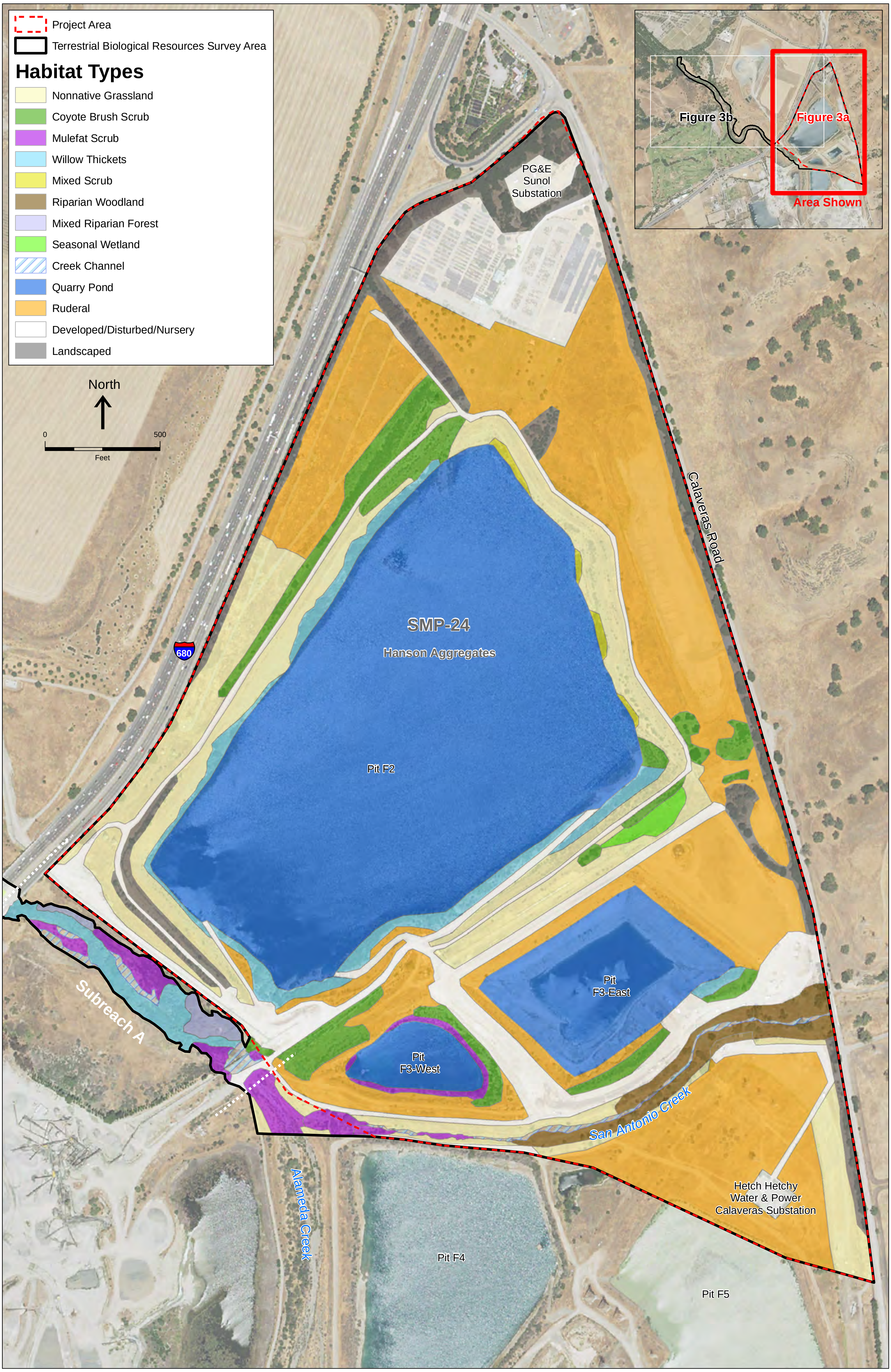
2.2 Habitat Types

The majority of the project area within the survey area has been heavily disturbed from past land uses including quarry operations, commercial nursery operations, and construction of other SFPUC projects. Alameda Creek in the Sunol Valley has been altered by realignment, grade controls at pipeline crossings, infiltration galleries, impoundments, and regulated discharges, all of which affect the shape and width of the floodplain and the type and distribution of vegetation it supports.

The survey area supports non-native grassland, coyote brush scrub, mulefat scrub, willow thickets, mixed scrub, riparian woodland, mixed riparian forest, seasonal wetland, creek channel, quarry pond, ruderal, developed/disturbed/nursery, and landscaped habitats. **Figures 3a** and **3b** show the distribution of these habitat types within the survey area. Appendix A shows representative photographs of each habitat type found within the survey area. Appendix B presents a crosswalk of habitat terminology used in this report compared with terminology used in various resource documents.

2.2.1 Non-native Grassland

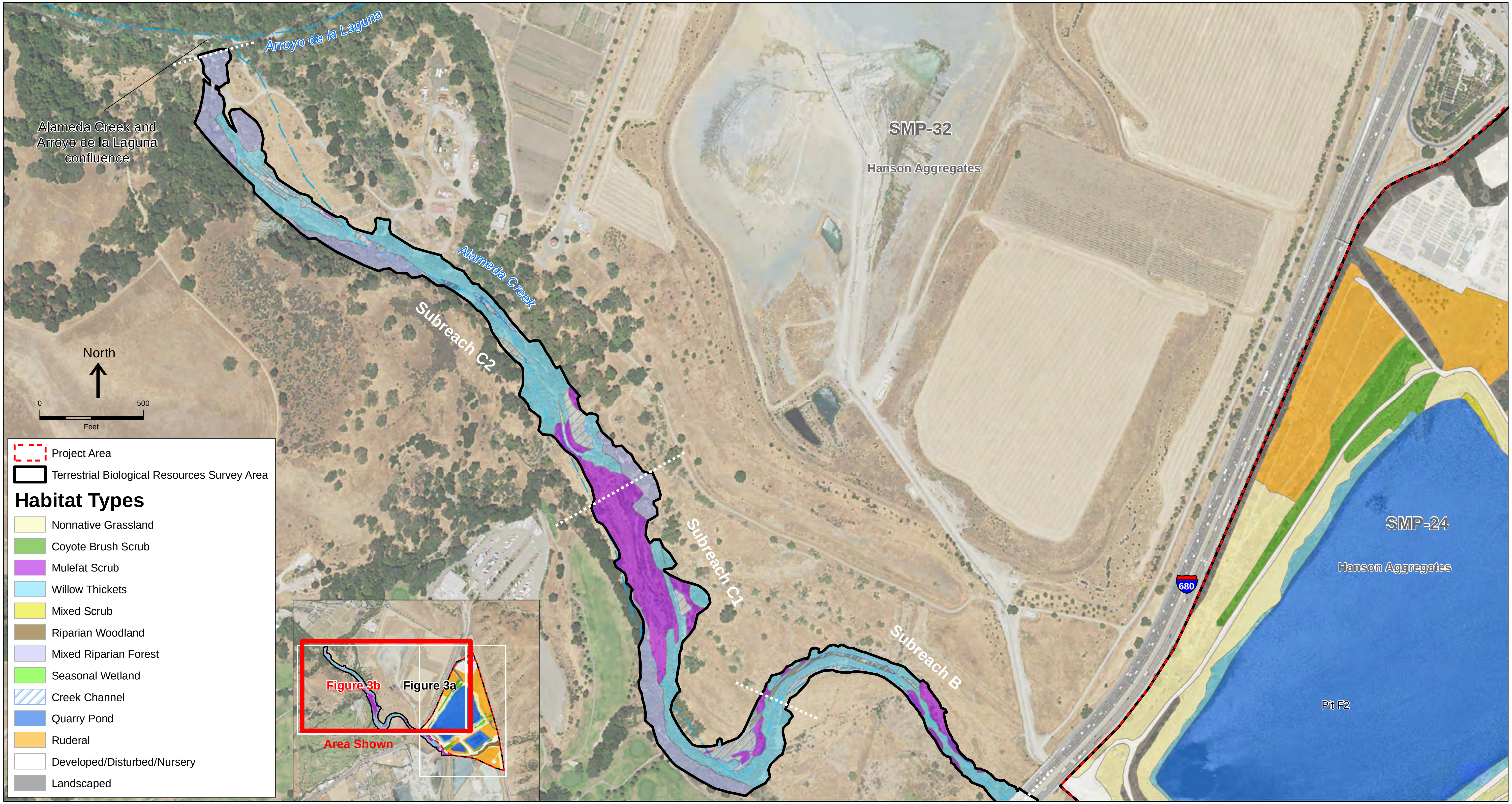
Non-native grassland consists of a dense to sparse cover of non-native annual grasses of medium height. Throughout its range, this habitat type is found on a wide variety of soils and slopes, from valley bottoms to steep slopes, and heavy clay soils to sandy or rocky soils. The dominant species vary based on location and soils, and from year to year depending on precipitation patterns and levels of residual dry matter. The dominant non-native species in the survey area include the grasses ripgut brome (*Bromus diandrus*), soft brome (*B. hordeaceus*), red brome (*B. madritensis*), wild oats (*Avena fatua, A. barbata*), Italian ryegrass (*Festuca perennis* formerly *Lolium multiflorum*), and annual fescue (*Festuca* spp. formerly *Vulpia* spp.) species, stork's bill (*Erodium* spp.), and smooth catsear (*Hypochaeris glabra*). In less-disturbed areas, nonnative grassland also supports a considerable variety of native grasses and forbs. Under favorable conditions, these may create showy, colorful displays in the spring. Typical native herb species in nonnative grassland include California poppy (*Eschscholzia californica*), sky lupine (*Lupinus nanus*), miniature lupine (*L. bicolor*), and shining pepperweed (*Lepidium nitidum* var. *nitidum*). Non-native grassland may also support some very persistent invasive non-native annual herbs, such as shortpod mustard (*Hirschfeldia incana*), poison hemlock (*Conium maculatum*), Italian thistle *(Carduus pycnocephalus*), stinkwort (*Dittrichia graveolens*), and yellow star thistle (*Centaurea solstitialis*). Where these broadleaf species are dominant, vegetation may be mapped as ruderal. Nonnative grassland is not a sensitive natural community (Sawyer et al., 2009).



SOURCE: ESA, 2015; Date of aerial photo is 2014.

SFPUC Alameda Creek Recapture Project

Figure 3a
Habitat Types



SOURCE: ESA, 2015; Date of aerial photo is 2014.

SFPUC Alameda Creek Recapture Project
Figure 3b
Habitat Types

In the survey area, nonnative grassland is generally found in areas of coarser soils (i.e., sandy rather than clay-dominated) with limited residual soil moisture. Species richness is generally very low and is overwhelmingly dominated by a few species of non-native grasses with few native herbs. More recently-disturbed sites often support herb-dominated developed/ruderal habitat rather than nonnative grassland; nonnative grassland sites left undisturbed for many years in the survey area are eventually replaced by coyote brush scrub. Nonnative grassland was mapped in the survey area along San Antonio Creek above the active channel, on the higher edge of quarry pit F2, and along berms (see **Appendix A**, **Photo 1**).

During the reconnaissance level survey, small mammal burrows were noted within the non-native grasslands. These grasslands likely support low densities of small and medium-sized mammals like California vole (*Microtus californicus*), Botta's pocket gopher (*Thomomys bottae*), California ground squirrel (*Otospermophilus beecheyi*), Audubon's cottontail (*Sylvilagus audubonі*), and black-tailed jackrabbit (*Lepus californicus*). Western rattlesnake (*Crotalus viridis helleri*) and Pacific gopher snake (*Pituophis catenifer catenifer*) are also common in grasslands with small mammal populations.

The grasslands provide foraging habitat for large raptors like red-tailed hawk and nesting habitat for passerines like the western meadowlark (*Sturnella neglecta*). The occasional shrub or tree also provides roosting and nesting habitat for birds and cover for other wildlife.

2.2.2 Coyote Brush Scrub

Coyote brush scrub is a low, dense shrub community with scattered grassy openings. This natural community is dominated by coyote brush (*Baccharis pilularis*), usually with smaller amounts of bush monkeyflower (*Mimulus aurantiacus*), coastal sage (*Artemisia californica*) and Pacific poison oak (*Toxicodendron diversilobum*). In the Alameda watershed, it is usually found on exposed steep, north-facing slopes. In deeper and less sloping soils on south-facing slopes, it grades into nonnative grassland; in steeper and rockier areas it grades into Diablan sage scrub; in less exposed areas it grades into any one of several oak woodland communities. Coyote brush scrub forms as a seral (successional) stage following disturbance in relatively mesic sites, following non-native grassland and eventually being replaced by oak woodland, forest, or coastal scrub in the absence of further disturbance. Coyote brush scrub is not a sensitive natural community (Sawyer et al., 2009).

In the survey area coyote brush scrub is relatively uncommon, limited to slopes on the berms surrounding Pits F2, F3-East and F3-West. In these areas, coyote brush scrub is strongly dominated by a single species, coyote brush, with limited amounts of bush monkeyflower and coastal sage and some mulefat (*Baccharis salicifolia*). The inner slopes of Pit F2 contain a fine-textured mosaic of coyote brush, mulefat, and willow; this mosaic is mapped as mixed scrub and is described in a later section (see Appendix A, Photo 2). Openings in coyote brush scrub typically contain nonnative grassland species.

Common wildlife species found in scrub habitat include common mammalian species such as Botta's pocket gopher, house mouse (*Mus musculus*), California vole, and raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). Reptile species common to these areas include kingsnake

(*Lampropeltis getulus*), Pacific gopher snake, and western fence lizard (*Sceloporus occidentalis*). These species in turn attract larger predators and scavengers, particularly to scrub edges and nearby grassland clearings. These areas provide nesting and perching habitat for scrub jay (*Aphelocoma californica*), and mockingbirds (*Mimus polyglottos*), and also serve as a food bank of insects and seeds.

2.2.3 Mulefat Scrub

Mulefat scrub is a very open, rather tall shrub community strongly dominated by mulefat. Mulefat scrub is found primarily in larger stream channels that carry flow in the winter but are dry in the summer. Mulefat depends on access to moderately shallow groundwater, so it is usually closely associated with active channels. The continued existence of the mulefat scrub natural community along creeks is dependent on disturbance caused by frequent flooding. Other species found in mulefat scrub include California brickellbush (*Brickellia californica*) and many weedy annual species. Sandbar willow and arroyo willow are found in areas with higher or more consistent year-round groundwater. Mulefat scrub is equivalent to the mulefat thicket vegetation alliance. It is not a sensitive natural community as defined by CNDDB based on rarity, (Sawyer et al., 2009), although when it is associated with riparian systems such as along Alameda Creek it is considered a sensitive natural community under CEQA.

In the survey area, mulefat scrub is found in the lower portion of San Antonio Creek, in a narrow band near the water's edge at Pit F3-West, and in many locations along Alameda Creek from I-680 to the confluence with Arroyo de la Laguna (see **Appendix A**, **Photo 3**). Along Alameda Creek it sometimes forms a narrow band at the periphery of willow riparian scrub but was too narrow to map at the scale of the habitat map. Although mulefat grows on the side Pit F3-West where groundwater seepage allows this species to thrive, this area lacks other physical features of the natural stream channels where the mulefat scrub community is often found.

Mulefat scrub supports wildlife species typical of other scrub habitats. This includes small mammals such as brush rabbit and Botta’s pocket gopher, reptiles such as western rattlesnake and gopher snake and passerines such as white-crowned sparrow (*Zonotrichia leucophrys*) and mockingbird.

2.2.4 Willow Thickets

The willow-dominated riparian habitats in the survey area are a mosaic of two alliances identified by Sawyer et al. (2009), arroyo willow (*Salix lasiolepis*) thickets and sandbar willow (*Salix exigua*) thickets. In themselves, these alliances are not sensitive natural communities by CNDDB based on rarity because their state and global ranks are 4 and 5; however when occurring as riparian habitats along Alameda Creek willow thickets are considered sensitive natural communities under CEQA. Willow thickets associated with Pit F2 are created by and largely depend upon ongoing quarry operations; as a result, these areas are not considered sensitive natural communities. The two types of willow thickets (arroyo willow and sandbar willow) are briefly described below.

Arroyo willow thickets are low, dense, closed-canopy riparian forests dominated by arroyo willow. They are found in areas with moist soil year-round, either near ponds, near permanent streams, or in canyons with ephemeral flow or seepage. Soils vary from relatively fine-grained (in smaller arroyos) to fine sand and gravel bars near the larger creeks and streams. In the Alameda watershed, arroyo willow is the most common dominant species, but red willow (*S. laevigata*) is also frequent, along with occasional sandbar willow, mulefat, and California blackberry (*Rubus ursinus*).

Sandbar willow thickets are a scrubby streamside vegetation type, varying from open to impenetrable, found on temporarily flooded floodplains, depositions along rivers and streams, and at springs. Sandbar willow requires freshly deposited alluvium on which to germinate, so this vegetation type is typically found in active channels. It is usually the first woody riparian type to colonize point bars and cut banks, followed eventually by cottonwood (*Populus fremontii*) and other taller, longer-lived species (Sawyer et al., 2009).

Willow thickets are found along most of Alameda Creek between San Antonio Creek and Arroyo de la Laguna (see Appendix A, Photo 5). Willow thickets are also found within areas characterized by quarry operations (see Appendix A, Photo 4). Bands of arroyo and sandbar willow grow on the side slopes of quarry Pit F2 where seepage or water levels are sufficient to support willows.

Willow thickets support a variety of wildlife due to the presence of water and relatively dense vegetation cover. Willow thickets along Alameda Creek provides a greater value to wildlife than the quarry pit walls since it has been subject to less intensive disturbance and is in close proximity to creek resources. However, wildlife common to willow thickets would likely be found in any of these areas (see the discussions of mixed scrub and riparian woodland, below).

2.2.5 Mixed Scrub

The term mixed scrub was created to describe extensive areas supporting a fine-textured mosaic of nonnative grassland, coyote brush scrub, willow thickets and mulefat scrub (described above) in areas too small to distinguish at the mapping scale for this report. Mixed scrub is not recognized as a natural community by CDFW (Sawyer et al., 2009) and none of the vegetation alliances it contains are sensitive based on rarity. Further, it is mapped in quarry areas that are not considered riparian; therefore is not treated here as a sensitive natural community. The plant composition has formed in response to seepage as well as potentially other periodic disturbance. Mixed scrub occurs in patches along the eastern edge of quarry Pit F2 (see Appendix A, Photo 4).

These areas would provide habitat for wildlife species common in the coyote brush, mulefat, and willow thickets.

2.2.6 Riparian Woodland

Riparian woodland is a mix of trees found in moderate to mesic upland conditions but are associated with ephemeral streams or the floodplains of larger streams in otherwise dry, grass-dominated landscapes. It typically is an open woodland with low to moderately tall trees including coast live oak (*Quercus agrifolia*) with valley oak (*Quercus lobata*) and California buckeye (*Aesculus californica*), with an open understory consisting of blue wildrye (*Elymus glaucus* ssp. *glaucus*), coastal sagebrush, coyote brush, California rose *(Rosa californica*), California blackberry, common elderberry, California beeplant (*Scrophularia californica*), and poison oak. Native species frequently dominate the understory. In sites with more permanent access to surface and groundwater, riparian woodland habitat grades into willow forest and scrub. In the survey area it grades into nonnative grassland and disturbed habitats in upland conditions. Riparian woodland contains small areas of California buckeye groves and Central Coast live oak riparian forest, both of which have CNDDB ranks of G3 and S3 and are therefore considered sensitive natural communities (CDFG, 2010). Because this habitat type is found only in association with streams and is found only on streambanks, all examples of the habitat type are considered riparian and therefore a sensitive natural community under CEQA.

In the survey area, riparian woodland habitat is found along San Antonio Creek, where it covers the steep slopes above the creek channel, especially on the north-facing slopes (see Appendix A, Photo 6). There, it is strongly dominated by California buckeye, with a few coast live oaks, California sycamores, valley oaks, and associated shrubs such as common elderberry. The understory is typical of nonnative grassland.

Typically, riparian habitat supports a large variety of wildlife species—including passerines such as Bewick's wren (*Thryomanes bewickii*) and black phoebe (*Sayornis nigricans*), as well as many species of bats. Within the survey area, the structure and extent of riparian habitat is so limited along San Antonio Creek that this habitat is not expected to support species other than those found in non-native grassland.

2.2.7 Mixed Riparian Forest

Mixed riparian forest is comprised of taller, longer-lived riparian vegetation dominated by a variety of riparian trees. Within the survey area much of this habitat type most closely corresponds to black willow (*Salix gooddingii*) thickets alliance as described by Sawyer et al. (2009), although other species may dominate within portions of this mapping unit. Black willow thickets have a rank of S3 and are considered sensitive by CDFW. Since this habitat type is riparian, it is considered sensitive based on the CEQA criterion defining all riparian habitats as sensitive natural community.

Black willow thickets have open to continuous tree canopy dominated by black willow. They are found in terraces along large rivers and canyons and along rocky floodplains of small, intermittent streams, seeps, and springs. Within the survey area, mixed riparian forest occurs along Alameda Creek interspersed within the willow thickets and mulefat scrub habitats (see **Appendix A**, **Photo 7**). In addition to black willow, tree species within the mixed riparian forest include arroyo willow and sandbar willow, with occasional Fremont cottonwood, red willow (*Salix laevigata*), white alder (*Alnus rhombifolia*) and California sycamore (*Platanus racemosa*), occasionally with a mulefat understory.

Wildlife species that may be found in mixed riparian forest include a variety of wildlife species as described above for willow thickets and riparian woodland. A great blue heron (*Ardea herodias*) rookery was observed in large California sycamore trees on the Alameda Creek floodplain within the survey area.

2.2.8 Seasonal Wetland

Seasonal wetland is characterized by at least seasonally saturated soils and usually dense grass and grasslike plants. In well-established seasonal wetlands the soils are deep and highly organic. Dominant species may include spikerush (*Eleocharis* spp.), sedges (*Carex* spp.), nutsedges (*Cyperus* spp.) and rushes (*Juncus* spp.), as well as some perennial dicots, such as verbena (*Verbena lasiostachys*).

Seasonal wetland was observed south of the southeastern corner of Pit F2 (see Appendix A, Photo 2). Since this area has not been previously identified as a wetland, it may have developed relatively recently, perhaps as a result of changes in grading or groundwater levels. The predominant species noted in this seasonal wetland was nutsedge (*Cyperus eragrostis*). Nutsedge seasonal wetland is not considered sensitive natural community. Although within the survey area, the nutsedge seasonal wetland is outside of the construction footprint.

The seasonal wetland does not appear to support standing water for long periods of time, so wildlife use would likely be similar to that of the surrounding grassland areas and include passerines, small mammals, and reptiles. When saturated soils or standing water is present, this wetland may be used by adult Sierran treefrog (*Pseudacris sierra*).

2.2.9 Creek Channel and Instream Wetlands

Creek channel includes either the active channels or higher flow channels of ephemeral or seasonal streams (see Appendix A, Photos 6 and 8). In-channel pools and instream wetlands are also included in this mapping unit. Creek channel was mapped within the survey area along the active channels of both San Antonio and Alameda Creeks. These areas are either unvegetated, support some emergent wetland vegetation, seasonal wetland vegetation, or support sparse weedy annual plants similar to those found in ruderal and mulefat scrub habitat types. However, vegetation is limited by disturbance during high flow events. Creek channel is not recognized as a natural community (Sawyer et al., 2009) and therefore is not considered a sensitive natural community by CNDDB based on rarity; however, active creek channels are included within the CEQA definition of riparian habitat and therefore are considered sensitive natural communities.

Some small areas within the creek channel that are dominated by aquatic or wetland vegetation may be within state or federal jurisdiction. Two general types of instream wetlands occur within the creek channel: those that support perennial wetland vegetation and those that support seasonal wetland vegetation. Instream perennial wetlands are found at the shallow margins of more or less permanent pools in the deeper portions of the active channel, and in some cases these support taller emergent wetland species such as tule (*Bolboschoenus* spp.), cattails (*Typha* spp.) and spikerush. Vegetation alliances included in this sub-habitat type include cattail marshes, pale spikerush marshes, and bulrush marsh. Instream seasonal wetlands are found on the periphery of the instream pools where the seasonal rise and fall of subsurface water provides suitable conditions for the development of this vegetation. They are also found as isolated pools in low areas away from the active channel. These wetlands are fed by seepage when groundwater elevations are high. Typical species in these instream seasonal wetlands include nutsedge, rushes, and rabbitfoot grass (*Polypogon monspeliensis*).

Instream wetlands are found within the creek floodplain and are therefore considered riparian habitats. Under CEQA definition, instream wetlands would be considered sensitive vegetation communities. They may also be considered federally protected wetlands as defined by Section 404 of the Clean Water Act, which is evaluated under CEQA. Within the survey area, instream wetlands were found in all of the subreaches, although often in narrow or limited patches too small to map at the scale of the habitat map shown in Figure 5.14-1 and are included in the creek channel mapping unit. Wetland tributary (seasonal wetland) was also delineated within San Antonio Creek near the confluence of Alameda Creek as part of the SABPL delineation (USACE, 2011).

Within the survey area, San Antonio Creek confluence does not receive direct NPDES discharges from the adjacent quarry operations and typically lacks continuous flow during most of the year. Currently, flow in this reach of San Antonio Creek is dependent on seasonal precipitation and local runoff; releases from Turner Dam, an impoundment on San Antonio Creek several miles to the east, are generally insufficient to cause flow in this reach of the creek. San Antonio Creek was dry during March and May 2015 surveys. The channel was an estimated 6 to 30 feet in width at ordinary high water and the substrate was mostly silt and sand.

Most of the Alameda Creek channel is covered by riparian trees and shrubs, but some portions downstream of I-680 do not have vegetative cover. Alameda Creek is a naturally flashy stream. Stream flow and pool conditions along Alameda Creek within the survey area are described below.

Alameda Creek between San Antonio Creek Confluence and I-680 Culvert (Subreach A)

During the May 2015 survey, both San Antonio Creek and Alameda Creek were dry at the confluence. Water was present approximately 50 feet below the confluence and a quarry access road that crosses Alameda Creek immediately downstream of the confluence. In this area, isolated seepage pools were present within Alameda Creek. These pools were generally small, up to 16 feet in length and less than 3 feet deep, with abundant duckweed in the water, and emergent vegetation margins. These pools were occupied by adult and juvenile bullfrogs (*Lithobates catesbeianus*) during the May 2015 and October 2015 surveys. Additional flowing water was encountered downstream of these isolated pools. Alameda Creek in this reach has abundant emergent vegetation, high riparian cover, and slow-moving water dominated by pool habitat with interspersed riffle habitat. The habitat in this reach is likely quite dynamic with changes in pool locations dependent on woody debris dams that form and move during high flow events. Substrate in this reach was dominated by silt and fine sediment with some gravels in the isolated riffles.

Alameda Creek from I-680 Culvert Downstream Approximately 1,500 Feet (Subreach B)

In this reach, Alameda Creek is dominated by a series of long glides, with high algal cover, and dense riparian vegetation on the creek margins. Water depths were up to 3 feet deep and water was generally very slow moving. Largemouth bass (*Micropterus salmoides*) and bullfrog tadpoles were observed in this reach.

Alameda Creek from Approximately 1,500 Feet Downstream of I-680 to Arroyo de la Laguna Confluence (Subreaches C1 and C2)

There is an increase in cobble substrate and habitat diversity with a few riffle/pool complexes present. Largemouth bass and bullfrog tadpoles were observed in this reach. Both riparian vegetation cover and flows decrease as Alameda Creek approaches Arroyo de la Laguna. During May 2015 habitat surveys, There was no flowing water in Alameda Creek along the approximately 3,000-foot section of creek located upstream of Arroyo de la Laguna. However, several isolated pools with standing water and emergent vegetation were present within this predominantly dry reach.

2.2.10 Quarry Pond

Quarry ponds are the areas of open water within the pits created by quarry operations (see Appendix A, Photos 9, 10, and 11). Within the survey area, the largest of these ponds is Pit F2; much smaller in size is Pit F3-East and smallest is Pit F3-West. The ponds are fed by groundwater seepage, but also are managed by the quarry operators. These ponds did not support any emergent aquatic vegetation, which generally depends on fairly stable water levels. However, Pit F2 and F3-West supported discontinuous rings of willow and mixed scrub vegetation around their perimeter at the time of the surveys in 2015, as well as areas of nonnative grassland.

The pond would likely support Sierran treefrog and possibly western toad as well as various waterfowl.

2.2.11 Ruderal

Ruderal is a term created to describe sites that have experienced disturbance that resulted in removal of the natural vegetation, but at least some vegetation has returned. Typically, ruderal vegetation is sparse and consists of a low diversity of weedy species, typically broadleaf rather than grassy. Typical species found in ruderal habitats in the survey area include shortpod mustard, stinkwort, poison hemlock, milk thistle (*Silybum marianum*), bristly ox-tongue (*Helminthotheca echioides = Picris echioides*) and fennel (*Foeniculum vulgare*). Areas dominated by pampas grass (*Cortaderia selloana*) have also been included in this habitat type. Shrubs are sometimes present, such as coyote brush, but these tend to be sparse. Ruderal is not recognized as a natural community (Sawyer et al., 2009) and therefore is not considered a sensitive natural community by CDFW.

Ruderal is the most extensive upland habitat type mapped within the survey area, which has been extensively and repeatedly disturbed over the decades from a variety of extractive and infrastructure development activities (see Appendix A, Photos 12 and 13). The uplands south of San Antonio Creek support ruderal vegetation, as well as the areas between the quarry pits and Calaveras Road, and former nursery areas abandoned for several years also have developed ruderal vegetation. The species composition varies from site to site, depending on site conditions and the history of past disturbance.

Ruderal areas provide marginal wildlife habitat due to high levels of human disturbance and high cover of non-native vegetation. These areas contain a limited number of small mammal burrows and only a few California ground squirrel burrows located within friable soils These areas may serve as a movement corridor for common wildlife species such as jackrabbit (*Lepus californicus*) and mule deer (*Odocoileus hemionus*) and nesting habitat for common birds such as American crow (*Corvus brachyrhynchos*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), and killdeer (*Charadrius vociferus*). Large expanses of tall mustard may also provide nesting habitat for passerines.

2.2.12 Developed/Disturbed/Nursery

The developed/disturbed/nursery habitat type describes sites that have experienced disturbance so recently that little or no vegetation has become established, or where the site is maintained in a vegetation-free condition, such as for roads or for nursery management. These sites are characterized by open, bare soil, although other man-made features may also be present, such as sheds, buildings, roads and parking areas. This habitat type is not recognized as a natural community (Sawyer et al., 2009) and therefore is not considered a sensitive resource by CDFW.

Disturbed habitat areas within the survey area include: some of the recently-completed work areas for the San Antonio Backup Pipeline, in and around Pit F3-East; the maintained nursery areas at the northern end of the survey area between Calaveras Road and I-680; access roads (see Appendix A, Photo 14); and areas maintained free of vegetation as part of quarry operations on the west side of Pit F-2.

Soils in developed/disturbed/nursery habitat areas are typically compact, lined with gravel or paved and provide limited habitat for burrowing wildlife species. These areas would only be used occasionally by common wildlife species tolerant of human disturbance. These areas may serve as a refuge for common birds, but would not provide ideal wildlife habitat because of constant human disturbance.

2.2.13 Landscaped

The landscaped habitat type describes areas where the predominant vegetation, usually trees and shrubs, have been planted and persist, with or without maintenance such as irrigation. It is not recognized as a natural community by CDFW (Sawyer et al., 2009) and therefore is not considered a sensitive natural community. Landscaped habitat was mapped along the western edges of Pit F2, where cottonwood (*Populus* sp.) and oleander (*Nereum oleander*) have been planted in rows along the perimeter road; along I-680 where walnut (*Juglans* sp.) have been planted; at the northern portion of the survey area between Pit F2 and I-680 where a row of tall blue gum eucalyptus (*Eucalyptus globulus*) trees extends in a more or less north-south row; near the nursery at the northern tip of the survey area where scattered redwoods (*Sequoia sempervirens*) have been planted; along Calaveras Road where cork oak (*Quercus suber*) and other oaks (*Quercus* sp.) have been planted; and in the vicinity of the PG&E Sunol Substation south of San Antonio Creek, where oleander and common elderberry have been planted. The trees and shrubs may provide potential roosting and nesting habitat for the common bird species listed above. The larger trees may also provide habitat for birds of prey such as the red-tailed hawk (*Buteo jamaicensis*).

2.3 Special-status Wildlife Species

Based on habitat present within the survey area and locally documented occurrences, several special-status wildlife species have potential to occur within the survey area. Appendix C contains a full list of special-status wildlife species considered, which was compiled from a CNDDB search of the La Costa Valley and Niles USGS 7.5-minute quadrangles (CDFW, 2015). **Table C-1** in Appendix C includes a description of the potential for each special-status species from the CNDDB and USFWS search to occur within the survey area. **Table 1** below includes a list of all special-status species that have been observed within 5 miles of the survey area or have potential to occur in the survey area. See **Figure 4** for a map of special-status species occurrences within 5 miles of the survey area. A description of each special-status species that has a moderate potential or higher to occur in the survey area is detailed below.

Appendix E contains a full list of all wildlife species observed in the survey area during the reconnaissance survey.

2.3.1 Federal and/or State Listed Species

California Tiger Salamander

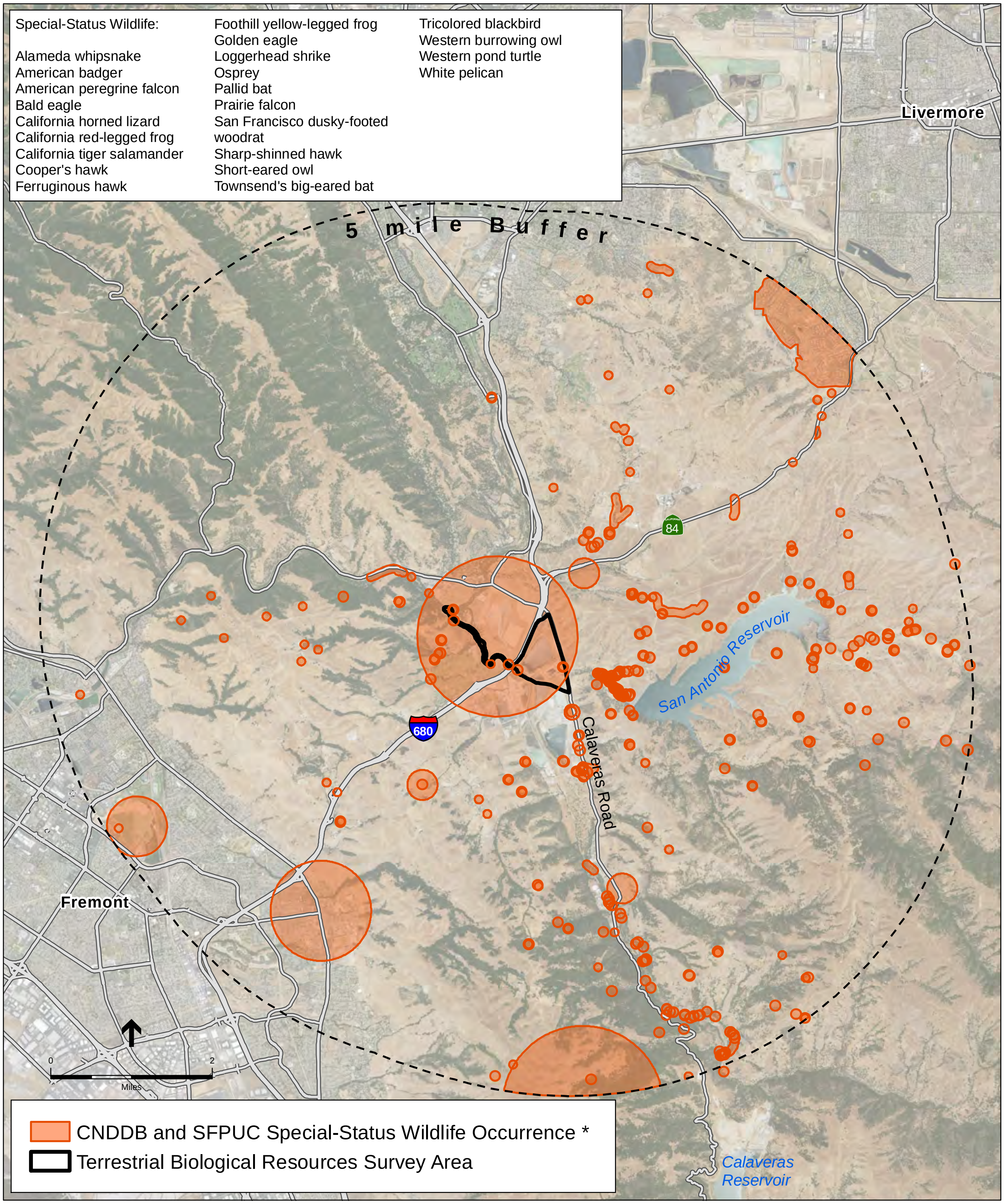
Status

The central California Distinct Population Segment (DPS) of California tiger salamander (*Ambystoma californiense*) is federally listed as threatened and is a state threatened species.

General Ecology and Distribution

California tiger salamander is principally an upland species found in annual grasslands and in the grassy understory of valley-foothill hardwood habitats in Central and Northern California. They require underground refuges (usually ground squirrel or other small mammal burrows), where they spend the majority of their annual cycle. Between December and February, when seasonal ponds begin to fill, adult California tiger salamanders engage in mass migrations to aquatic sites during a few rainy nights and are explosive breeders[6] (Barry and Shaffer, 1994).

[6] A species in which the breeding season is very short; in the case of tiger salamander, this usually occurs at the time of the first heavy rains of the rainy season.



* The occurrences shown on this map represent the known locations of the species listed here as of the date of this version of CNDDB (04/2015) and other species observed during SFPUC surveys or projects. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Details on documented locations of special-status species is withheld according to CNDDB guidelines due to the sensitivity of the information.

SOURCE: CDFW, 2015; Dettman, 2009; SFPUC, 2010b; SFPUC, 2011a; SFPUC, 2011b; SFPUC, 2011c; SFPUC, 2011d; SFPUC, 2015; ESA, 2009a

SFPUC Alameda Creek Recapture Project

Figure 4
Special-Status Wildlife within 5 Miles of the Survey Area

TABLE 1
FOCUSED LIST OF SPECIAL STATUS WILDLIFE SPECIES CONSIDERED FOR THE ALAMEDA CREEK RECAPTURE PROJECT

Common Name **Scientific Name**	**Listing Status FESA/ CESA/CDFW**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Survey area**
FEDERAL AND STATE LISTED SPECIES, DE-LISTED SPECIES, OR PROPOSED FOR LISTING			
Amphibians			
California tiger salamander *Ambystoma californiense*	FT/ST	Occurs in grasslands occupied by burrowing mammals; breed in ponds, vernal pools, and slow-moving or receding streams.	**High potential.** Numerous breeding locations are known within 1.2 miles of the survey area (CDFW, 2015a). Additionally, several adults have been observed within 1 mile of the survey area. Non-native grassland with small mammal burrows within the survey area provide upland habitat.
California red-legged frog *Rana draytonii*	FT/SSC	Breed in stock ponds, pools, and slow-moving streams.	**High potential.** This species has been observed in Alameda Creek within the survey area, 3 miles upstream, and 0.2 mile downstream of the survey area, and from San Antonio Creek approximately 0.4 mile upstream of the survey area (CDFW, 2015a; SFPUC, 2010b and 2015). Portions of Alameda Creek, particularly the reach downstream of I-680, provide potential breeding and non-breeding aquatic habitat, and San Antonio Creek provides non-breeding aquatic habitat. This species has potential to disperse through upland areas.
Reptiles			
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT/ST	Coastal scrub, grassland, and open oak woodland. Prefers rocky openings for basking, foraging.	**Moderate potential.** This species has been documented within 5 miles of the survey area (CDFW, 2015a). Core habitat is absent, but some foraging and dispersal habitat is present in the survey area.
Birds			
American peregrine falcon *Falco peregrinus anatum*	FD/SD/FP	Nests on cliffs, tall buildings, high bridges, and specially-designed towers.	**Low potential.** Suitable nesting habitat is absent from the survey area.
Bald eagle *Haliaeetus leucocephalus*	FD/SE/FP	Nest in mountainous habitats near reservoirs, lakes and rivers, usually in coniferous trees, close to permanent water.	**Low potential.** Suitable nesting habitat is absent from the survey area, although quarry pits could be used for foraging. Closest documented nesting site is 3 miles east of the survey area (SFPUC, 2011c; 2011d).
Mammals			
Townsend's big-eared bat *Corynorhinus townsendii*	--/SC/SSC	Roosts in caves, mines, buildings or structures. Forages in open lowlands.	**Low potential.** No suitable undisturbed roosting habitat present in the survey area.

**TABLE 1 (Continued)
FOCUSED LIST OF SPECIAL STATUS WILDLIFE SPECIES CONSIDERED FOR THE ALAMEDA CREEK RECAPTURE PROJECT**

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
OTHER SPECIAL STATUS SPECIES			
Amphibians			
Foothill yellow-legged frog *Rana boylii*	--/SSC	A year-round resident of cobble-lined streams; breeds in spring months after high water subsides.	**Low potential.** Based on habitat assessment survey, suitable habitat is absent from the survey area. This species is limited to perennial, moderate- to high-gradient portions of Alameda Creek that occur several miles upstream from the survey area.
Reptiles			
Western pond turtle *Emys marmorata*	--/SSC	Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands.	**High potential.** This species is known from Alameda Creek and San Antonio Creek (CDFW, 2015a; ESA, 2009a; SFPUC, 2015). Western pond turtle may be found in quarry pits, riparian areas, and uplands.
Coast horned lizard *Phyrnosoma coronatum*	--/SSC	Sandy areas and river washes, as well as riparian woodland clearings, chaparral, and alkali flats.	**Low to moderate potential.** Alameda Creek provide suitable river wash habitat for this species. Documented within 5 miles of the survey area (SFPUC, 2010b).
Birds			
Cooper's hawk *Accipiter cooperii*	--/3503.5	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also in live oaks.	**Moderate potential.** Riparian, oak, and eucalyptus trees within the survey area provide suitable nesting habitat for this species. Nearest CNDDB occurrence is approximately 2.7 miles west of survey area (CDFW, 2015a).
Sharp-shinned hawk *Accipiter striatus*	--/3503.5	A common migrant and winter resident in California. Nests in dense, even-aged, single-layered forest canopy.	**Low potential.** Dense oak woodland nesting habitat is not present within the survey area. Nesting is documented from hills surrounding Sunol Valley, with the nearest known occurrence approximately 2.9 miles south of the survey area (SFPUC, 2015).
Tricolored blackbird *Agelaius tricolor*	--/SSC	A colonial nester; nests in dense freshwater emergent vegetation.	**Moderate potential.** Breeding is known from the Sunol Valley and large flocks have been observed in the survey area (CDFW, 2015a; SFPUC, 2015). Potential breeding habitat is present in the survey area.
Golden eagle *Aquila chrysaetos*	--/FP	Nests in open areas on cliffs and in large trees.	**Moderate potential.** Larger trees near Alameda and San Antonio Creeks provide potential nesting habitat. Several occurrence records in the vicinity of the survey area (SFPUC, 2015).

TABLE 1 (Continued)
FOCUSED LIST OF SPECIAL STATUS WILDLIFE SPECIES CONSIDERED FOR THE ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
OTHER SPECIAL STATUS SPECIES			
Birds (cont.)			
Short-eared owl *Asio flammeus*	--/SSC	Nests in grasslands, usually on the ground.	**Moderate potential.** Grasslands within the site provide nesting habitat for short-eared owl. Known nesting site along southeastern San Antonio Reservoir (SFPUC, 2010b).
Burrowing owl *Athene cunicularia*	--/SSC	Nests and forages in low-growing grasslands that support burrowing mammals.	**Moderate potential.** Grasslands and ruderal habitat with ground squirrel burrows within the survey area provide suitable habitat for this species. This species has been documented within 5 miles of the survey area (SFPUC, 2010b).
Ferruginous hawk *Buteo regalis*	--/3503.5	Uncommon winter resident and migrant. Nests in foothills or prairies, on low cliffs, cut banks, shrubs, trees, or other natural or manmade elevated structures. Nest tree often isolated or in transition zones.	**Low potential.** Although there is a 1987 breeding record within 5 miles of the survey area (SFPUC, 2010b), the survey area is outside of the typical breeding range of this species and this species has low potential to breed within the survey area.
Northern harrier *Circus cyaneus*	--/SSC	Nests in coastal freshwater and saltwater marshes, nests and forages in grasslands.	**Moderate potential.** Limited nesting habitat is available adjacent to quarry pits because of site disturbance, but potential to nest in along Alameda Creek.
White-tailed kite (nesting) *Elanus leucurus*	--/FP	Nests near wet meadows and open grasslands in dense oak, willow or other large tree stands.	**Moderate potential.** Potential nesting habitat is present in trees adjacent to Alameda and San Antonio Creeks.
Prairie falcon *Falco mexicanus*	--/3503.5	Uncommon permanent resident. Usually nests on cliffs overlooking open areas.	**Low potential.** Nesting habitat is absent from the survey area. The closest documented CNDDB breeding location is approximately 3.9 miles south southeast of the survey area (Brian Acord, pers. comm., 2015).
Loggerhead shrike *Lanius ludovicianus*	--/SSC	Scrub, open woodlands, and grasslands.	**High potential.** Potential nesting habitat present in grasslands, shrubs, and trees throughout the survey area.
Osprey *Pandion haliaetus*	--/3503.5	Nest on large sturdy treetops, cliffs, or human-built platforms near water.	**Low potential.** Although the quarry pits may provide some suitable foraging habitat, disturbance from quarry operations would likely preclude nesting on-site. SFPUC occurrence record in the survey area vicinity is from a resident, not breeding, bird (SFPUC, 2010b).

TABLE 1 (Continued)
FOCUSED LIST OF SPECIAL STATUS WILDLIFE SPECIES CONSIDERED FOR THE ALAMEDA CREEK RECAPTURE PROJECT

Common Name **Scientific Name**	**Listing Status FESA/ CESA/CDFW**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Survey area**
OTHER SPECIAL STATUS SPECIES			
Birds (cont.)			
American white pelican *Pelecanus erythrorhynchos*	--/SSC	Breed on islands in lakes or wetlands.	**Low potential.** The survey area is outside of the breeding range of this species. SFPUC occurrence record in the survey area vicinity is from a wintering, not breeding bird (SFPUC, 2010b). Low potential to use the quarry pits during wintering.
Mammals			
Pallid bat *Antrozous pallidus*	--/SSC	Day roosts are mainly in caves, crevices and mines; also found in buildings and under bark. Forages in open lowland areas.	**Moderate potential.** Potential roosting habitat is available in large diameter trees.
Mammals			
San Francisco dusky-footed woodrat *Neotoma fuscipes*	--/SSC	Occur in forests with established understory. Construct nests from woody debris.	**High potential.** This species is known to nest within the vicinity of the survey area (CDFW, 2015a), suitable habitat is present in the Alameda Creek corridor and one woodrat nest was observed during the 2011 reconnaissance survey.
American badger *Taxidea taxus*	--/SSC	Grasslands, savannas, deserts, timberline mountain meadows.	**Moderate potential.** Documented 1 mile east of the survey area (SFPUC, 2010b). Some potential habitat present in grassland within the survey area.

STATUS CODES:

FEDERAL ENDANGERED SPECIES ACT (FESA)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FD = Federally Delisted

CALIFORNIA ENDANGERED SPECIES ACT (CESA)/CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW)
SE = Listed as Endangered by the State of California
ST = Listed as Threatened by the State of California
SC = State Candidate for Listing as Endangered
SD = State Delisted
SSC = California Species of Special Concern
FP = California Fully Protected
3503.5 = Section 3503.5 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

During drought years when ponds do not form, adults may spend the entire year in upland environments. Juveniles may spend 4 to 5 years in their upland burrows before reaching sexual maturity and breeding for the first time (Petranka, 1998; Trenham et al, 2000). Adults have been documented at distances of 1.2 miles or more from breeding ponds (Orloff, 2007). Typical upland sites include the burrows of California ground squirrels and valley pocket gophers.

Survey Area Occurrence

California tiger salamanders have been documented from at least 48 locations within 5 miles of the survey area, including five stock ponds in the foothills within 1.2 miles of the survey area (CDFW, 2015a). Several adults have been observed in upland areas in close proximity to the survey area. In February 2011, one adult was observed less than 0.2 mile south of the survey area boundary in non-native grassland habitat east of the SMP-30 aggregate processing facility and west of Calaveras Road (SFPUC, 2011a). The adult was unearthed while excavating burrows within the SFPUC's New Irvington Tunnel (NIT) spoils area and then relocated into adjacent grasslands outside of the work area. In February 2014, one adult was found in a pitfall trap, approximately 0.7 mile south of the survey area; it was subsequently relocated 0.08 mile to the east (SFPUC, 2015). In March 2011, one adult was observed approximately 0.8 mile southeast of the survey area, just east of Calaveras Road, during work for the Alameda Siphons project. The adult was subsequently moved outside of the construction area (SFPUC, 2011b). Additionally, three adults have been observed (one in 2009, 2011, and 2013) approximately 0.9 mile south of the survey area near the Sunol Valley Chloramination Facility in staging areas for the SFPUC's Alameda Siphons and San Antonio Backup Pipeline and NIT projects (CDFW, 2015a). The adults were relocated to suitable habitat outside of the staging areas. The closest documented breeding ponds are located approximately 0.3 and 0.5 mile west of the survey area. In 1994, many larvae were observed in these seasonal stockponds located east of Alameda Creek and north of the Sunol Valley Golf Course (CDFW, 2015a). The next closest documented breeding pond is located approximately 0.9 mile south of the survey area east of SMP-33. Many larvae were observed in this seasonal stock pond in 1994 (CDFW, 2015a).

The survey area does not contain California tiger salamander breeding habitat. The seasonal wetland located south of Pit F2 does not provide breeding habitat for this species. No standing water was present during the May 2015 survey and, from a review of historical aerial photographs of the site, this seasonal wetland does not appear to support standing water. The quarry pits are too deep (pond depths are greater than 10 feet) to support breeding California tiger salamander.

The majority of the project area within the survey area has been heavily disturbed from commercial nursery use, quarry operations, and construction of the SFPUC WSIP projects. Portions of the survey area along Calaveras Road north and south of San Antonio Creek and the area around Pit F3-East has been recently fenced off with special-status species exclusion fencing and disturbed as part of construction for SFPUC's SABPL. A portion of this exclusion fencing west of Pit F3-East has been removed, as observed during the reconnaissance-level survey, although segments near Calaveras Road appeared to be intact. Although these areas were revegetated following construction, the exclusion fence prohibited California tiger salamander from entering these areas during SABPL construction.

Non-native grassland within the survey area contains a small number of small mammal burrows, which would limit the extent of upland habitat and foraging opportunities for this species. However, California tiger salamanders have potential to utilize the non-native grasslands within the survey area, since the grasslands are located within 1.2 mile of several documented breeding ponds, and adult California tiger salamanders have been documented to travel within the valley floor. Coyote brush scrub, mulefat scrub, willow thickets, mixed riparian forest, and riparian woodland habitats along Alameda and San Antonio Creeks provide potential upland dispersal habitat for California tiger salamander. Although California tiger salamanders are typically found in grassland habitats, these areas are relatively undisturbed and may serve a movement corridor for this species.

Undeveloped habitats (including coyote brush scrub, mulefat scrub, willow thickets, mixed scrub, and ruderal habitats) surrounding the quarry pits may provide low quality upland dispersal habitat for California tiger salamanders. Although these areas contain some native vegetation and may be utilized by California tiger salamanders for dispersal, they contain relatively few small mammal burrows and are located within active quarry work sites.

California tiger salamanders may occasionally travel through the developed portions of the site on a transient basis, but developed areas do not contain California tiger salamander habitat.

California Red-legged Frog

Status

The California red-legged frog (*Rana draytonii*) is federally listed as a threatened species, and is a California species of special concern.

General Ecology and Distribution

This ranid species is principally a pond frog that can be found in permanent or semi-permanent (seasonal or ephemeral) ponds, pools, streams, springs, marshes, and lakes. Moist woodlands, forest clearings, and grasslands also provide suitable or upland dispersal habitat for this species in the non-breeding season. Adult frogs seek waters with shoreline vegetation for breeding and protection from predators, but may be found in unvegetated waters as well. Adults consume insects such as beetles, caterpillars and isopods, while tadpoles forage on algae and detritus.

California red-legged frogs breed from January to May. Eggs are attached to vegetation in shallow water and are deposited in irregular clusters. Tadpoles grow to 3 inches before metamorphosing.

Historically, the California red-legged frog occurred along the coast from the vicinity of Point Reyes National Seashore, Marin County, and inland from Redding, Shasta County southward to northwestern Baja California, Mexico (Jennings and Hayes, 1994). The majority of California red-legged frog occurrences in the San Francisco Bay Area are from Contra Costa and Alameda Counties. Grazing practices have altered California red-legged breeding habitat. In some instances grazing has contributed to California red-legged frog decline by decreasing riparian breeding habitat (USFWS, 2002a). In other instances stock pond creation for livestock has increased breeding habitat and grazing has also kept ponds clear by removing dense vegetation.

Survey Area Occurrence

California red-legged frog has been observed in Alameda Creek within the survey area, but outside of the project area. On July 24, 2014, one adult California red-legged frog was observed within Alameda Creek approximately 100 feet downstream of I-680 (SFPUC, 2015). In 1999, one adult was observed within the creek, approximately 0.1 mile north of I-680 and just east of the Sunol Valley Golf Course (CDFW, 2015a). In 2002, several California red-legged frogs were observed approximately 0.2 mile northwest of the survey area in an off-channel pond between Western Star Nursery and Alameda Creek (CDFW, 2015a). They were not observed at that location during USFWS protocol-level surveys conducted in 2008, 2009, and 2010, but two individuals were documented during the 2011 survey (ESA, 2008; ESA, 2009b; ESA, 2010; ESA, 2011). No individuals were observed during 2012, 2013, or 2014 surveys of that location (ESA, 2012; ESA, 2013; ESA, 2014). Upstream of the survey area within Alameda Creek, at a distance of approximately 3 miles, one juvenile was observed in a riffle, run, and pool complex in 1998 (CDFW, 2015a). California red-legged frogs have also been documented in San Antonio Creek, approximately 0.4 mile upstream of the survey area (SFPUC, 2015). On March 23, 2013, one adult frog was observed approximately 0.7 mile south of survey area and was moved to a pond one mile to the west (SFPUC, 2015). In February 2010, during surveys for the Alameda Siphons project, one California red-legged frog was observed within a seasonal wetland and one in an overflow ditch east of Calaveras Road, approximately 0.8 miles south of the survey area (SFPUC, 2011d). The frogs were relocated and the overflow ditch and seasonal wetland features have been removed as a result of the Alameda Siphons and NIT projects. On December 30, 2009, one California red-legged frog was observed in a small freshwater pond at the base of Pit F6, approximately 0.8 mile south of the survey area (Dettman, 2009). The closest documented California red-legged frog breeding sites are in San Antonio Creek approximately 0.5 mile east of the survey area (SFPUC, 2015) and in a small, shallow pond 1.25 miles northeast of the survey area (CDFW, 2015a).

Potential California red-legged frog habitat is present along Alameda Creek within the survey area. The isolated seepage pools located adjacent to Pit F2 contain emergent vegetation along the margin. The pools may be supported by the variable quarry discharges or seepage from the adjacent quarry. These pools provide potential breeding habitat, although the presence of bullfrogs reduce habitat quality. Other potential breeding pools are located in the creek channel downstream of I-680 These pools are dammed by woody debris and their location and size likely fluctuate when woody debris is moved during high flow events. The presence of bullfrogs in the reach, combined with the highly variable water source, reduce habitat quality. Further downstream, potential breeding pools were observed within the wetted creek channel and in isolated pools within the dry creek reach. Habitat quality is diminished in these areas due to the presence of bullfrogs and largemouth bass in the wetted creek channel. Other riffle and glide segments of the creek provide potential non-breeding aquatic habitat when water is present.

Flow along San Antonio Creek within the survey area is not continuous during the rainy season and is not sufficient to sustain breeding California red-legged frogs. Non-breeding aquatic refugia habitat may be present along San Antonio Creek following seasonal storm events, and portions of the creek corridor may provide year-round upland refugia habitat.

The quarry pits do not support emergent aquatic vegetation, such as cattails and tules, and are deep with steep side slopes. The lack of emergent vegetation for egg attachment and lack of warm, shallow tadpole rearing areas limits breeding potential. The quarry pit edges with riparian shrub or tree cover provide marginal aquatic refugia habitat. Although frogs could occur at these areas, the pit edges lack emergent aquatic vegetation, have steep side slopes, and fluctuating water levels. Additionally, several large fish were observed in Pit F2 during the May 2015 reconnaissance survey and may also be present in Pits F3-West and East. The seasonal wetland located south of Pit F2 does not support standing water deep enough to provide breeding habitat.

Coyote brush scrub, mulefat scrub, willow thickets, riparian woodland, and mixed riparian forest along Alameda and San Antonio Creeks provide potential upland dispersal habitat for California red-legged frog. These areas are relatively undisturbed and may serve a movement corridor for this species. Small mammal burrows and rock and debris piles in non-native grasslands offer refugia habitat.

As with the California tiger salamander, undeveloped habitats surrounding the quarry pits may provide low quality upland dispersal habitat for California red-legged frog. Although these areas contain some native vegetation and are located adjacent to aquatic features, they are actively disturbed by quarry operations. As described for California tiger salamander, California red-legged frogs have been recently excluded from some of these upland areas during construction of the SFPUC San Antonio Backup Pipeline Project.

Developed areas do not contain California red-legged frog habitat.

Alameda Whipsnake

Status

Alameda whipsnake (*Masticophis lateralis euryxanthus*) is a federal and state threatened species.

General Ecology and Distribution

Alameda whipsnakes are dependent upon open chaparral, sage scrub, and coastal scrub. Core habitat most commonly occurs on east, southeast, south, and southwest facing slopes (USFWS, 2000). However, telemetry data indicate that although core habitat is centered on shrub communities, they extensively utilize adjacent habitats including grassland, oak savanna, and occasionally oak-bay woodland. Alameda whipsnakes use grassland habitats for periods of up to several weeks, with males using grassland habitats more frequently in the mating season and females using grassland habitats after mating occurs. Rock outcrops are an important feature of Alameda whipsnake habitat because they provide retreat opportunities and support lizard populations (USFWS, 2002b; 2005).

Historically, Alameda whipsnakes were probably found in the coastal scrub and oak woodland communities of the East Bay in Contra Costa, Alameda, western San Joaquin, and northern Santa Clara Counties (USFWS, 2002b). Currently, they are only found in the inner Coast Range in western and central Contra Costa and Alameda Counties (USFWS, 2002b). Five isolated populations of Alameda whipsnake are now recognized within its historical range: Tilden–

Briones, Oakland–Las Trampas, Hayward–Pleasanton Ridge, Sunol–Cedar Mountain, and Mt. Diablo–Black Hills (USFWS, 1997).

Survey Area Occurrence

Alameda whipsnake is known from several occurrences in the La Costa Valley and Niles USGS 7.5-minute quadrangles, which includes the Sunol Valley. All locations are sensitive and thus are suppressed data, though CDFW disclosed that the nearest occurrence is approximately 4.2 miles southeast of the survey area (Brian Acord, pers. comm., 2015).

Core habitat consisting of sage scrub, chaparral, coastal scrub habitats and rock outcrops are absent from the survey area. Sage scrub is present outside of the survey area in small, discontinuous patches on the upper south and west-facing slopes east of Calaveras Road, approximately 300 feet east of the survey area. Alameda whipsnakes have been found at distances of over 4 miles from such habitat (Alvarez et al., 2005).

The non-native grassland throughout the survey area and riparian and scrub habitats along Alameda and San Antonio Creeks provide potential moderate quality habitat for the Alameda whipsnake. These areas contain small mammal burrows and are relatively undisturbed.

Undeveloped habitats (including coyote brush scrub, mulefat scrub, willow thickets, riparian woodland, and riparian forest habitats) surrounding the quarry pits may provide low quality habitat for the Alameda whipsnake. Although these areas contain some native vegetation, they are located within active quarry work sites and subject to disturbance.

Developed and aquatic portions of the site do not contain potential Alameda whipsnake habitat.

2.3.2 Other Special-Status Species

Foothill Yellow-legged Frog

Status

The foothill yellow-legged frog (*Rana boylii*) is a California species of special concern.

General Ecology and Distribution

This ranid species historically occurred in most Pacific drainages west of the Sierra/Cascade Crest from the from the Santiam River system in Oregon to the San Gabriel River in Los Angeles (Jennings and Hayes, 1994). Their present range excludes coastal areas south of northern San Luis Obispo County and foothill areas south of Fresno County where this species is presumed extirpated (Jennings and Hayes, 1994). This species' known elevation range extends from near sea level to approximately 6,700 feet above sea level (Stebbins, 2003). The foothill yellow-legged frog is known from several perennial drainages in the Bay Area, including from the Alameda Creek watershed.

The foothill yellow-legged frog is a stream-dwelling species that requires shallow, perennial water flows. This species requires shallow, flowing water, apparently preferentially in small to moderate-sized streams situations with at least some cobble-sized substrate (Jennings and Hayes, 1988). Some researchers emphasize riffles as one of the key aspects of this species' habitat (Stebbins, 2003; Jennings and Hayes, 1988). Jennings and Hayes (1988) note that as intermittent streams lose surface flow during late summer, riffles disappear, and this species can then be found associated with stream pools. However, yellow-legged frogs are not described from ephemeral streams that lack water during summer and fall months. Some degree of riparian vegetation coverage is preferred by foothill yellow-legged frogs, as is open habitat and sunny banks (Stebbins, 2003). This species may be excluded by dense canopy. For example, Moyle found no yellow-legged frogs at sites with greater than 90 percent shading (Moyle, 1973). Studies suggest that this species is infrequent or absent in habitats where introduced aquatic predators (i.e., predatory fishes and bullfrogs) are present (Hayes and Jennings, 1988), probably because their aquatic developmental stages are susceptible to such predators (Grinnell and Storer, 1924).

Adult foothill yellow-legged frogs feed primarily on both aquatic and terrestrial insects (Ashton et al., 1997); tadpoles preferentially graze on algae (Jennings and Hayes, 1994). Postmetamorphic larvae eat aquatic and terrestrial insects (Storer, 1925).

California yellow-legged frogs generally breed following the period of high flow discharge resulting from winter rainfall and snowmelt, which results in oviposition usually occurring between late March and early June (Storer, 1925; Grinnell et al. 1930; Jennings and Hayes, 1994). Ashton et al. (1997) report that cobble and pebble are the preferred substrate for egg mass attachment, but egg masses may be attached to other available in-water structure as well.

Survey Area Occurrence

CDFW notified the SFPUC of an undocumented 2006 FYLF sighting along Alameda Creek between the treatment plant and quarry (pers. comm., Grefsrud, 2016). However, the nearest documented foothill yellow-legged frog to the survey area is located within Alameda Creek approximately 2.6 miles south of the survey area near the Sunol Valley Water Treatment Plant (SFPUC, 2015). There are also several occurrence records in Alameda Creek upstream of this record and into the Sunol Regional Wilderness (SFPUC, 2015; CDFW, 2015a). The segment of Alameda Creek where this species occurs supports year-round flows with riffle habitat, gravel, cobble and boulder substrate. Annual focused California red-legged frog surveys in Alameda Creek approximately 0.1 mile downstream of the survey area have not identified foothill yellow-legged frog, and suggested no evidence of foothill yellow-legged frog presence (ESA, 2008; ESA, 2009b; ESA, 2010; ESA, 2011).

ESA biologists performed a focused habitat assessment survey of the survey area on October 23, 2015 to assess the quality of potential foothill yellow-legged frog habitat and ascertain the potential for species' presence. The survey included portions of Alameda Creek from the downstream confluence with Arroyo de la Laguna to the quarry discharge point near Pit F2. Survey data sheets and representative photographs of the survey area are included in Appendix G.

In all, nine pools of varying sizes were recorded within the survey area. The pools varied greatly in size and character. The five relatively small downstream pools (Appendix G, Data Sheets 2 through 4) appeared to maintain semi-permanent water with input from underground water sources. The profile of Alameda Creek in this area is that of a low gradient stream with a predominance of silt and clay substrate and organic material. The pools ranged in size from approximately 650 to 2,200 ft^2, these still water pools were reminiscent of habitat for California red-legged frog. Water depth ranged from 6 to 27.5 inches and the pools showed perhaps 50 percent coverage by riparian vegetation around their margins. Large numbers of bullfrog larvae, up to 50 per pool, were observed; however, no other ranid species were noted. Fish species were generally absent from these pools. These pools are not considered optimal habitat for foothill yellow-legged frog because they dry seasonally, do not support appropriate riffle habitat, contain inappropriate substrates, and also support a large population of predatory species. The likelihood that foothill yellow-legged frog would be present is also reduced due to the distance from known populations and seasonally dry instream conditions upstream from the quarry area.

The roughly 0.65-mile portion of Alameda Creek downstream from the quarry discharge point near pit F2 supports perennial water and four large pools, greater than 330 to 660 feet in length. The perennial water reach included Pool 6, 7, 8, and 9, and areas upstream of I-680. All portions of the stream upstream of Pool 6 showed perennial flows and dense riparian vegetation (see Appendix G, data sheets 4 through 6). These larger pools support bullfrog breeding, red swamp crayfish (*Procambarus clarkii*), minnows, California roach (*Hesperoleucus symmetricus*), and mosquito fish (*Gambusia affinis*) and largemouth bass. In most areas, the creek margins supported dense willow growth with water present from bank-to-bank (e.g., see Appendix G, Figures G-7 and G-8) with no protruding rocks or boulders. Upstream of Pool 7, the aquatic substrate overwhelmingly consisted of silt and clay, often overlain with organic materials. Such habitat can be used by yellow-legged frog larvae when stream conditions may otherwise support this species, though adult yellow-legged frogs typically occur in deeper water in association with instream rock features, such as large cobble or boulders that provide resting sites for adult and immature frogs or some degree of gravel or sandy substrate overlain by organic materials. Such habitat was absent from subreaches A, B, and the upstream portion of Subreach C1. Habitat quality for yellow-legged frog is also diminished in these features due to the presence of largemouth bass, bullfrogs, and crayfish. Other riffle and glide segments of the creek provide potential non-breeding aquatic habitat when water is present.

In summary, based on the findings of the October 23, 2015 habitat assessment, distance from known populations of this species, and presence of a seasonally dry channel between known populations and the survey area, Alameda Creek within the survey area may seasonally support low quality foothill yellow-legged frog movement habitat. Given the absence of established foothill yellow-legged frog source populations near the survey area, such intermittent movement through the area would be exceedingly rare.

San Antonio Creek is typically dry for most of the year and, due to its ephemeral nature and distance from documented populations, foothill yellow-legged frogs are unlikely to occur in this creek within the survey area. Since foothill yellow-legged frogs are a stream-dwelling frogs, they are not be expected to occur in the quarry pits or upland areas within the survey area.

Western Pond Turtle

Status

Western pond turtle (*Emys marmorata*) is a California species of special concern.

General Ecology and Distribution

Western pond turtles are uncommon and discontinuously distributed throughout California west of the Cascade-Sierran crest (Jennings and Hayes, 1994). Western pond turtles are typically found in ponds, lakes, marshes, rivers, streams, and irrigation ditches with rocky or muddy substrates surrounded by aquatic vegetation. These watercourses usually are within woodlands, grasslands, and open forests, between sea level and 6,000-foot elevation. Turtles bask on logs or other objects when water temperatures are lower than air temperatures. Nests are located at upland sites, often up to 0.25 mile from an aquatic site (Jennings and Hayes, 1994; Stebbins, 2003; Zeiner et al, 1988). General dispersal may occur throughout upland habitat.

Survey Area Occurrence

Western pond turtle has been documented in Alameda Creek and its tributaries and other aquatic features in the vicinity of the survey area (CDFW, 2015a; SFPUC, 2015). Western pond turtle was observed near the Alameda Creek and Arroyo de la Laguna confluence just outside of the survey area (SFPUC, 2015). The closest CNDDB documented occurrence is approximately 0.4 mile west of the survey area where one turtle was observed in a stockpond in 2010 (CDFW, 2015a). Additionally, during reconnaissance surveys for the San Antonio Backup Pipeline Project, this species was observed in San Antonio Creek at the base of Turner Dam (ESA, 2009a) approximately 0.8 mile east of the survey area.

Alameda Creek, San Antonio Creek, and SMP-24 quarry pits provide potential aquatic habitat for the western pond turtle. Non-native grassland, riparian, and scrub habitats, particularly those with friable soils, contain potential nesting and dispersal habitat for this species.

Coast Horned Lizard

Status

The coast horned lizard (*Phrynosoma coronatum*) is a California species of special concern.

General Ecology and Distribution

The coast horned lizard occurs in the Sierra Nevada foothills from Butte County to Kern County and throughout the central and southern California coast. The species is found in several habitat types including areas with an exposed gravelly-sandy substrate containing scattered shrubs, clearings in riparian woodlands, dry uniform chamise chaparral, and annual grassland with scattered perennial seepweed or saltbush. Horned lizard populations reach maximum abundance in sandy loam areas and on alkali flats often dominated by iodine bush. Coast horned lizards utilize small mammal burrows or burrow into loose soils under surface objects during extended periods of inactivity or hibernation (Jennings and Hayes, 1994).

Survey Area Occurrence

This species has not been documented in the Sunol Valley. The closest documented occurrence is approximately 4.8 miles east of the survey area within eastern La Costa Valley (SFPUC, 2010b). This species is typically found in alkaline areas with sandy loam soils, which are absent from the survey area. Alameda Creek contains washes that consist of cobble beds with sand. Although these areas are not alkaline, this species has potential to occur in this area.

Cooper's Hawk

Status

Cooper's hawk (*Accipiter cooperii*) is protected under Section 3503.5 of the California Fish and Game Code.

General Ecology and Distribution

Cooper's hawks nest throughout most of the wooded portion of California (Zeiner et al., 1998). They are often found in oak, riparian, or other forest habitats and typically forage near open water or riparian vegetation. They prey on small birds and mammals and some reptiles and amphibians.

Survey Area Occurrence

This species has been documented nesting at several locations within 5 miles of the survey area (CDFW, 2015a). Nests have typically been found in oak woodland or mixed oak woodland habitat. Riparian woodland along San Antonio Creek and riparian forest along Alameda Creek provide potential nesting habitat for this species.

Tricolored Blackbird

Status

The tricolored blackbird (*Agelaius tricolor*) is a California species of special concern.

General Ecology and Distribution

Tricolored blackbird is a colonial species that nest in dense vegetation in and around freshwater wetlands. When nesting, tricolored blackbirds generally require freshwater wetland areas large enough to support colonies of 50 pairs or more. They prefer freshwater emergent wetlands with tall, dense cattails or tules for nesting, but will also breed in thickets of willow, blackberry, wild rose, or tall herbs. During the nonbreeding season, flocks are highly mobile and forage in grasslands, croplands, and wetlands (Shuford and Gardali, 2008).

Survey Area Occurrence

Tricolored blackbirds have been documented from the Sunol Valley and in the survey area (CDFW, 2015a; SFPUC, 2015). During the 2009 reconnaissance survey for the SABPL project, a large mixed flock of tricolored and red-winged blackbirds numbering in the hundreds-to-thousands were observed flying back and forth over the SABPL and ACRP project areas. Another smaller flock of tricolored blackbirds numbering approximately 100 was also observed foraging in the floodplain of Alameda Creek south of SMP-30 and flying back and forth over the quarry area (ESA, 2009a).

Large expanses of freshwater emergent wetlands, which tricolored blackbird typically prefer for nesting, are absent from the survey area. Potential nesting habitat is present in the willow or mulefat scrub habitat located within the project area; however these areas are relatively small in extent and are subject to disturbance from the surrounding quarry operations. Breeding may occur outside of the survey area in a large freshwater marsh located southwest of Pit F3-West on the west side of Alameda Creek, which contains abundant cattails and measures roughly 6 acres in size. Since only low-quality nesting habitat is present in the project area, tricolored blackbirds would not be expected to nest here with high quality nesting habitat present nearby.

Willow thickets and mixed riparian forest along Alameda Creek within the survey area, but outside of the project area, provide suitable nesting habitat and are subject to less disturbance than in the vicinity of the quarry area.

Golden Eagle

Status

The golden eagle (*Aquila chrysaetos*) is a CDFW fully protected species.

General Ecology and Distribution

Golden eagles nest in open areas on cliffs and in large trees, often constructing multiple nests in one breeding territory (Zeiner et al., 1988). They prefer open habitats such as rolling grasslands, deserts, savannahs, and early successional forest and shrub habitats, with cliffs or large trees for nesting and cover.

Survey Area Occurrence

Golden eagle nests have been documented from several locations within the vicinity of the survey area, with the closest record along Alameda Creek just outside of the survey area, approximately 0.2 mile upstream of the Arroyo de la Laguna confluence (SFPUC, 2015). There are several other occurrence records east of the survey area near San Antonio Creek and San Antonio Reservoir. This species was observed flying during the site survey in 2011. Potential nesting habitat is present in the eucalyptus trees near the nursery or in the larger trees along Alameda and San Antonio Creeks.

Short-Eared Owl

Status

The short-eared owl (*Asio flammeus*) is a California species of special concern.

General Ecology and Distribution

The short-eared owl is an open country bird that is seen most often at dawn and dusk. Short-eared owls usually nest on dry ground in depressions that are concealed by vegetation, sometimes nesting within burrows. Breeding is from early March through July with a typical clutch size of five to seven eggs. This owl is a widespread winter migrant with resident populations in portions of California (Shuford and Gardali, 2008). The short-eared owl is one of the most widely distributed owls in the world.

Survey Area Occurrence

Nesting short-eared owls are documented from western La Costa Valley at a distance of 2.7 miles east of the survey area (SFPUC, 2010b). This species was not observed during the reconnaissance survey, however, non-native grasslands within the survey area provide suitable nesting habitat for this species.

Western Burrowing Owl

Status

The western burrowing owl (*Athene cunicularia*) is a California species of special concern.

General Ecology and Distribution

Western burrowing owls are relatively small, semicolonial owls, and are mostly residents of open dry grasslands and desert areas. They occupy burrows for both breeding and roosting. They use burrows excavated by ground squirrels and other small mammals and will use human-made burrows and cavities. Where the number and availability of natural burrows is limited, owls may occupy human-made burrows such as drainage culverts, cavities under piles of rubble, discarded pipe, and other tunnel-like structures (Shuford and Gardali, 2008). Burrowing owls hunt from perches and are opportunistic feeders. They consume arthropods, small mammals (e.g., meadow voles), birds, amphibians, and reptiles. Insects are often taken during the day, while small mammals are taken at night (Shuford and Gardali, 2008).

Survey Area Occurrence

The closest documented occurrence of the western burrowing owl is approximately 1 mile east of the survey area on the northern slopes of San Antonio Reservoir (SFPUC, 2010b), but there are several additional observations in the vicinity of San Antonio Reservoir. Non-native grasslands and ruderal areas within the survey area are fairly compact with few small mammal burrows. However, there is some potential for burrowing owl to occur in these areas.

Northern Harrier

Status

The northern harrier (*Circus cyaneus*) is a California species of special concern.

General Ecology and Distribution

Northern harriers are found in a wide variety of habitats from Central Valley grasslands up to lodgepole pines and alpine meadow habitats. They are known to frequent meadows, grasslands, open rangelands, desert sinks, freshwater and saltwater emergent wetlands. Harriers are seldom found in wooded areas. Harriers nest on the ground, usually within patches of dense, tall vegetation in undisturbed areas (Shuford and Gardali, 2008).

Survey Area Occurrence

No northern harrier nesting sites are documented within the vicinity of the survey area (CDFW, 2015a; SFPUC, 2010b). Suitable nesting habitat is present within the survey area along the edges of Alameda Creek and in the grassland and scrub habitats adjacent to the quarry pits. However, much of the quarry area is heavily disturbed, which would likely preclude nesting in that area.

White-Tailed Kite

Status

The white-tailed kite (*Elanus leucurus*) is a CDFW fully protected species.

General Ecology and Distribution

White-tailed kites forage in open grasslands, meadows, farmlands, and emergent wetlands. They typically nest in oak woodlands or trees, especially along marsh or river margins, although they will use any suitable tree or shrub that is of moderate height. They are rarely found far from agricultural areas (Zeiner et al., 1988).

Survey Area Occurrence

Nesting locations are not documented within the vicinity of the survey area (SFPUC, 2010b; CDFW, 2015). White-tailed kite was observed foraging east of Calaveras Road during the 2009 reconnaissance surveys for the SABPL project (ESA, 2009a) and was observed flying overhead during the December 2010 reconnaissance survey. Suitable nesting habitat is present within the trees along Alameda and San Antonio Creeks.

Loggerhead Shrike

Status

The loggerhead shrike (*Lanius ludovicianus*) is a California species of special concern.

General Ecology and Distribution

Loggerhead shrikes are a California semipermanent resident species that occurs in abundance in the Central Valley and central coast where scrub habitats and open woodlands are available. Shrikes generally forage on the fringes of open habitats where suitable hunting perches are available. This species typically hunts from dead trees, tall shrubs, utility wires and fences, impaling their prey on sharp twigs, thorns, or barbed wire.

Survey Area Occurrence

Nesting loggerhead shrikes have been documented approximately 2 miles east of the survey area on the northern slopes of San Antonio Reservoir (SFPUC, 2010b). Shrike populations are generally known from wooded riparian corridors and grazed lands, with breeding often associated with blackberry and willows ranging in size from individual shrubs to dense thickets. Shrikes are common throughout California and would be expected to nest and forage within the grassland and scrub habitats adjacent to the creeks and quarry pits.

Pallid bat

Status

The Pallid bat (*Antrozous pallidus*) is a California species of special concern.

General Ecology and Distribution

Pallid bat occurs throughout California except for the high Sierra Nevada from Shasta to Kern Counties, and the northwestern corner of the state from Del Norte and western Siskiyou Counties to northern Mendocino County (Zeiner et. al., 1988). This large pale bat establishes maternity roosts in crevices in rocky outcrops and cliffs, caves, mines, hollowed trees, large tree cavities, and vacant buildings (Western Bat Working Group, 2005).

Survey Area Occurrence

A pallid bat maternity colony was documented approximately 4.4 miles south southeast of the survey area in 2001 (CDFW, 2015a). Potential roosting habitat is present within the survey area in larger trees, particularly alongside Alameda and San Antonio Creeks. Quarry pits and Alameda Creek channel provide foraging habitat for insectivorous bats.

San Francisco Dusky-footed Woodrat

Status

The San Francisco dusky-footed woodrat (*Neotoma fuscipes*) is a California species of special concern.

General Ecology and Distribution

This woodrat subspecies is found on the San Francisco peninsula southward to Santa Cruz County, and in the East Bay hills as well. It is a medium-sized native rodent. Dusky-footed woodrats are widespread in chaparral, woodland, and forest habitats with well-developed undergrowth, where their conical stick houses are often visible (Carraway and Verts, 1991). These houses may be as much as 6 feet tall, and contain multiple chambers used for sleeping and food storage. Reproduction occurs from February through September.

Survey Area Occurrence

San Francisco dusky-footed woodrat nests have been documented within the Alameda Creek riparian corridor, approximately 0.5 mile northwest of the survey area (CDFW, 2015a). A woodrat nest was also observed during the 2011 reconnaissance survey along the northern segment of Alameda Creek within the survey area and in 2015 elsewhere along Alameda Creek downstream of the project area.

American Badger

Status

The American badger (*Taxidea taxus*) is a California species of special concern.

General Ecology and Distribution

In North America, American badgers occur as far north as Alberta, Canada and as far south as central Mexico. In California, American badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties. The species has been decreasing in numbers throughout California over the last century. American badgers occur in a wide variety of open, arid vegetation communities but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub. The principal habitat requirements for this species appear to be sufficient food (burrowing rodents), friable soils, and relatively open uncultivated ground. American badgers are primarily found in areas of low to moderate slope.

Survey Area Occurrence

Badgers have been documented approximately 1 mile east of the survey area in the grassland hills and north banks of San Antonio Reservoir (SFPUC, 2010b). Although most of the grassland within the survey area is located within close vicinity of quarry operations, some mammal and ground squirrel burrows are located within the survey area. Due to a known occurrence record in the survey area vicinity, and potentially suitable grassland habitat present, badger use of the site cannot be ruled out.

2.4 Special-status Plant Species

A full list of special-status plant species considered as potentially occurring in the project area is included in Appendix D. This list of 50 species was compiled from California Natural Diversity Database and CNPS queries for the nine-quadrangle area centered on the La Costa Valley 7.5-minute quadrangle (CNDDB, 2015b; CNPS, 2015); USFWS official lists (USFWS 2015); and review of previous environmental studies in the vicinity of the survey area. No federal- or state-listed species were documented within 5 miles or determined to have potentially suitable habitat onsite. From the list of 50 special-status plant species considered, a list of 15 special-status plants was selected as having potential to occur. These consisted of species appearing on CNDDB and CNPS queries for the La Costa Valley and Niles quadrangles (CNDDB, 2015a; CNPS, 2015); any rare (i.e., CNPS Rank 1 or 2, candidate or listed) plant species known from the Alameda Watershed (Nomad Ecology, 2009); and rare species which, in the opinion of the investigators, should be further considered based on habitat and distribution. **Table 2** presents information on the name, status, habitat, distribution, flowering period and an assessment of the potential for the species to occur in the project area for these 15 special-status plants.

TABLE 2
SPECIAL-STATUS PLANTS KNOWN FROM THE REGION, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CRPR	Habitat and Distribution[b]	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
SPECIAL-STATUS PLANTS					
Chaparral harebell *Campanula exigua*	–/–/1B.2	Rocky, usually serpentinite chaparral habitats; on talus slopes; sometimes in coastal scrub or chaparral, at edges of blue oak and gray pine; vernally moist areas, often very open or barren. Nearest record is a general locality near Sunol, last seen in 1973. Most localities are south of the Alameda watershed. Range: ALA, CCA, SBT, SCL, STA.	900-4100 feet	**Not observed.** Suitable serpentinite soil and chaparral habitats absent from the survey area; species not found during focused surveys for this and nearby projects.	May – June
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	–/–/1B.2	Alkaline valley and foothill grassland, probably in low areas with high residual soil moisture. Reported in 2009 from vicinity of Andrade Road; also known from Irvington District in Fremont. Range: ALA, CCA, MNT, SCL, SLO, SMT.	0-750 feet	**Not observed.** Alkaline soils absent from the survey area; species not found during focused surveys for this and nearby projects.	May – October, uncommonly in November
Hospital Canyon larkspur *Delphinium californicum* ssp*. interius*	–/–/1B.2	Chaparral, cismontane woodland; wet, boggy meadows, openings in soft chaparral habitat, woodland in canyons; shaded gullies, sometimes in thick undergrowth. Nearest records are Williams Gulch and near Arroyo Mocho. Range: ALA, CCA, MER, SBT, SCL, SJQ, SBT.	750-3600 feet	**Not observed.** Suitable chaparral and woodland habitats absent from the survey area; species not observed during suitably-timed surveys for this and nearby projects.	April – June
San Joaquin spearscale *Extriplex joaquiniana*	–/–/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; seasonal wetlands or alkali sink scrub. Nearest records are from Warm Springs in Fremont and Livermore area. Range: ALA, CCA, COL, FRE, GLE, MER, MNT, NAP, SBT, SCL* SJQ*, SLO, SOL, TUL*?, YOL	0-2750 feet	**Not observed.** Suitable alkaline habitats absent from the survey area. Species not found during suitably-timed focused surveys for this and nearby projects.	April – October
Diablo helianthella *Helianthella castanea*	–/–/1B.2	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill woodland; openings or outcrops in scrub or forest; often in soils formed on sandstone. Recent studies have concluded that species present in the Alameda watershed is California helianthella. Range: ALA, CCA, MRN, SFO, SMT; most localities in CCA	200-4300 feet	**Not observed.** Although moderately suitable grassland habitat present in the survey area, species not found during suitably-timed focused surveys for this and other nearby projects. Project area appears to be out of range for species.	March – June

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS KNOWN FROM THE REGION, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CRPR	Habitat and Distribution[b]	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
SPECIAL-STATUS PLANTS (cont.)					
California alkali grass *Puccinellia simplex*	--/--/1B.2	Meadows and seeps, saline flats; chenopod scrub, valley and foothill grasslands, vernal pools. Nearest record is 5 miles south of Livermore in Vallecitos area. Range: ALA, BUT, CCA, COL, GLE, KRN, KNG, LAK, LAX, FRE, MAD, MER, NAP, SCL, SCR, SOL, STA, SBD, SLO, YOL.	0-3050 feet	**Not observed.** Alkaline soils, vernal pools, and chenopod scrub are unknown from the project area; species not found during suitably-timed focused surveys.	March-May
Most beautiful jewelflower *Streptanthus albidus* ssp.*peramoenus*	–/–/1B.2	Chaparral, coastal scrub woodland, and grassland; outcrops and barren areas on south- and west-facing exposures on ridges and slopes; serpentine soils. Nearest records are from Sunol Regional Wilderness, Goat Rock, and east of Calaveras Reservoir. Range: ALA, CCA, SCL, MNT, SLO.	300-3300 feet	**Not observed.** Suitable habitats absent from survey area; species not found during suitably-timed focused surveys for this and nearby projects.	April – September, uncommonly in March and October
PLANT SPECIES OF INTEREST					
Santa Clara thorn-mint *Acanthomintha lanceolata*	--/--/4.2	Chaparral, cismontane woodland and coastal scrub, generally on serpentinite. Nearest records are from upper San Antonio Creek, Oak Ridge, Calaveras Dam and Sunol Regional Wilderness. Range: ALA, FRE, MER, MNT, SBT, SCL, SJQ, STA.	260-4000 feet	**Not observed**. Suitable serpentine substrate absent from the survey area. Species not found during focused surveys for this project or other nearby SFPUC projects.	March-June
California androsace *Androsace elongata* ssp*. acuta*	--/--/4.2	Chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grassland; meadows and seeps. Highly localized and often overlooked.	490-4000 feet	**Not observed.** Nearest record is in the headwaters of Arroyo del Valle. Range: ALA, CCA, COL, FRE, GLE, KRN, LAX, MER, RIV, SBD, SBT, SCL, SDG, SIS, SJQ, SLO, SMT, STA, TEH.	March-June
Santa Clara red ribbons *Clarkia concinna* ssp. *automixa*	–/–/4.3	Chaparral and cismontane woodland. Nearest records are from Niles Canyon and Poverty Ridge in Ohlone Regional Wilderness. Range: ALA, SCL, SCR	290-5000 feet	**Not observed.** Suitable habitat absent from survey area; species not found during focused surveys for this and nearby projects.	May – June, uncommonly in April and July
Jepson's woolly sunflower *Eriophyllum jepsonii*	--/--/4.3	Chaparral, dry oak woodland and coastal scrub, sometimes on serpentine. Nearest records San Antonio Creek, Williams Gulch, and Upper Alameda Creek. Range: ALA, CCA, KRN, MNT, SBT, SCL, STA, VEN	650-3400 feet	**Not observed.** Undisturbed scrub and woodland habitats absent from the survey area; species not observed during suitably-timed surveys for this and nearby projects.	April -- June

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS KNOWN FROM THE REGION, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CRPR	Habitat and Distribution[b]	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
PLANT SPECIES OF INTEREST (cont.)					
Stinkbells *Fritillaria agrestis*	--/--/4.2	Chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland. Clay substrate, sometimes on serpentinite. Most populations small. Nearest records are in Williams Gulch and Mines Road area, with several additional localities along Tesla Road. Range: ALA, CCA, FRE, KRN, MEN, MER, MNT, MPA, PLA, SAC, SBA, SBT, SCL, SCR, SLO, SMT, STA, TUP, VEN, YUB	30-5200 feet	**Not observed.** Suitable undisturbed clay and serpentine-derived soils absent from the habitats absent from the survey area. Species not found during suitably-timed focused surveys for this and nearby projects.	March -- June
Bristly leptosiphon *Leptosiphon acicularis*	--/--/4.2	Grassy areas in woodland and chaparral; mostly coastal distribution. Nearest occurrences are very old and general collections from Hayward and unspecified location in Alameda County. Range: ALA, BUT, HUM, LAK, MRN, MEN, NAP, SMT, SON	180-5000 feet	**Not observed.** Moderately suitable grassland habitat present in the survey area; species not found during suitably-timed focused surveys for this and nearby projects.	April -- May
Serpentine leptosiphon *Leptosiphon ambiguus*	--/--/4.2	Cismontane woodland, coastal scrub, valley and foothill grassland, usually on sparse serpentinite substrate. Nearest records are in the Goat Rock area in upper Alameda Creek watershed. Range: ALA, CCA, MER, SBT, SCL, SCR, SJQ, SMT, STA	390-3800 feet	**Not observed.** Suitable serpentine grassland habitat not present in the survey area; species not found during suitably-timed focused surveys for this and nearby projects.	March-June
San Antonio Hills monardella *Monardella antonina* ssp. *antonina*	–/–/3	Chaparral, cismontane woodland. Nearest records are from McGuire Peaks, Sunol Regional Wilderness, Palomares Canyon. Range: ALA?, CCA?, MNT, SBT?, SCL?	1600-3300 feet	**Not observed.** Suitable chaparral and woodland habitats absent from the survey area.	June – August
Slender-leaved pondweed *Stuckenia filiformis* ssp. *alpina*	–/–/2B.2	Shallow freshwater marshes and swamps. Record from Niles quadrangle. Range: ALA, BUT, CCA, ELD, LAS, MER, MON, MOD, MPA, PLA, SCL* SIE, SHA, SMT, SON, SOL, AZ, NV, OR, +	980-7050 feet	**Not observed.** Suitable habitats absent from survey area; species not found during suitably-timed focused surveys for this and nearby projects.	May – July

TABLE 2 (Continued)
SPECIAL-STATUS PLANTS KNOWN FROM THE REGION, ALAMEDA CREEK RECAPTURE PROJECT

STATUS CODES:

FEDERAL ENDANGERED SPECIES ACT (FESA)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FC = Candidate to become a *proposed* species.

CALIFORNIA ENDANGERED SPECIES ACT (CESA)/CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW)
CE = Listed as Endangered by the State of California.
CT = Listed as Threatened by the State of California.
CC= Candidate to become a *proposed* species.

California Rare Plant Rank (CRPR; Formerly known as CNPS List):
1A = Plants presumed extinct in California.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed.
4 = Plants of limited distribution.

An extension reflecting the level of threat to each species is appended to each CRPR as follows:
.1 – Seriously threatened in California.
.2 – Moderately threatened in California.
.3 – Not very threatened in California.

SOURCES:

California Department of Fish and Wildlife (CDFW), California Natural Diversity Database (CNDDB) Rarefind version 5, data request for the Niles, La Costa Valley, Calaveras Reservoir, Milpitas, Newark, Hayward, Mountain View, Livermore, and Dublin U.S. Geological Survey 7.5-minute topographic quadrangles, commercial version, information retrieved 5/10/2015.

California Native Plant Society (CNPS), CNPS Electronic Inventory, version 8, data request for La Costa Valley U.S. Geological Survey 7.5-minute topographic quadrangles, online application, http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Html?item=checkbox.htm, information retrieved 5/21/2015.

Consortium of California Herbaria, collection records for plants listed in table, http://ucjeps.berkeley.edu/consortium/, information retrieved May 7, 2015.

U.S. Fish and Wildlife Service, query for project area showing listed species, migratory birds and critical habitat.
http://ecos.fws.gov/ipac/project/FSFVRBVMYVGJ3G2H2BHCRZPOOQ/resources; information retrieved April 27, 2015.

[b] Distribution range is based on County codes, as follows:

County abbreviations: AMA--Amador; BUT-- Butte; CAL-- Calaveras; CCA--Contra Costa; COL—Colusa; DNT--Del Norte; ELD--El Dorado; FRE—Fresno; GLE—Glenn; HUM—Humboldt; KRN—Kern; LAK—Lake; LAS—Lassen; LAX--Los Angeles; MAD—Madera; MOD—Modoc; MEN—Mendocino; MER—Merced; MNT—Monterey; MPA—Mariposa; MRN—Marin; NEV—Nevada; ORA—Orange; PLA—Placer; PLU—Plumas; RIV—Riverside; SAC—Sacramento; SBA--Santa Barbara; SBD--San Bernardino; SBT--San Benito; SCL--Santa Clara; SCR--Santa Cruz; SCT--Santa Catalina Island; SCZ--Santa Cruz Island; SDG--San Diego; SFO--San Francisco; SHA—Shasta; SIE—Sierra; SIS—Siskiyou; SJQ--San Joaquin; SMI--San Miguel Island; SMT--San Mateo; SNI--San Nicolas Island; SOL—Solano; SON—Sonoma; SRO--Santa Rosa Island; TEH—Tehama; TRI—Trinity; TUL—Tulare; VEN—Ventura; YOL—Yolo; YUB—Yuba
"*" indicates species is presumed extirpated from county; "?" indicates questionable record from county

Figure 5 presents a map of special-status plant occurrences within 5 miles of the ACRP survey area. As shown in Figure 5, seven special-status plants are known to occur within 5 miles of the survey area. Of these, three are found primarily on serpentine substrates: Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*), chaparral harebell (*Campanula exigua*), and most beautiful jewel-flower (*Streptanthus albidus* ssp. *peramoenus*). Two species, Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) and San Joaquin spearscale (*Extriplex joaquiniana*), are found in seasonal wetlands in alkaline scrub, typically on alkaline clay soils that also support alkali scrub vegetation. Hospital Canyon larkspur (*Delphinium californicum* ssp. *interius*) is found on moist scrub slopes. Slender-leaved pondweed (*Stuckenia filiformis* ssp. *alpina*) occurs in ponds and other permanent water. An eighth plant, Diablo helianthella, was included to allow for an explanation of recent analysis of species distribution, as explained further in Section 2.4.5.

In the sections that follow, the status, ecology and distribution, and an assessment of survey area occurrence will be presented for the eight special-status plants known from the region. No special-status plants, and indeed no plant species of interest, were found in the survey area during seasonally-appropriate, floristic surveys. Based on the habitats present, no special-status plants are expected to occur there.

2.4.1 Chaparral Harebell

Status

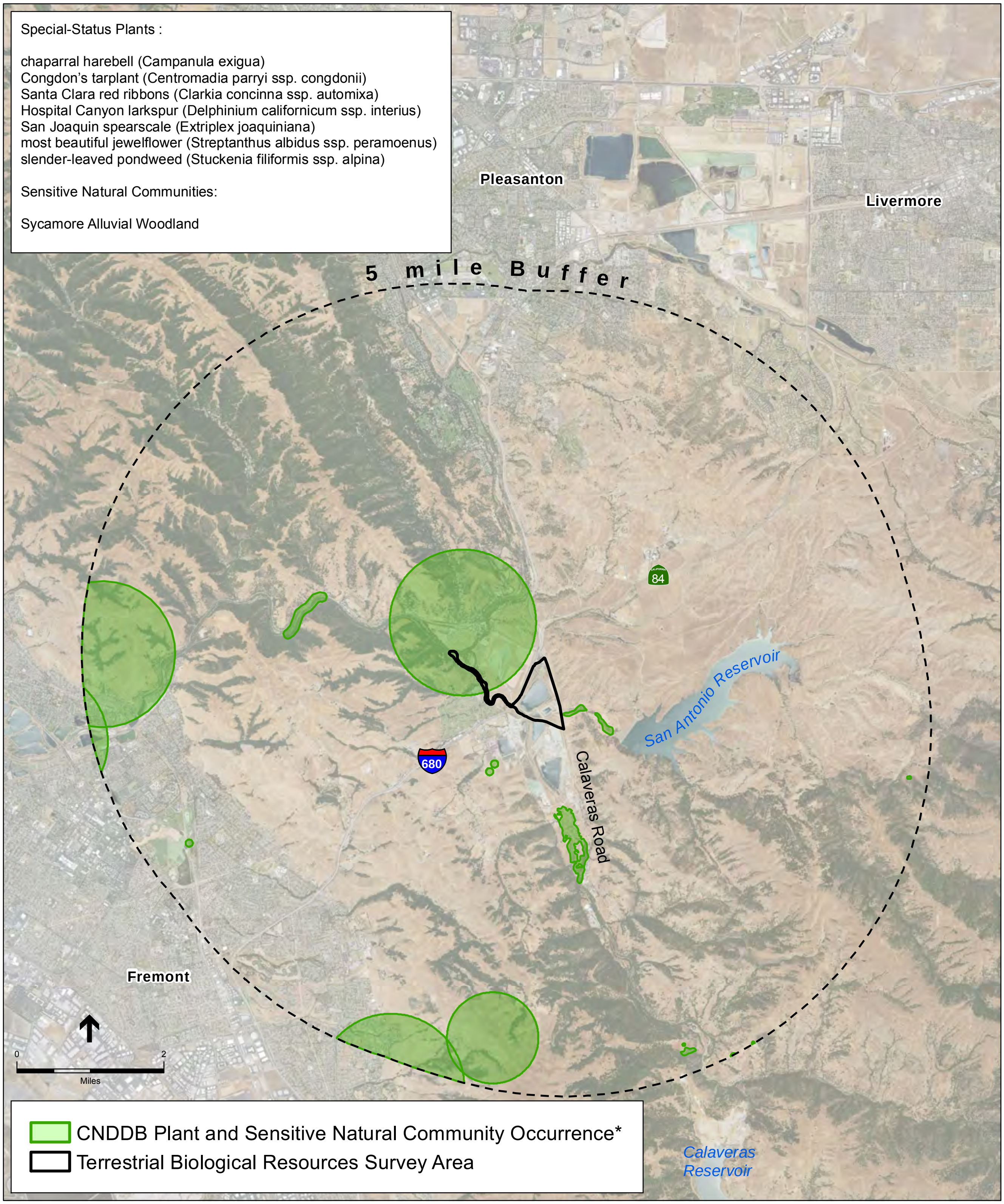
Chaparral harebell (*Campanula exigua*) is ranked as rare and endangered (Rank 1B.2) by the California Native Plant Society.

General Ecology and Distribution

An annual member of the bellflower family, chaparral harebell is found on rocky sites, sometimes on talus slopes, in openings in serpentine chaparral, coastal scrub, and sometimes at the edges of blue oak (*Quercus douglasii*) and gray pine (*Pinus sabiniana*) woodland. It is usually found on poorly-developed serpentine soils. It is found at elevations of 900 to 4,100 feet in the Inner Coast Ranges of Central California, from San Benito and Stanislaus counties to Alameda and Contra Costa counties. Most records are south of the Alameda Watershed. CNDDB has a general locality reported in the vicinity of Sunol (CNDDB, 2015b); a new and very small population was observed in the upper portion of the Alameda Creek watershed near the Alameda Creek Diversion Dam (Nomad Ecology, 2009). It was noted that suitable habitat was present elsewhere but was not fully investigated.

Survey Area Occurrence

The survey area lacks serpentine substrate and the habitat types and rocky talus substrate associated with this species. Suitably timed surveys were carried out in May 2015 and the species was not observed in the survey area.



* The occurrences shown on this map represent the known locations of the species listed here as of the date of this version of CNDDB (04/2015). There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Details on documented locations of special-status species is withheld according to CNDDB guidelines due to the sensitivity of the information.

SOURCE: CDFW, 2015

SFPUC Alameda Creek Recapture Project

Figure 5
Special-Status Plants and Sensitive Communities within 5 Miles of the Survey Area

2.4.2 Congdon's tarplant

Status

Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) is ranked as rare and endangered (Rank 1B.2) by the California Native Plant Society.

General Ecology and Distribution

Congdon's tarplant is found in seasonally wet, often saline or alkaline grasslands near the coast of central California and foothill grasslands. It occurs at elevations of 0 to 750 feet. It is reported from San Luis Obispo to Alameda and Contra Costa counties, and is presumed extirpated from Santa Cruz and Solano counties. In the general region of the project, Congdon's tarplant is known from the alkaline bayshore grasslands in the Irvington District of Fremont, and from two small colonies in the vicinity of Andrade Road (Nomad Ecology, 2009). These records were of interest because they were reported from Azule clay loam, a non-alkaline soil that is not reported as saline-affected (U.S. Dept. Agric., 2016) in a field containing mostly non-native species.

Survey Area Occurrence

Alkaline soils were not encountered in the survey area, and all of the area proposed for disturbance was highly altered, suggesting that habitat quality was poor for this species. Although at the early end of the range of flowering for this species, appropriately-timed surveys in May failed to result in the detection of Congdon's tarplant and the potential for this species to occur in the survey area was concluded to be low.

2.4.3 Santa Clara Red Ribbons

Status

Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*) is ranked as uncommon and not very endangered in California (Rank 4.3) by the California Native Plant Society.

General Ecology and Distribution

Santa Clara red ribbons is found in chaparral and oak woodland. It occurs at elevations from 90 to 290 to 5,000 feet. This subspecies ranges from Santa Cruz to Alameda counties, with most occurrences in the Santa Cruz Mountains and Inner Coast Range near San Jose.

Survey Area Occurrence

This species was reported from Niles Canyon and the Ohlone Wilderness. Although not observed by Nomad Ecology (2009), some plants possibly identifiable to this species were found on shaded, fairly moist slopes in oak woodland. The species was not found in the survey area and suitable habitat was not present. A similar-appearing plant, *C. unguiculata*, was observed as a waif on the Alameda Creek floodplain between I-680 and the Sunol Water Temple.

2.4.4 Hospital Canyon Larkspur

Status

Hospital Canyon larkspur (*Delphinium californicum* ssp. *interius*) is ranked as rare and endangered (Rank 1B.2) by the California Native Plant Society.

General Ecology and Distribution

Hospital Canyon larkspur is found primarily found on north or south facing slopes and it is nearly always associated with chaparral or Diablan sage scrub at elevations of 830 to 2,825 feet. It is typically located in areas with partial shade, where this species spends most of its vegetative life in the shady shrub understory until its long inflorescence penetrates the top of the shrub canopy. In the general region of the project, Hospital Canyon larkspur is known from Arroyo Mocho and the easternmost portion of the San Antonio Creek watershed, in Williams Gulch. Several new records for this species were reported from Williams Gulch by Nomad Ecology in 2009, where they represent the westernmost occurrences of the species in the Mount Hamilton Range (Nomad Ecology, 2009).

Survey Area Occurrence

Shaded chaparral and sage scrub habitats were not present in the survey area. Side canyons of Alameda Creek, just outside the survey area, were investigated during field surveys in late March and May, and the species was not detected. This species was concluded to have low potential to occur within the project area.

2.4.5 San Joaquin Spearscale

Status

San Joaquin spearscale (*Extriplex joaquiniana*) is ranked as rare and endangered (Rank 1B.2) by the California Native Plant Society.

General Ecology and Distribution

San Joaquin spearscale is found in seasonal wetlands or alkali sink scrub where water ponds during the wet season and then dries, accumulating dissolved solids. The species is reported from chenopod scrub, meadows and seeps, playas, valley and foothill grassland, seasonal wetlands, and alkali sink scrub. Known both from the South Bay, Inner Coast Ranges and San Joaquin Valley, San Joaquin spearscale has a distribution ranging from Fresno and San Benito counties northward through Monterey, Santa Clara, and Alameda counties to Colusa and Glenn counties. Nearest the project area, San Joaquin spearscale is known from the Springtown area in eastern Livermore and the alkaline flats in the Warm Springs district of Fremont.

Survey Area Occurrence

Suitable alkaline habitats were not found in the survey area, and suitably-timed surveys in May 2015 did not result in the detection of the species or its habitat. As a result, San Joaquin spearscale was concluded to have low potential to occur in the survey area.

2.4.6 Diablo Helianthella

Status

Diablo helianthella (*Helianthella castanea*) is ranked as rare and endangered (Rank 1B.2) by the California Native Plant Society.

General Ecology and Distribution

Diablo helianthella is found in broadleaved upland forest, cismontane woodland, chaparral, coastal scrub, and valley and foothill grasslands. It is often found in openings and forest edges. It is found in the Coast Ranges of Central California, from San Mateo to Marin County, with most records in Contra Costa County. The nearest confirmed record of Diablo helianthella is in the hills southwest of San Ramon (Nomad Ecology, 2009), approximately 9 miles from the survey area. This species has been searched for in focused surveys for the San Antonio Backup Pipeline and New Irvington Tunnel projects, and it was not found, nor was it detected in focused special-status surveys for the Alameda watershed (Nomad Ecology, 2009). Nomad Ecology (2009) reviewed a number of records of a closely-related species, California helianthella (*Helianthella californica*), including two CNDDB records southeast of San Antonio Reservoir within 5 miles of the survey area. They concluded that all of the helianthella in the Alameda watershed was California helianthella and not Diablo helianthella.

Survey Area Occurrence

Focused surveys were carried out in May 2015 for Diablo helianthella in the ACRP survey area and none was found. The high levels of disturbance and lack of suitable habitat, as well as distributional considerations, indicate that this species is not present in the project area.

2.4.7 Most Beautiful Jewelflower

Status

Most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*) is ranked as rare and endangered (Rank 1B.2) by the California Native Plant Society.

General Ecology and Distribution

This species is found in chaparral, coastal scrub, woodland, and grassland, on outcrops and barren areas on south- and west-facing slopes on serpentine soils. The general distribution for the species is from San Luis Obispo and Monterey counties to Alameda and Contra Costa counties. A number of populations of this species are reported from the upper Alameda Creek watershed, Arroyo Hondo, the eastern edge of Calaveras Reservoir, and just below the confluence of Alameda and Calaveras creeks.

A taxonomic evaluation of the genus *Streptanthus* in 2008 resulted in *S. albidus* (and all its subspecies) being combined within the common genus *S. glandulosus*. Although the populations in the Alameda Watershed have the dark maroon sepals characteristic of *S. glandulosus,* they also possess some characteristics of the violet-sepaled *S. albidus* ssp. *peramoenus* and have been treated as such by CNDDB and CNPS. CNPS retains the older taxonomic treatment, preserving *S. albidus* ssp. *peramoenus.*

Survey Area Occurrence

Serpentine substrate and suitable chaparral, scrub, native grassland and woodland are not present within the ACRP survey area. Suitably-timed surveys did not reveal the presence of this species or its habitat. Most beautiful jewelflower was therefore concluded to have low potential to occur in the survey area.

2.4.8 Slender Pondweed

Status

Slender pondweed (*Stuckenia filiformis* ssp.*alpina*) is ranked as fairly rare and endangered in California (Rank 2B.2) by the California Native Plant Society.

General Ecology and Distribution

This species is found in shallow, clear water of freshwater ponds, ditches, vernal pools and marshes. The general distribution for the species is from Monterey and Santa Clara counties northward to Alameda and Contra Costa counties and in the Sierra Nevada foothills from Merced to Lassen and Modoc counties. It is also reported from a limited number of records from Washington, Oregon, and the Rocky Mountain states. There are relatively few occurrence records within this large geographic distribution.

Survey Area Occurrence

It is reported from the Niles quadrangle locally, from the Quarry Lakes area of Fremont. The species was not addressed in the rare plant survey for the Alameda Watershed (Nomad Ecology, 2009). Habitat for this species does not appear to be well-characterized. It was not observed during field surveys, although potentially suitable habitat could be present in areas of ponded water of Alameda Creek north of I-680.

2.4.7 Unusual and Significant Plants

The East Bay chapter of the California Native Plant Society maintains a database of unusual and significant plants for Alameda and Contra Costa counties (Lake, 2010). These include both special-status plants (135 taxa in the East Bay) and 960 additional taxa more common than state-CNPS-listed Rank 4 plants, but which have limited abundance, have experienced declines due to habitat loss or other causes, or are at the limits of their geographic range in the East Bay. A-ranked plants (632 taxa) are known from five or fewer localities in the East Bay; B-ranked plants (191 taxa) are known from six to nine localities in the East Bay; and C-ranked plants (a watch list consisting of 137 taxa) are known from more localities but are still considered limited and vulnerable.

Within the survey area, five unusual and significant plants were observed; one A-ranked plant (durango root, *Datisca glomerata*), and four B-ranked plants: California brickellbush (*Brickellia californica*), California sycamore, Goodding's black willow, and willow dock (*Rumex salicifolius)*. All occur exclusively within riparian habitats along Alameda Creek.

2.5 Invasive Plants in the Survey Area

As discussed in preceding sections, much of the Alameda Creek Recapture Project area is characterized by a high degree of historical and ongoing disturbance. As a result, the vegetation is largely dominated by non-native, invasive plants. In upland habitats, the majority of species observed, as well as the majority of cover, is provided by non-native species. Five species are ranked as “highly” invasive by Cal-IPC; these are yellow star thistle, fennel, red brome, pampas grass, and Himalayan blackberry. Fifteen species are ranked as “moderately” invasive, including stinkwort, which is given a “red alert” designation because of the rapidity of its spread (Cal-IPC, 2016).

Several habitat types are dominated by invasive plants: non-native grassland has a high proportion of cover provided by red brome, as well as significant cover provided by yellow star thistle, patches of black and shortpod mustard (*Brassica nigra* and *Hirschfeldia incana*), wild radish (*Raphanus sativus*) and poison hemlock (*Conium maculatum*). Ruderal has variable species composition, but in the survey area a majority of cover is provided by invasive herbs such as black and shortpod mustard, wild radish, poison hemlock, stinkwort, fennel, and thistles. Mixed scrub and coyote brush scrub, while not dominated by these species, has an understory with a high proportion of non-native invasives. Willow thickets within the project area have a lower proportion of invasive plants, although Himalayan blackberry and stinkwort are present in these communities.

2.6 Sensitive Natural Communities and Habitats

Sensitive natural communities and habitats include the following: natural communities identified by the California Natural Diversity Database as having Global or State rank of 1, 2, or 3 (Sawyer et al., 2009) and all riparian habitats, which are defined as sensitive natural communities under CEQA Checklist Question IV.b. Historically, the site may have supported sensitive natural communities such as sycamore alluvial woodland and valley oak riparian forest and woodland, but these are not currently present in the survey area. Figure 5 shows the distribution of sensitive natural communities on file with CNDDB. This figure shows the examples of sycamore alluvial woodland habitat along the lower portion of San Antonio Creek and the extensive stands of sycamore alluvial woodland in the central portion of the Sunol Valley, about 1 mile south and upstream of the survey area.

The CEQA checklist, Question IV.b, includes all riparian communities within the definition of sensitive natural communities, so all of the identified natural communities associated with the Alameda Creek and San Antonio Creek floodplain within the survey area are considered sensitive. They are listed here, with an asterisk if they also are identified by CNDDB as sensitive:

- Willow thickets associated with Alameda Creek (includes arroyo willow thicket and sandbar willow thicket alliances)
- Mulefat scrub
- Creek channel (includes small areas of instream perennial wetlands and instream seasonal wetlands)
- Mixed riparian forest (includes small areas of black willow thickets*)
- Riparian woodland (includes small areas of California buckeye groves*, Central Coast live oak riparian forest*)

The seasonal wetland, outside of the Alameda Creek floodplain, although not considered a sensitive natural community, may be considered a wetland regulated by the CDFW, RWQCB, and/or Corps.

2.7 Summary of Results

The survey area has been subject to a long history of intensive land uses including nurseries, sand and gravel operations, and clearing and grading for WSIP projects. The majority of the project area within the survey area is altered or has been altered in the past due to these activities. Alameda Creek in the Sunol Valley has been altered by realignment, grade controls at pipeline crossings, infiltration galleries, impoundments, and regulated discharges.

No suitable habitat was found for any of the special-status plants known from the region, no special-status plants were observed during suitably-timed site surveys, and none are considered likely to occur within the ACRP survey area.

Although the CNDDB considers some willow thickets to be sensitive natural communities, only the portion closely associated with Alameda Creek is considered to be a sensitive resource in the survey area. Other habitats associated with Alameda Creek, mulefat scrub and creek channel, are also considered sensitive because they are riparian habitats.

The high degree of historic and ongoing disturbance that characterize the survey area mean that even apparently natural communities like willow thickets are constantly responding to changing hydrologic conditions due to quarry operations and watershed management. One indication of changing conditions was periodic dieback or mortality and subsequent regrowth of sandbar willow along much of Alameda Creek within the survey area; taller skeletons of dead trunks of sandbar willow were observed along with shorter live regrowth.

One riparian area of particular interest is the section of Alameda Creek just west of Pit F2. The proposed project could alter surface and subsurface flow in this area. This section of Alameda

Creek is noteworthy in that it transitions from mulefat scrub just upstream to relatively broad and dense willow thicket and mixed riparian forest, suggesting a consistently higher water table in the willow thicket and mixed riparian forest. Based on transect sampling carried out as part of this survey, the average width of the riparian zone, including floodplain and riparian vegetation, is 167 feet in this section. **Table 3** shows the result of measurement of perpendicular transects across Alameda Creek at 25-foot intervals.

TABLE 3
EXTENT OF RIPARIAN HABITATS, ALAMEDA CREEK ADJACENT TO PIT F2

Habitat type	Acreage (based on average width in 47 sampled transects and 1,175 foot length of sample area)
Mulefat scrub	1.21
Willow thickets	1.81
Mixed riparian forest	0.84
Main channel	0.24
Side channel/floodplain	0.31
Seasonal wetland	0.08
Total	**4.49**

The survey area does include habitats that are potentially suitable for special-status wildlife species. California tiger salamander breeding habitat is absent from the survey area, but this species would be expected to use the non-native grasslands within the survey area based on habitat conditions and the proximity to potential breeding sites and known occurrence records. California red-legged frog breeding habitat is also absent from the survey area, however, non-breeding aquatic refugia habitat is present within the aquatic habitats on-site. Alameda whipsnake core habitat is absent from the survey area, but this species may occur in non-native grassland, scrub, and riparian habitats through the survey area.

Tricolored blackbird has potential to nest in the willow thickets and mixed riparian forest along Alameda Creek. Western pond turtle could potentially occupy the aquatic habitats in the survey area and potential nesting and dispersal habitat is present in the adjacent uplands. Coast horned lizard has potential to occur in sandy washes associated with Alameda Creek. Cooper's hawk, Golden eagle, short-eared owl, western burrowing owl, northern harrier, white-tailed kite, and loggerhead shrike have potential to nest within the survey area.

Potential pallid bat roosting habitat is present within the larger trees within the survey area. A San Francisco dusky-footed woodrat nest was observed along Alameda Creek within the survey area and this species could occur within other portions of the creek. American badger has potential to occur in grasslands within the survey area.

This page intentionally left blank

CHAPTER 3
References and Report Preparation

3.1 References

Acord, Brian, 2015. Personal communication with CDFW's Biogeographic Data Branch regarding suppressed location data in the vicinity of the survey area. April 28, 2015.

Alvarez, J.A., Shea, M.A., Murphy, A.C., 2005. *Compilation of Observations of Alameda Whipsnakes Outside of Typical Habitat*, Transactions of the Western Section of the Wildlife Society 41: 21-25, 2005.

Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., Rosatti, T.J., and Wilken, D.H. (editors), 2012, *The Jepson Manual: Vascular Plants of California, second edition*: University of California Press, Berkeley, 1568 pp.

Barry, S.J. and H.B. Shafer, 1994. *The status of the California tiger salamander (Ambystoma californiense) at Lagunita: a 50-year update*. *Copeia 1994*:159-164, 1994.

Calflora, 2016, occurrence records for various plants, http://www.calflora.org/species/, accessed on August 16, 2016.

California Department of Fish and Game (CDFG), 2009. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities, November. Available online at http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/protocols_for_surveying_and_evaluating_impacts.pdf.

California Department of Fish and Game, 2010. Natural Communities List. Pdf prepared by the California Natural Diversity Database, Sacramento, CA. 72 pp.

California Department of Fish and Wildlife, 2015a. California Natural Diversity Database. Rarefind 5 printout and GIS database for the Niles and La Costa Valley 7.5 minute topographic quadrangles. Accessed April 27, 2015, information expires 10/7/2015.

California Department of Fish and Wildlife, 2015b. California Natural Diversity Database. Rarefind 5 printout and GIS database for plants, Niles, La Costa Valley, Calaveras Reservoir, Milpitas, Newark, Hayward, Mountain View, Livermore, and Dublin 7.5 minute topographic quadrangles. Accessed May 10, 2015, information expires 11/5/2015.

California Invasive Plant Council. 2016. California Invasive Plant Inventory. California Invasive Plant Council, http://www.cal-ipc.org/ip/inventory/index.php, accessed August 16, 2016.

California Native Plant Society, 2001, CNPS Botanical Survey Guidelines, revision of 1983 guidelines. Available online at www.cnps.org/cnps/rareplants/pdf/cnps_survey_guidelines.pdf.

Carraway, L. N. and B. J. Verts. 1991. *Neotoma fuscipes*. Mammalian Species 386:1-10.

CNPS, Rare Plant Program. 2015. Inventory of Rare and Endangered Plants (online edition, v8-02). Nine-quad search centered on La Costa Valley 7.5-minute topographic quadrangles. California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed 21 May 2015].

Camp Dresser & McKee Inc. (CDM), 2007. Technical Memorandum, San Antonio Creek Discharge Facility. Prepared for the San Francisco Public Utilities Commission. June 22, 2007.

Consortium of California Herbaria, 2015; search of occurrence records for various special-status plants; http://ucjeps.berkeley.edu/consortium/, accessed on various dates, April and May, 2015.

Dettman, D.H. 2009. California Native Species Field Survey Form for California red-legged frog observation at SMP-30. Survey date: 12/30/09.

Environmental Science Associates (ESA), 2008. Sunol and Niles Dam Removal Project, California Red-legged Frog Baseline Population Assessment. *Prepared for* San Francisco Public Utilities Commission, Barbara Palacios, Project Manager. December 2008.

ESA, 2009a. *San Francisco Public Utilities Commission San Antonio Backup Pipeline Project Terrestrial Assessment.* Prepared for the San Francisco Public Utilities Commission. June, 2009.

ESA, 2009b. Sunol and Niles Dam Removal Project, California Red-legged Frog Habitat and Population Assessment – Year 2. *Prepared for* San Francisco Public Utilities Commission, Barbara Palacios, Project Manager. December 2009.

ESA, 2010. Sunol and Niles Dam Removal Project, California Red-legged Frog Habitat and Population Assessment – Year 3. *Prepared for* San Francisco Public Utilities Commission, Carin Apperson, Project Manager. December 2010

ESA, 2011. Sunol and Niles Dam Removal Project, California Red-legged Frog Habitat and Population Assessment – Year 4. *Prepared for* San Francisco Public Utilities Commission, Carin Apperson, Project Manager. December 2011.

ESA, 2012. Sunol and Niles Dam Removal Project, California Red-legged Frog Habitat and Population Assessment – Year 5. *Prepared for* San Francisco Public Utilities Commission, Carin Apperson, Project Manager. December 2012.

ESA, 2013. Sunol and Niles Dam Removal Project, California Red-legged Frog Habitat and Population Assessment – Year 6. *Prepared for* San Francisco Public Utilities Commission, Carin Apperson, Project Manager. December 2013.

ESA, 2014. Sunol and Niles Dam Removal Project, California Red-legged Frog Habitat and Population Assessment – Year 7 (2014). Prepared for San Francisco Public Utilities Commission. December 2014.

ESA+Orion, 2010a. *Special-status Plant Surveys for San Antonio Backup Pipeline Project*, Memo from B.M. Leitner and M. Lowe, November 2010.

ESA+Orion, 2010b. *Final San Francisco Public Utilities Commission Habitat Reserve Program: Alameda Watershed Biological Resources*. Prepared for the San Francisco Public Utilities Commission and the San Francisco Planning Department. June 2010.

Irvington Partners Joint Venture, 2008. *Biological Assessment for the Alameda Siphons Seismic Reliability Upgrade Project*. Prepared for the San Francisco Public Utilities Commission. April 2008.

Grefsrud, Marcia. Personal communication between Marcia Grefsrud, California Department of Fish and Wildlife and Deborah Craven-Green, San Francisco Public Utilities Commission via email dated October 3, 2016.

Grinnell, J., and T. I. Storer. 1924. Animal life in the Yosemite. University of California Press, Berkeley.

Hayes, M. P. and M. R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): implications for management. In R. C. Szaro, K. E. Severson, D. R. Patton (tech. Coords.), Management of Amphibians, Reptiles, and Small Mammals in North America, pp 144-158. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Gen. Tech. Rep. RM-166, Fort Collins, Colorado.

Jennings, M. R., and M. P. Hayes, 1994. *Amphibian and reptile species of special concern in California. Final Report to the California Department of Fish and Game*, Inland Fisheries Division, Rancho Cordova, CA. 225pp., 1994.

Lake, Dianne, 2010. *Unusual and Significant Plants of the East Bay, Eighth Edition*. California Native Plant Society, East Bay Chapter. March 2010.

May and Associates, 2008. *Botanical Survey Report, San Antonio Backup Pipeline Project*, prepared for San Francisco Public Utilities Commission, San Francisco, CA, November 2008.

Mayer, K.E. and W.F. Laudenslayer (eds.), 1988. *A Guide to Wildlife Habitats of California*. California Department of Forestry and Fire Protection, Sacramento, CA, 1988.

Moyle, Peter B., and Robert D. Nichols. 1973. Ecology of some native and introduced fishes of the Sierra Nevada Foothills in Central California. Copeia 1973:478-490.

Nomad Ecology, 2009, *Focused Rare Plant Survey Report, Alameda Watershed, Alameda and Santa Clara Counties, California*. Prepared for San Francisco Public Utilities Commission, San Francisco, CA.

Orloff, S, 2007. *Migratory Movements of California Tiger Salamander in Upland Habitat – A Five Year Study*, Pittsburg, California. Prepared for Bailey Estates, LLC, May 2007.

Petranka, James W., 1998 *Salamanders of the United States and Canada*. Smithsonian Institution Press, 1998.

San Francisco Planning Department, 2000, *Final Environmental Impact Report for the Alameda Watershed Management Plan*, San Francisco Planning Department, San Francisco, CA.

San Francisco Planning Department, 2008a. *Final Program Environmental Impact Report for the San Francisco Public Utilities Commission Water System Improvement Program*, San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.

San Francisco Planning Department, 2008b. *Initial Study/Mitigated Negative Declaration for the San Francisco Public Utilities Commission Alameda Siphons Seismic Reliability Upgrade Project*, San Francisco Planning Department File No. 2006.0776E. February 2008.

San Francisco Planning Department, 2009a. *Final Environmental Impact Report for the San Francisco Public Utilities Commission New Irvington Tunnel Project*, San Francisco Planning Department File No. 2006.0162E, State Clearinghouse No. 2006092085. November 5, 2009.

San Francisco Planning Department, 2009b. *Final Environmental Impact Report for the San Francisco Public Utilities Commission Sunol Valley Water Treatment Plant Expansion and Treated Water Reservoir Project*, San Francisco Planning Department File No. 2006.0137E, State Clearinghouse No. 2007082014. December 3, 2009.

San Francisco Public Utilities Commission (SFPUC), 2001. *Alameda Watershed Management Plan*, April 2001.

SFPUC, 2010a Draft Alameda Watershed Habitat Conservation Plan, Chapters 1, 2 and 3. January 2010 http://www.sfwater.org/modules/showdocument.aspx?documentid=749

SFPUC, 2010b. GIS data relating to sensitive species and other biological resources, supplied by SPFUC for the project vicinity. Shapefiles entitled “SSAnimals_pt,” “SSAnimals_py,” and “SFPUC PondSurvey.”

SFPUC, 2011a. Email from Kimberly Stern Liddell, San Francisco Public Utilities Commission, regarding a California tiger salamander salvaged from NIT spoils area, dated February 16, 2011.

SFPUC, 2011b. Email from Scott MacPherson, San Francisco Public Utilities Commission, regarding a California tiger salamander salvaged relocated from AS4. March 7, 2011.

SFPUC, 2011c. Email from Karen Frye, San Francisco Public Utilities Commission, regarding eagle sightings. May 2, 2011.

SFPUC, 2011d. Email from J.T. Mates-Muchin, San Francisco Public Utilities Commission, regarding special status species sightings near the Upper Alameda Creek Filter Gallery Project area. January 13, 2011.

SFPUC, 2015. Special Status Animals GIS data for the SFPUC Alameda Watershed (includes file ‘SSAnimals.shp’ and ‘2000-2014 CNDDB spreadsheet.xlsx’. Data from J. Lukins, SFPUC-NRD, 9/9/15.

Sawyer, John O., Todd Keeler-Wolf, and Julie Evens, 2009. A Manual of California Vegetation Third Edition, California Native Plant Society and California Department of Fish and Game, Sacramento, CA, 2009.

Shuford, W. David and Thomas Gardali, editors. 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. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Stebbins, R. C., 2003 *A Field Guide to Western Reptiles and Amphibians*. Third Edition. Houghton Mifflin Company, Boston. 533 pp., 2003.

Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publication Zoology 27:1-342.

Trenham, P., H.B. Shaffer, W.D. Koenig, and M.R. Stromberg, 2000. *Life history and demographic variation of the California tiger salamander* (*Ambystoma californiense*), (2):365-377, Copeia, 2000.

U.S. Army Corps of Engineers (USACE), Letter to YinLan Zhang, San Francisco Public Utilities Commission from Jane Hicks, U.S. Army Corps of Engineers verifying the jurisdictional delineation maps submitted on June 14, 2010 entitled "USACE File # 08-00207S, San Francisco Public Utilities Commission, San Antonio Backup Pipeline." July 8, 2011.

U.S. Dept. Agric., description of Azule clay loam, https://soilseries.sc.egov.usda.gov/OSD_Docs/A/AZULE.html, accessed August 16, 2016.

United States Fish and Wildlife Service (USFWS), 1997. *Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Callippe Silverspot Butterfly and the Behren's Silverspot Butterfly and Threatened Status for the Alameda Whipsnake*, 62:234 FR, U.S. Department of the Interior, Fish and Wildlife Service, December 5, 1997.

USFWS, 2000. Final Determination of Critical Habitat for the Alameda Whipsnake (*Masticophis lateralis euryxanthus*). 50 CFR Part 17. October 3, 2000.

USFWS, 2002a. *Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*)*, Region 1 United States Fish and Wildlife Service. Portland Oregon.

USFWS, 2002b. *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay*, California, U.S. Department of the Interior, Fish and Wildlife Service, Region 1, Portland, OR. xvi + 306 pp, 2002.

USFWS, 2005. Endangered and threatened wildlife and plants; proposed determination of critical habitat for the Alameda whipsnake (*Masticophis lateralis euryxanthus*). 70:200 FR, U.S. Department of the Interior, Fish and Wildlife Service, October 18, 2005.

USFWS, 2015. Resource List of Federal Endangered and Threatened Species that Occur in or may be Affected by the Alameda Creek Recapture Project. Retrieved April 27, 2015.

Western Bat Working Group (WBWG), 2005. *Antrozous pallidus* (pallid bat) species account. http://wbwg.org/western-bat-species Accessed May 15, 2015

Zeiner, D.C., W.F. Laudenslayer, Jr., and K.E. Mayer, 1988. *California's Wildlife, Vol. I-III*, California Department of Fish and Game, 1988.

3.2 List of Preparers

Prepared by: Barbara Malloch Leitner
Orion Environmental Associates
550 Kearny St, Suite 800A
San Francisco, CA 94108

Michelle Giolli-Hornstein
Environmental Science Associates
350 Frank H. Ogawa Plaza, Suite 300
Oakland, CA 94612

Other contributors: Brian Pittman, CWB, Sr. Wildlife Biologist
Wes McCullough, GIS, graphics
Chris Rogers, Senior Program Manager
Kelly White, Project Manager

APPENDIX A
Representative Photographs

Photo 1: Photo facing north of the non-native grassland and ruderal areas located in the southeastern corner of the survey area (May, 2015).

Photo 2: Photo facing north showing a developed roadway in the foreground, seasonal wetland in the center, and coyote brush scrub in the background (May, 2015).

Source: ESA, 2015

Figure A-1
Representative Photographs

Photo 3: Photo facing south showing mulefat scrub within the Alameda Creek corridor just north of the creek's confluence with San Antonio Creek (May, 2015).

Photo 4: Photo facing northeast showing willow thickets along the southeastern edge of Pit F2 and mixed scrub in the background (May, 2015).

Source: ESA, 2015

Figure A-2
Representative Photographs

Photo 5: Photo facing southeast showing willow thickets along Alameda Creek just northwest of Interstate 680 (May 2015).

Photo 6: Photo facing east showing the San Antonio Creek channel with non-native grassland on the edges and riparian woodland in the background (May, 2015).

Source: ESA, 2015

Figure A-3
Representative Photographs

Photo 7: Representative photograph of mixed riparian forest along Alameda Creek in the background with willow thickets and mulefat scrub along Alameda Creek in the foreground (May, 2015).

Photo 8: Representative photo of high flow channel along the edge of Alameda Creek with willow thickets on the left side of the photo (May, 2015).

Source: ESA, 2015

Figure A-4
Representative Photographs

Photo 9: Photo facing southeast of quarry pit F3-West showing mulefat scrub along the water edge and coyote brush scrub along the upper edge of the pit (May, 2015).

Photo 10: Photo facing southeast of quarry pit F3-East showing willow thickets along the water edge and coyote brush scrub along the upper edge of the pit (May, 2015).

Source: ESA, 2015

Figure A-5
Representative Photographs

Photo 11: Photo facing north of quarry pit F2 showing willow thickets along the water edge and non-native grassland along the upper edge of the pit (May, 2015).

Photo 12: Photo facing west showing ruderal areas in the foreground and Pit F2 in the background (May, 2015).

Source: ESA, 2015

Figure A-6
Representative Photographs

Photo 13: Photo facing south of ruderal areas with planted cork oak trees in the left side of the photo (May, 2015).

Photo 14: Representative photo of developed roadway located south of Pit F3-West (May, 2015).

Source: ESA, 2015

Figure A-7
Representative Photographs

APPENDIX B

Crosswalk of Habitats, Cover Types, Natural Communities, and Vegetation Types, Alameda Creek Recapture Project

TABLE B-1
CROSSWALK OF HABITATS, COVER TYPES, NATURAL COMMUNITIES, AND VEGETATION TYPES, ALAMEDA CREEK RECAPTURE PROJECT

Alameda Creek Recapture Botanical Survey	Alameda Watershed HCP Land-Cover Types (SFPUC, 2010a)	Wildlife Habitat Relations (Mayer and Laudenslayer, 1988)	Holland Natural Communities (1986)	Sawyer et al. Vegetation Type (2009)
Nonnative Grassland	Nonnative Grassland	Annual Grassland	Non-native Annual Grassland	• *Bromus-Brachypodium* Semi-Natural Herbaceous Stands
Coyote Brush Scrub	Diablan Sage Scrub	Coastal Scrub	Northern Coyote brush Scrub	• *Baccharis pilularis* Shrubland Alliance
Mulefat Scrub	Included in Willow Riparian Forest and Scrub	Valley Foothill Riparian	Mule Fat Scrub	• *Baccharis salicifolia* Shrubland Alliance
Willow Thickets	Willow Riparian Forest and Scrub	Valley Foothill Riparian	Central Coast Riparian Scrub*	• *Salix lasiolepis* Shrubland Alliance • *Salix exigua* Shrubland Alliance
Mixed Scrub	Disturbed/Developed	Contains elements of: Annual Grassland Coastal Scrub Urban Valley Foothill Riparian	(no equivalent)	(no equivalent)
Riparian Woodland	Coast Live Oak Riparian Forest	Valley Foothill Riparian	Central Coast Live Oak Riparian Forest*	• *Aesculus californica* Woodland Alliance • *Quercus agrifolia* Woodland Alliance
Mixed Riparian Forest	Willow Riparian Forest and Scrub	Valley Foothill Riparian	Central Coast Riparian Scrub*	• *Salix gooddingii* Woodland Alliance
Creek Channel	Stream	Included in Valley Foothill Riparian	(no equivalent)	(no equivalent)
Seasonal Wetland	Freshwater Marsh	Wet Meadow	Coastal and Valley Freshwater Marsh*	(no equivalent)
Quarry Pond	Quarry Pond	Lacustrine	(no equivalent)	(no equivalent)
Ruderal	Disturbed/Developed	Urban	(no equivalent)	• *Brassica (nigra*) and Other Mustards Semi-Natural Herbaceous Stands • *Centaurea (solstitialis, melitensis*) Semi-Natural Herbaceous Stands • *Conium maculatum-Foeniculum vulgare* Semi-Natural Herbaceous Stands • *Cortaderia (jubata, selloana*) Semi-Natural Herbaceous Stands
Landscaped	Developed	Urban	(no equivalent)	(no equivalent)
Developed/ Disturbed/Nursery	Developed/ Disturbed	Urban	(no equivalent)	(no equivalent)

* California Department of Fish and Wildlife sensitive natural community (CDFW, 2015).

APPENDIX C

Special-status Wildlife Species Considered as Potentially Occurring in the Survey Area

U.S. Fish and Wildlife Service

Trust Resources List

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

Sacramento Fish and Wildlife Office
FEDERAL BUILDING
2800 COTTAGE WAY, ROOM W-2605
SACRAMENTO, CA 95825
(916) 414-6600

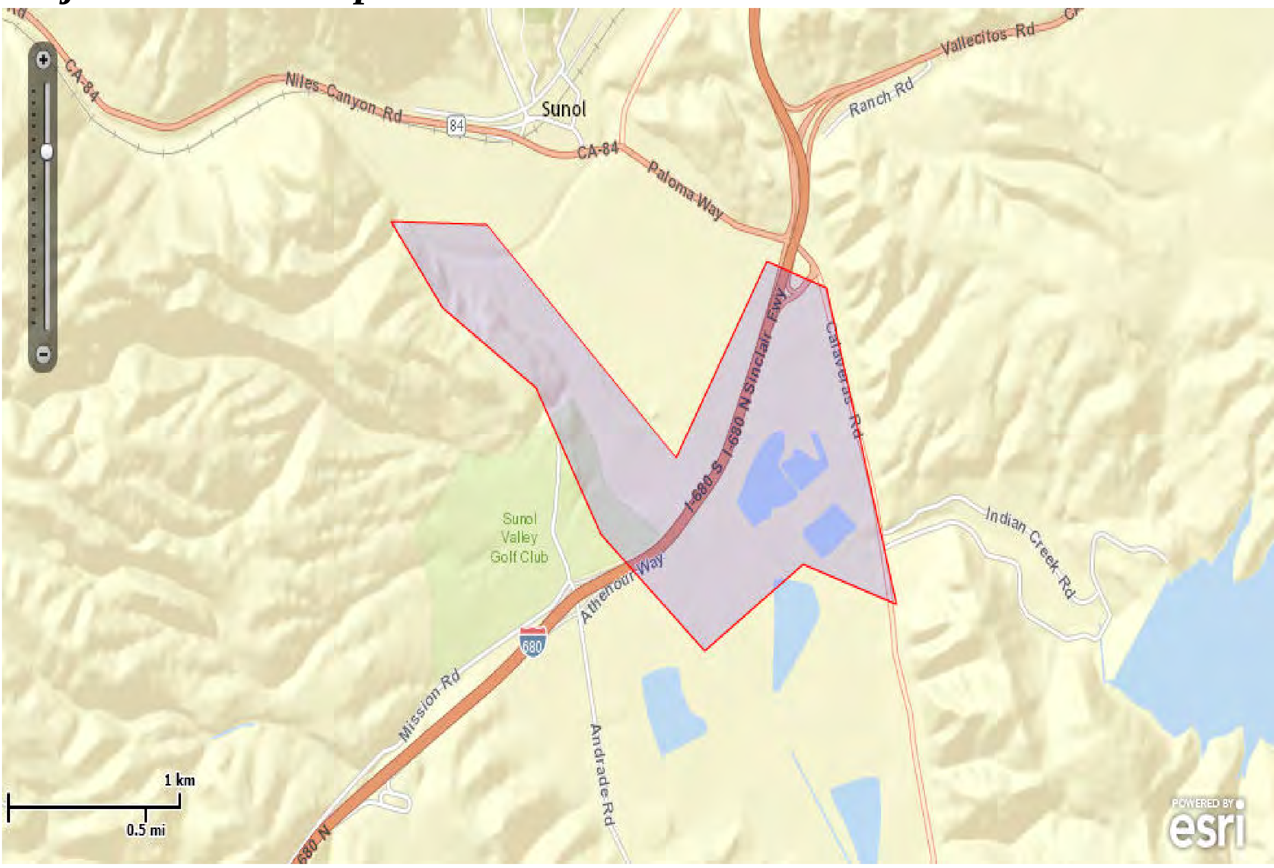
Project Name:

Alameda Creek Recapture Project

U.S. Fish and Wildlife Service

Trust Resources List

Project Location Map:



Project Counties:

Alameda, CA

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-121.8974773 37.5897819, -121.8911259 37.5896459, -121.8785946 37.5801235, -121.8725864 37.5881496, -121.8686382 37.5870613, -121.8640034 37.5741375, -121.8701832 37.5757701, -121.8767063 37.5722327, -121.8835728 37.5769945, -121.8878643 37.5829804, -121.8940441 37.5862452, -121.8974773 37.5897819)))

Project Type:

** Other **

Trust Resources List

Endangered Species Act Species List (USFWS Endangered Species Program).

There are a total of **13** threatened or endangered species on your 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 fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

Species that should be considered in an effects analysis for your project:

Amphibians	Status		Has Critical Habitat	Contact
California Tiger Salamander (*Ambystoma californiense*) Population: U.S.A. (CA - Sonoma County)	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
California red-legged frog (*Rana draytonii*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Birds				
California Least tern (*Sterna antillarum browni*)	Endangered	species info		Sacramento Fish And Wildlife Office
Crustaceans				
Conservancy fairy shrimp (*Branchinecta conservatio*) Population: Entire	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Vernal Pool fairy shrimp (*Branchinecta lynchi*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Vernal Pool tadpole shrimp (*Lepidurus packardi*) Population: Entire	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Fishes				
Delta smelt (*Hypomesus transpacificus*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office

Trust Resources List

steelhead (*Oncorhynchus (=salmo) mykiss*) Population: Northern California DPS	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Flowering Plants				
Contra Costa goldfields (*Lasthenia conjugens*)	Endangered	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Insects				
Bay Checkerspot butterfly (*Euphydryas editha bayensis*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office
Mammals				
Salt Marsh Harvest mouse (*Reithrodontomys raviventris*) Population: U.S.A.(CA)	Endangered	species info		Sacramento Fish And Wildlife Office
San Joaquin Kit fox (*Vulpes macrotis mutica*) Population: U.S.A(CA)	Endangered	species info		Sacramento Fish And Wildlife Office
Reptiles				
Alameda whipsnake (*Masticophis lateralis euryxanthus*) Population: Entire	Threatened	species info	Final designated critical habitat	Sacramento Fish And Wildlife Office

Critical habitats within your project area:

There are no critical habitats within your project area.

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

Trust Resources List

FWS Migratory Birds (USFWS Migratory Bird Program).

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). 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)). The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. For more information regarding these Acts see: http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tool links in the Bird Conservation Tools section at: http://www.fws.gov/migratorybirds/CCMB2.htm.

For information about conservation measures that help avoid or minimize impacts to birds, please visit:
http://www.fws.gov/migratorybirds/CCMB2.htm.

Migratory birds of concern that may be affected by your project:
There are **26** birds on your Migratory birds of concern list. The underlying data layers used to generate the migratory bird list of concern will continue to be updated regularly as new and better information is obtained. User feedback is one method of identifying any needed improvements. Therefore, users are encouraged to submit comments about any questions regarding species ranges (e.g., a bird on the USFWS BCC list you know does not occur in the specified location appears on the list, or a BCC species that you know does occur there is not appearing on the list). Comments should be sent to the ECOS Help Desk.

Species Name	Bird of Conservation Concern (BCC)	Species Profile	Seasonal Occurrence in Project Area
Allen's Hummingbird (*Selasphorus sasin*)	Yes	species info	Breeding

Trust Resources List

Bald eagle (*Haliaeetus leucocephalus*)	Yes	species info	Year-round
Bell's Sparrow (*Amphispiza belli*)	Yes	species info	Year-round
Black Oystercatcher (*Haematopus bachmani*)	Yes	species info	Year-round
Black rail (*Laterallus jamaicensis*)	Yes	species info	Breeding
Black-chinned Sparrow (*Spizella atrogularis*)	Yes	species info	Breeding
Burrowing Owl (*Athene cunicularia*)	Yes	species info	Year-round
California spotted Owl (*Strix occidentalis occidentalis*)	Yes	species info	Year-round
Costa's Hummingbird (*Calypte costae*)	Yes	species info	Breeding
Fox Sparrow (*Passerella liaca*)	Yes	species info	Wintering
Lawrence's Goldfinch (*Carduelis lawrencei*)	Yes	species info	Breeding
Least Bittern (*Ixobrychus exilis*)	Yes	species info	Breeding
Lesser Yellowlegs (*Tringa flavipes*)	Yes	species info	Wintering
Lewis's Woodpecker (*Melanerpes lewis*)	Yes	species info	Wintering
Loggerhead Shrike (*Lanius ludovicianus*)	Yes	species info	Wintering
Long-Billed curlew (*Numenius americanus*)	Yes	species info	Wintering
Marbled Godwit (*Limosa fedoa*)	Yes	species info	Wintering
Nuttall's Woodpecker (*Picoides nuttallii*)	Yes	species info	Year-round
Oak Titmouse (*Baeolophus inornatus*)	Yes	species info	Year-round
Olive-Sided flycatcher (*Contopus cooperi*)	Yes	species info	Breeding
Peregrine Falcon (*Falco peregrinus*)	Yes	species info	Year-round

Short-billed Dowitcher (*Limnodromus griseus*)	Yes	species info	Wintering
Short-eared Owl (*Asio flammeus*)	Yes	species info	Wintering
Swainson's hawk (*Buteo swainsoni*)	Yes	species info	Wintering
tricolored blackbird (*Agelaius tricolor*)	Yes	species info	Year-round
Yellow-billed Magpie (*Pica nuttalli*)	Yes	species info	Year-round

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

Data Limitations, Exclusions and Precautions

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Trust Resources List

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following wetland types intersect your project area in one or more locations:

Wetland Types	NWI Classification Code	Total Acres
Freshwater Emergent Wetland	PEM1C	0.5278
Freshwater Emergent Wetland	PEMC	7.3681
Freshwater Pond	PUBHx	2.1123
Riverine	R4SBAx	0.6109
Riverine	R3UBH	51.0402
Riverine	R4SBC	9.2907
Riverine	R3UBHx	2.3741
Riverine	R4SBA	4.3691
Riverine	R4SBCx	0.9333
Riverine	R3USC	1.2199
Riverine	R4USF	22.2653

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad is (La Costa Valley (3712157) or Niles (3712158))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Accipiter striatus sharp-shinned hawk	ABNKC12020	None	None	G5	S4	WL
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Endangered	G2G3	S1S2	SSC
Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Ardea herodias great blue heron	ABNGA04010	None	None	G5	S4	
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Campanula exigua chaparral harebell	PDCAM020A0	None	None	G2	S2	1B.2
Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1	None	None	G3T2	S2	1B.1
Clarkia concinna ssp. automixa Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	Candidate Threatened	G3G4	S2	SSC
Delphinium californicum ssp. interius Hospital Canyon larkspur	PDRAN0B0A2	None	None	G3T3	S3	1B.2
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Extriplex joaquinana San Joaquin spearscale	PDCHE041F3	None	None	G2	S2	1B.2
Falco mexicanus prairie falcon	ABNKD06090	None	None	G5	S4	WL
Falco peregrinus anatum American peregrine falcon	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Laterallus jamaicensis coturniculus California black rail	ABNME03041	None	Threatened	G3G4T1	S1	FP
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G2G3	S2S3	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Masticophis lateralis euryxanthus Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2	
Melospiza melodia pusillula Alameda song sparrow	ABPBXA301S	None	None	G5T2?	S2?	SSC
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	AMAFF08082	None	None	G5T2T3	S2S3	SSC
Oncorhynchus mykiss irideus steelhead - central California coast DPS	AFCHA0209G	Threatened	None	G5T2T3Q	S2S3	
Rana boylii foothill yellow-legged frog	AAABH01050	None	None	G3	S2S3	SSC
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
Stuckenia filiformis ssp. alpina slender-leaved pondweed	PMPOT03091	None	None	G5T5	S3	2B.2
Sycamore Alluvial Woodland Sycamore Alluvial Woodland	CTT62100CA	None	None	G1	S1.1	

Record Count: 30

TABLE C-1
FULL LIST OF SENSITIVE SPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING			
Animals			
Invertebrates			
Conservancy fairy shrimp *Branchinecta conservatio*	FE/--	Vernal pools.	**Absent.** No suitable habitat present within the survey area.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/--	Vernal pools.	**Absent.** No suitable habitat present within the survey area.
Bay checkerspot butterfly *Euphydryas editha bayansis*	FT/--	Serpentine or similar soils with its host plant dwarf plantain or purple owl's clover.	**Absent.** Outside of the known range of this species and no suitable habitat present within the survey area.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/--	Vernal pools.	**Absent.** No suitable habitat present within the survey area.
Amphibians			
California tiger salamander *Ambystoma californiense*	FT/ST	Occur in grasslands occupied by burrowing mammals; breed in ponds, vernal pools, and slow-moving or receding streams.	**High potential.** Numerous breeding locations are known within 1.2 miles of the survey area (CDFW, 2015). Additionally, several adults have been observed within 1 mile of the survey area. Non-native grassland with small mammal burrows within the survey area provide upland habitat.
California red-legged frog *Rana draytonii*	FT/SSC	Breed in stock ponds, pools, and slow-moving streams.	**High potential.** This species has been observed in Alameda Creek within the survey area, 3 miles upstream, and 0.2 mile downstream of the survey area, and from San Antonio Creek approximately 0.4 mile upstream of the survey area (CDFW, 2015; SFPUC, 2010b and 2015). Alameda Creek and San Antonio Creek provide habitat and species has potential to disperse through upland areas.
Reptiles			
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT/ST	Coastal scrub, grassland, open oak woodland. Prefers rocky openings for basking, foraging.	**Moderate potential.** This species has been documented within 5 miles of the survey area (CDFW, 2015). Core habitat is absent, but some foraging and dispersal habitat is present in the survey area.
Birds			
American peregrine falcon *Falco peregrinus anatum*	FD/SD/FP	Nests on cliffs, tall buildings, high bridges, and specially-designed towers.	**Low potential.** Suitable nesting habitat is absent from the survey area.
Bald eagle *Haliaeetus leucocephalus*	FD/SE/FP	Nest in mountainous habitats near reservoirs, lakes and rivers, usually in coniferous trees, close to permanent water.	**Low potential.** Suitable nesting habitat is absent from the survey area, although quarry pits could be used for foraging. Closest documented nesting site is 3 miles east of the survey area (SFPUC, 2011d).

TABLE C-1 (Continued)
FULL LIST OF SENSITIVE SPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING (cont.)			
Animals (cont.)			
Birds (cont.)			
California black rail *Laterallus jamaicensis coturniculus*	--/ST/FP	Freshwater marshes, wet meadows, and shallow margins of saltwater margins bordering larger bays; needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat	**Low potential.** While patches of freshwater marsh occur within Alameda Creek and a seasonal wetland occurs in the quarry area, large expanses of undisturbed suitable habitat are not present.
California least tern *Sterna antillarum browni*	FE/SE/FP	Nest on beaches or open areas.	**Absent.** No suitable nesting habitat present. Survey area is outside the range of this species.
Mammals			
Townsend's big-eared bat *Corynorhinus townsendii*	--/SC	Roosts in caves, mines, buildings or other human-made structures for roosting. Forages in open lowland areas. Sensitive to human disturbance	**Low potential.** No suitable undisturbed roosting habitat present in the survey area.
Saltmarsh harvest mouse *Reithrodontomys raviventris*	FE/SE/FP	Salt marsh habitat dominated by pickleweed.	**Absent.** No suitable habitat present. Survey area is outside the range of this species.
San Joaquin kit fox *Vulpes macrotis mutica*	FE/SE	Open grassland areas.	**Absent.** Survey area is outside the range of this species.
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN			
Animals			
Amphibians			
Foothill yellow-legged frog *Rana boylii*	--/SSC	A year-round resident of cobble-lined streams; breeds in spring months after high water subsides.	**Low potential.** Based on habitat assessment survey, suitable habitat is absent from the survey area. This species is limited to perennial, moderate- to high-gradient portions of Alameda Creek that occur several miles upstream from the survey area.
Reptiles			
Western pond turtle *Emys marmorata*	--/SSC	Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands.	**High potential.** This species is known from Alameda Creek and San Antonio Creek (CDFW, 2015; ESA, 2009a; SFPUC, 2015). Western pond turtle may be found in quarry pits, riparian areas, and uplands.
Coast horned lizard *Phyrnosoma coronatum*	--/SSC	Sandy areas and river washes, as well as riparian woodland clearings, chaparral, and alkali flats.	**Low to moderate potential.** Alameda Creek provide suitable river wash habitat for this species. Documented within 5 miles of the survey area (SFPUC, 2010b).
Birds			
Cooper's hawk *Accipiter cooperii*	--/3503.5	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also in live oaks.	**Moderate potential.** Riparian, oak, and eucalyptus trees within the survey area provide suitable nesting habitat for this species. Nearest CNDDB occurrence is approximately 2.7 miles west of survey area (CDFW, 2015).

TABLE C-1 (Continued)
FULL LIST OF SENSITIVE SPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)			
Animals (cont.)			
Birds (cont.)			
Sharp-shinned hawk *Accipiter striatus*	--/3503.5	A common migrant and winter resident in California. Nests in dense, even-aged, single-layered forest canopy.	**Low potential.** Dense oak woodland nesting habitat is not present within the survey area. Nesting is documented from hills surrounding Sunol Valley, with the nearest known occurrence approximately 2.9 miles south of the survey area (SFPUC, 2015).
Tricolored blackbird *Agelaius tricolor*	--/SSC	A colonial nester; nests in dense freshwater emergent vegetation.	**Moderate potential.** Breeding is known from the Sunol Valley and large flocks have been observed in the survey area (CDFW, 2015; SFPUC, 2015). Potential breeding habitat is present in the survey area.
Golden eagle *Aquila chrysaetos*	--/CDFW Fully Protected	Nests in open areas on cliffs and in large trees.	**Moderate potential.** Larger trees near Alameda and San Antonio Creeks provide potential nesting habitat. Several occurrence records in the vicinity of the survey area (SFPUC, 2015).
Short-eared owl *Asio flammeus*	--/SSC	Nests in grasslands, usually on the ground.	**Moderate potential.** Grasslands within the site provide nesting habitat for short-eared owl. Known nesting site along southeastern San Antonio Reservoir (SFPUC, 2010b).
Burrowing owl *Athene cunicularia*	--/SSC	Nests and forages in low-growing grasslands that support burrowing mammals.	**Moderate potential.** Grasslands and ruderal habitat with ground squirrel burrows within the survey area provide suitable habitat for this species. This species has been documented within 5 miles of the survey area (SFPUC, 2010b).
Ferruginous hawk *Buteo regalis*	--/3503.5	Uncommon winter resident and migrant. Nests in foothills or prairies, on low cliffs, cut banks, shrubs, trees, or other natural or manmade elevated structures. Nest tree often isolated or in transition zones.	**Low potential.** Although there is a 1987 breeding record within 5 miles of the survey area (SFPUC, 2010b), the survey area is outside of the typical breeding range of this species and this species has low potential to breed within the survey area.
Northern harrier *Circus cyaneus*	--/SSC	Nests in coastal freshwater and saltwater marshes, nests and forages in grasslands.	**Moderate potential.** Limited nesting habitat is available adjacent to quarry pits because of site disturbance, but potential to nest in along Alameda Creek.
White-tailed kite (nesting) *Elanus leucurus*	--/CDFW Fully Protected	Nests near wet meadows and open grasslands in dense oak, willow or other large tree stands.	**Moderate potential.** Potential nesting habitat is present in trees adjacent to Alameda and San Antonio Creeks.
Prairie falcon *Falco mexicanus*	--/3503.5	Uncommon permanent resident. Usually nests on cliffs overlooking open areas.	**Low potential.** Nesting habitat is absent from the survey area. The closest documented CNDDB breeding location is approximately 3.9 miles south southeast of the survey area (Brian Acord, pers. comm., 2015).
Loggerhead shrike *Lanius ludovicianus*	--/SSC	Scrub, open woodlands, and grasslands.	**High potential.** Potential nesting habitat present in grasslands, shrubs, and trees throughout the survey area.

TABLE C-1 (Continued)
FULL LIST OF SENSITIVE SPECIES POTENTIALLY PRESENT IN THE ALAMEDA CREEK RECAPTURE PROJECT SURVEY AREA

Common Name Scientific Name	Listing Status FESA/ CESA/CDFW	General Habitat Requirements	Potential for Species Occurrence Within the Survey area
FEDERAL OR STATE SPECIES OF SPECIAL CONCERN (cont.)			
Animals (cont.)			
Birds (cont.)			
Alameda song sparrow *Melospiza melodia pusillula*	--/SSC	Tidal salt marsh.	**Absent.** Nesting habitat is absent from the survey area.
Osprey *Pandion haliaetus*	--/3503.5	Nest on large sturdy treetops, cliffs, or human-built platforms near water.	**Low potential.** Although the quarry pits may provide some suitable foraging habitat, disturbance from quarry operations would likely preclude nesting on-site. SFPUC occurrence record in the survey area vicinity is from a resident, not breeding, bird (SFPUC, 2010b).
American white pelican *Pelecanus erythrorhynchos*	--/SSC	Breed on islands in lakes or wetlands.	**Low potential.** The survey area is outside of the breeding range of this species. SFPUC occurrence record in the survey area vicinity is from a wintering, not breeding bird (SFPUC, 2010b). Low potential to use the quarry pits during wintering.
Mammals			
Pallid bat *Antrozous pallidus*	--/SSC	Day roosts are mainly in caves, crevices and mines; also found in buildings and under bark. Forages in open lowland areas.	**Moderate potential.** Potential roosting habitat is available in large diameter trees.
Tule elk *Cervus elaphus nannodes*	--/--/Local protection	The San Antonio elk herd is a resident herd from hills surrounding the San Antonio Reservoir.	**Low potential.** Tule elk are present on the slopes east of Calaveras Road, but would not be expected to cross the fenced road into the survey area.
San Francisco dusky-footed woodrat *Neotoma fuscipes*	--/SSC	Occur in forests with established understory. Construct nests from woody debris.	**High potential.** This species is known to nest within the vicinity of the survey area (CDFW, 2015), suitable habitat is present in the Alameda Creek corridor and one woodrat nest was observed during the 2011 reconnaissance survey.
American badger *Taxidea taxus*	--/SSC	Grasslands, savannas, deserts, timberline mountain meadows.	**Moderate potential.** Documented 1 mile east of the survey area (SFPUC, 2010b). Some potential habitat present in grassland within the survey area.

STATUS CODES:

FEDERAL ENDANGERED SPECIES ACT (FESA)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FD = Federally Delisted

CALIFORNIA ENDANGERED SPECIES ACT (CESA)/CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW)
SE = Listed as Endangered by the State of California
ST = Listed as Threatened by the State of California
SC = State Candidate for Listing as Endangered
SD = State Delisted
SSC = California Species of Special Concern
FP = California Fully Protected
3503.5 = Section 3503.5 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

This page intentionally left blank

APPENDIX D

Special-status Plant Species Considered as Potentially Occurring in the Survey Area

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Taxonomic Group is (Dune or Scrub or Herbaceous or Marsh or Riparian or Woodland or Forest or Alpine or Inland Waters or Marine or Estuarine or Riverine or Palustrine or Ferns or Gymnosperms or Monocots or Dicots or Lichens or Bryophytes) and Quad is (La Costa Valley (3712157) or Niles (3712158) or Mendenhall Springs (3712156) or Mt. Day (3712146) or Livermore (3712167) or Calaveras Reservoir (3712147) or Milpitas (3712148) or Altamont (3712166) or Dublin (3712168) or Livermore (3712167))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1	None	None	G2T2	S2	1B.2
Atriplex cordulata var. cordulata heartscale	PDCHE040B0	None	None	G3T2	S2	1B.2
Atriplex depressa brittlescale	PDCHE042L0	None	None	G2	S2	1B.2
Atriplex minuscula lesser saltscale	PDCHE042M0	None	None	G2	S2	1B.1
Balsamorhiza macrolepis big-scale balsamroot	PDAST11061	None	None	G2	S2	1B.2
Blepharizonia plumosa big tarplant	PDAST1C011	None	None	G2	S2	1B.1
Boechera rubicundula Mt. Day rockcress	PDBRA40100	None	None	G1	S1	1B.1
California macrophylla round-leaved filaree	PDGER01070	None	None	G2	S2	1B.1
Calyptridium parryi var. hesseae Santa Cruz Mountains pussypaws	PDPOR09052	None	None	G3G4T2	S2	1B.1
Campanula exigua chaparral harebell	PDCAM020A0	None	None	G2	S2	1B.2
Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1	None	None	G3T2	S2	1B.1
Chloropyron maritimum ssp. palustre Point Reyes salty bird's-beak	PDSCR0J0C3	None	None	G4?T2	S2	1B.2
Chloropyron molle ssp. hispidum hispid salty bird's-beak	PDSCR0J0D1	None	None	G2T2	S2	1B.1
Chloropyron palmatum palmate-bracted salty bird's-beak	PDSCR0J0J0	Endangered	Endangered	G1	S1	1B.1
Chorizanthe robusta var. robusta robust spineflower	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
Clarkia concinna ssp. automixa Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
Deinandra bacigalupii Livermore tarplant	PDAST4R0V0	None	Candidate Endangered	G1	S1	1B.2
Delphinium californicum ssp. interius Hospital Canyon larkspur	PDRAN0B0A2	None	None	G3T3	S3	1B.2
Eryngium aristulatum var. hooveri Hoover's button-celery	PDAPI0Z043	None	None	G5T1	S1	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Extriplex joaquinana San Joaquin spearscale	PDCHE041F3	None	None	G2	S2	1B.2
Fritillaria agrestis stinkbells	PMLIL0V010	None	None	G3	S3	4.2
Fritillaria liliacea fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
Helianthella castanea Diablo helianthella	PDAST4M020	None	None	G2	S2	1B.2
Lasthenia conjugens Contra Costa goldfields	PDAST5L040	Endangered	None	G1	S1	1B.1
Legenere limosa legenere	PDCAM0C010	None	None	G2	S2	1B.1
Leptosyne hamiltonii Mt. Hamilton coreopsis	PDAST2L0C0	None	None	G2	S2	1B.2
Malacothamnus arcuatus arcuate bush-mallow	PDMAL0Q0E0	None	None	G1Q	S1	1B.2
Malacothamnus hallii Hall's bush-mallow	PDMAL0Q0F0	None	None	G2Q	S2	1B.2
Navarretia prostrata prostrate vernal pool navarretia	PDPLM0C0Q0	None	None	G2	S2	1B.1
Northern Coastal Salt Marsh Northern Coastal Salt Marsh	CTT52110CA	None	None	G3	S3.2	
Plagiobothrys glaber hairless popcornflower	PDBOR0V0B0	None	None	GH	SH	1A
Polemonium carneum Oregon polemonium	PDPLM0E050	None	None	G3G4	S2	2B.2
Sidalcea malachroides maple-leaved checkerbloom	PDMAL110E0	None	None	G3	S3	4.2
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
Stuckenia filiformis ssp. alpina slender-leaved pondweed	PMPOT03091	None	None	G5T5	S3	2B.2
Suaeda californica California seablite	PDCHE0P020	Endangered	None	G1	S1	1B.1
Sycamore Alluvial Woodland Sycamore Alluvial Woodland	CTT62100CA	None	None	G1	S1.1	
Trifolium hydrophilum saline clover	PDFAB400R5	None	None	G2	S2	1B.2
Tropidocarpum capparideum caper-fruited tropidocarpum	PDBRA2R010	None	None	G1	S1	1B.1
Valley Sink Scrub Valley Sink Scrub	CTT36210CA	None	None	G1	S1.1	

Record Count: 40

CALIFORNIA NATIVE PLANT SOCIETY SEARCH FOR 9-QUADRANGLE AREA CENTERED ON LA COSTA VALLEY 7.5' QUAD
Query dated May 21, 2015

Scientific Name	Common Name	Family	CNPS Status	State Rank	Global Rank
Acanthomintha lanceolata	Santa Clara thorn-mint	Lamiaceae	4.2	S4	G4
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	1B.2	S2?	G2?
Androsace elongata ssp. acuta	California androsace	Primulaceae	4.2	S3S4	G5?T3T4
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	1B.2	S2	G2T2
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	1B.2	S2	G3T2
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	4.2	S3	G4T3
Atriplex depressa	brittlescale	Chenopodiaceae	1B.2	S2	G2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	1B.1	S2	G2
Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	1B.2	S2	G2
Blepharizonia plumosa	big tarplant	Asteraceae	1B.1	S2	G2
Boechera rubicundula	Mt. Day rockcress	Brassicaceae	1B.1	S1	G1
California macrophylla	round-leaved filaree	Geraniaceae	1B.1	S2	G2
Calochortus umbellatus	Oakland star-tulip	Liliaceae	4.2	S4	G4
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	Montiaceae	1B.1	S2	G3G4T2
Campanula exigua	chaparral harebell	Campanulaceae	1B.2	S2	G2
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	1B.1	S2	G3T2
Chloropyron maritimum ssp. palustre	Point Reyes bird's-beak	Orobanchaceae	1B.2	S2	G4?T2
Chloropyron molle ssp. hispidum	hispid bird's-beak	Orobanchaceae	1B.1	S2	G2T2
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	1B.1	S1	G1
Clarkia breweri	Brewer's clarkia	Onagraceae	4.2	S4	G4
Clarkia concinna ssp. automixa	Santa Clara red ribbons	Onagraceae	4.3	S3	G5?T3
Deinandra bacigalupii	Livermore tarplant	Asteraceae	1B.2	S1	G1
Delphinium californicum ssp. interius	Hospital Canyon larkspur	Ranunculaceae	1B.2	S3	G3T3
Eriophyllum jepsonii	Jepson's woolly sunflower	Asteraceae	4.3	S3	G3
Eryngium aristulatum var. hooveri	Hoover's button-celery	Apiaceae	1B.1	S1	G5T1
Etriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	1B.2	S2	G2
Fritillaria agrestis	stinkbells	Liliaceae	4.2	S3	G3
Fritillaria liliacea	fragrant fritillary	Liliaceae	1B.2	S2	G2

CNPS 9-quad Query (contd)

Scientific Name	Common Name	Family	CNPS Status	State Rank	Global Rank
Helianthella castanea	Diablo helianthella	Asteraceae	1B.2	S2	G2
Lasthenia conjugens	Contra Costa goldfields	Asteraceae	1B.1	S1	G1
Legenere limosa	legenere	Campanulaceae	1B.1	S2	G2
Leptosiphon acicularis	bristly leptosiphon	Polemoniaceae	4.2	S3	G3
Leptosiphon ambiguus	serpentine leptosiphon	Polemoniaceae	4.2	S4	G4
Leptosyne hamiltonii	Mt. Hamilton coreopsis	Asteraceae	1B.2	S2	G2
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	3	S3?	G3?
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	1B.2	S1	G1Q
Malacothamnus hallii	Hall's bush-mallow	Malvaceae	1B.2	S2	G2Q
Monardella antonina ssp. antonina	San Antonio Hills monardella	Lamiaceae	3	S1S3	G4T1T3Q
Myosurus minimus ssp. apus	little mousetail	Ranunculaceae	3.1	S2	G5T2Q
Navarretia nigelliformis ssp. nigelliformis	adobe navarretia	Polemoniaceae	4.2	S3	G4T3
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	1B.1	S2	G2
Plagiobothrys glaber	hairless popcorn-flower	Boraginaceae	1A	SH	GH
Polemonium carneum	Oregon polemonium	Polemoniaceae	2B.2	S2	G3G4
Sidalcea malachroides	maple-leaved checkerbloom	Malvaceae	4.2	S3	G3
Streptanthus albidus ssp. peramoenus	most beautiful jewel-flower	Brassicaceae	1B.2	S2	G2T2
Stuckenia filiformis ssp. alpina	slender-leaved pondweed	Potamogetonaceae	2B.2	S3	G5T5
Suaeda californica	California seablite	Chenopodiaceae	1B.1	S1	G1
Trifolium hydrophilum	saline clover	Fabaceae	1B.2	S2	G2
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	1B.1	S1	G1

SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Distribution	Blooming Period
FEDERAL AND STATE-LISTED SPECIES OR PROPOSED FOR LISTING					
Palmate-bracted bird's-beak *Chloropyron palmatum*	E/E/1B.1	Chenopod scrub, valley and foothill grassland, alkaline soils	15-500 feet	ALA, COL, FRE, GLE, MAD, SJQ*, YOL	May-October
Robust spineflower *Chorizanthe robusta* var. *robusta*	E/--/1B.1	Cismontane woodland, coastal bluff scrub, coastal dunes; sandy terraces and bluffs or in loose sand	5-1000 feet	Currently known from only six extended occurrences. Nearest record is an extirpated site on Oakland East quad. ALA*, MNT, MRN?, SCL*, SCR, SFO, SMT*	April-September
Livermore tarplant *Deinandra bacigalupi*	CE/--/1B.2	Meadows and seeps in alkaline soils	490-610 feet	Known only from the Springtown Area of Livermore; ALA	June-October
Contra Costa goldfields *Lasthenia conjugens*	FE/–/1B.1	Cismontane woodland, playas, valley and foothill grassland; vernal pools, swales and low depressions in open grassy areas.	0-1600 feet	Nearest records are in Fremont baylands and Don Pedro Wildlife Refuge. Range: ALA, CCA, MEN, MNT, MRN, NAP, SBA, SCL, SOL, SON.	March – June
California seablite *Suaeda californica*	E/--/1B.1	Meadows and swamps; coastal salt marsh	0-50 feet	Largely extirpated from the Bay Area salt marshes; ALA*, CCA*, SCL*, SFO*, SLO	July-October
OTHER PLANT SPECIES OF CONCERN					
Santa Clara thorn-mint *Acanthomintha lanceolata*	--/--/4.2	Chaparral, cismontane woodland and coastal scrub, generally on serpentinite.	260-4000 feet	Nearest records are from Calaveras Dam and Sunol Regional Wilderness. Range: ALA, FRE, MER, MNT, SBT, SCL, SJQ, STA.	March-June
California androsace *Androsace elongata* ssp. *acuta*	--/--/4.2	Chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grassland; meadows and seeps. Highly localized and often overlooked.	490-4000 feet	Nearest record is in the headwaters of Arroyo del Valle. Range: ALA, CCA, COL, FRE, GLE, KRN, LAX, MER, RIV, SBD, SBT, SCL, SDG, SIS, SJQ, SLO, SMT, STA, TEH.	March-June
Bent-flowered fiddleneck *Amsinckia lunaris*	--/--/1B.2	Coastal bluff scrub, cismontane woodland, valley and foothill woodland;	5-1700 feet	Many records in ALA, CCA, COL, LAK, MRN, NAP, SVT, SCL, SCR, SMT, SON, YOL	March-June
Alkali milk-vetch *Astragalus tener* var. *tener*	--/--/1B.2	Vernal pools, valley and foothill grassland, playas; adobe clay in vernally moist places; low ground flooded lands	3-200 feet	Historic record in Milpitas. Many records in ALA, CCA*, MER, MNT, NAP, SBT*, SCL*, SFO*, SJQ*, SOL, SON*, STA*, YOL, with many populations extirpated.	March-June
Heartscale *Atriplex cordulata* var. *cordulata*	--/--/1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland; sandy, saline or alkaline sites	0-1900 feet	Nearest records are in Springtown Area of Livermore; ALA, BUT, CCA, COL, FRE, GLE, KRN, MAD, MER, SJQ*, SLO, SOL, STA*, TUL, YOL*	April-October
Crownscale *Atriplex coronata* var. *coronata*	--/--/4.2	Chenopod scrub, valley and foothill grassland, vernal pools; alkaline, often clay soils	3-2000 feet	ALA, CCA, FRE, GLE, KNG, KRN, MER, MNT, SJQ*, SLO, SOL, STA	March-October

SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT (Continued)

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Brittlescale *Atriplex depressa*	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools; alkaline, vernally moist clay soils	3-1100 feet	Nearest records are in Springtown and Don Edwards NWR; ALA, CCA, COL, FRE, GLE, KRN, MER, SOL, STA, TUL, YOL	April-October
Lesser saltscale *Atriplex minuscula*	--/--/1B.1	Chenopod scrub, playas, valley ahd foothill grassland; alkaline, sandy soils	40-700 feet	Many sites extirpated by agriculture. Nearest records are from Don Edwards NWR, Altamont Pass areas; ALA, BUT, FRE, KRN, MAD, MER, STA*, TUL	May-October
Big-scale balsamroot *Balsamorhiza macrolepis*	--/--/1B.2	Chaparral, cismontane woodland, valley and foothill grassland, sometimes on serpentinite or metamorphics	290-5200 feet	Nearest record is in Tesla Road area; ALA, AMA, BUT, COL, ELD, LAK, MAR, NAP, PLA, SCL, SHA, SOL, SON, TEH, TUO	March-June
Big tarplant *Blepharizonia plumosa*	--/--/1B.1	Valley and foothill grassland, usually on clay, more frequent after wildfires, often on slopes	90-1700 feet	Nearest record is west of Tesla; ALA, CCA, SJQ, SOL*, STA	July-October
Mt. Day rockcress *Boechera rubicundula*	--/--/1B.1	Chaparral on rocky slopes	+/- 4000 feet	Known from only one occurrence on Mt. Day; SCL	April-May
Round-leaved filaree *California macrophylla*	--/--/1B.1	Cismontane woodland, valley and foothill grassland; often on rich, low soils	40-4000 feet	Nearest records are in Altamont Pass area; ALA, BUT*?, CCA, COL, FRE, GLE, KNG, KRN, LAK, LAS, LAX, MER, MNT, NAP, RIV, SBA, SBT, SCL, SCZ*, SDG, SJQ, SLO, SMT, SOL, SON, STA, TEH, TUL, VEN, YOL	March-May
Oakland star-tulip *Calochortus umbellatus*	--/--/4.2	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland; often on serpentinite	320-2300 feet	ALA, CCA, LAK, MRN, SCL, SCR*, SMT, STA	March-May
Santa Cruz Mountains pussypaws *Calyptridium parryi* var. *hesseae*	--/--/1B.2	Chaparral, cismontane woodland; sandy or gravelly openings	1000-5100 feet	Nearest record is Black Mountain in the Mt. Hamilton Range. MNT, SCL, SCR, SLO, STA	May-August
Chaparral harebell *Campanula exigua*	–/–/1B.2	Rocky, usually serpentinite chaparral habitats; on talus slopes; sometimes in coastal scrub or chaparral, at edges of blue oak and gray pine; vernally moist areas, often very open or barren.	900-4100 feet	Nearest record is a general locality near Sunol. Most localities are south of the Alameda watershed. Range: ALA, CCA, SBT, SCL, STA.	May – June
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	–/–/1B.2	Alkaline valley and foothill grassland, probably in low areas with high residual soil moisture.	0-750 feet	Reported in 2009 from vicinity of Andrade Road; also known from Irvington District in Fremont. Range: ALA, CCA, MNT, SCL, SLO, SMT.	May – October, uncommonly in November

SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT (Continued)

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Pt. Reyes bird's-beak *Chloropyron maritimum* ssp. *palustre*	--/--/1B.2	Marshes and swamps; coastal salt marsh	0-40 feet	Nearest record is near Alviso; ALA*, HUM, MRN, SCL*, SFO, SMT*, SON	June-October
Hispid bird's-beak *Chloropyron molle* spp. *hispidum*	--/--/1B.1	Meadows and seeps, playas, valley and foothill grassland; alkaline meadows and alkali sinks with saltgrass (Distichlis)	3-510 feet	Nearest record is Springtown area of Livermore; ALA, FRE, KRN, MER, PLA, SOL	June-September
Brewer's clarkia *Clarkia breweri*	--/--/4.2	Chaparral, cismontane woodland, coastal scrub, often on serpentinite	700-3700 feet	ALA, FRE, MER, MNT, SBT, SCL, STA	April-June
Santa Clara red ribbons *Clarkia concinna* ssp. *automixa*	–/–/4.3	Chaparral and cismontane woodland.	290-5000 feet	Nearest records are from Niles Canyon and Ohlone Regional Wilderness. Range: ALA, SCL	May – June, uncommonly in April and July
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	–/–/1B.2	Chaparral, cismontane woodland; wet, boggy meadows, openings in soft chaparral habitat, woodland in canyons; shaded gullies, sometimes in thick undergrowth.	750-3600 feet	Nearest records are Williams Gulch and near Arroyo Mocho. Range: ALA, CCA, MER, SBT, SCL, SJQ, SBT.	April – June
Jepson's woolly sunflower *Eriophyllum jepsonii*	--/--/4.3	Chaparral, dry oak woodland and coastal scrub, sometimes on serpentine.	650-3400 feet	Nearest records are east of Del Valle Reservoir, with several occurrences along Mines Road. Range: ALA, CCA, KRN, MNT, SBT, SCL, STA, VEN	April -- June
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*	--/--/1B.1	Vernal pools, alkaline depressions, roadside ditches and other wet places near the coast	5-150 feet	Nearest records are along the edge of the South Bay; ALA, SBT, SCL (*?), SDG, SLO	June-August
San Joaquin spearscale *Extriplex joaquiniana*	–/–/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; seasonal wetlands or alkali sink scrub.	0-2750 feet	Nearest records are from Warm Springs in Fremont and Livermore area. Range: ALA, CCA, COL, FRE, GLE, MER, MNT, NAP, SBT, SCL* SJQ*, SLO, SOL, TUL*?, YOL	April – October
Stinkbells *Fritillaria agrestis*	--/--/4.2	Chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland. Clay substrate, sometimes on serpentinite. Most populations small.	30-5200 feet	Nearest record is in Mines Road area, with several additional localities along Tesla Road. Range: ALA, CCA, FRE, KRN, MEN, MER, MNT, MPA, PLA, SAC, SBA, SBT, SCL, SCR, SLO, SMT, STA, TUP, VEN, YUB	March -- June
Fragrant fritillary *Fritillaria liliacea*	--/--/1B.2	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland; clay soils, often on serpentinite	5-1400 feet	Nearest record is Alum Rock Park in San Jose; ALA, CCA, MNT, MRN, SBT, SCL, SFO, SMT, SOL, SON	February-April

SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT (Continued)

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Diablo helianthella *Helianthella castanea*	–/–/1B.2	Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill woodland; openings or outcrops in scrub or forest; often in soils formed on sandstone.	200-4300 feet	Recent studies have concluded that species present in the Alameda watershed is California helianthella. Range: ALA, CCA, MRN, SFO, SMT; most localities in CCA	March – June
Legenere *Legenere limosa*	--/--/1B.1	Vernal pools	3-2900 feet	Many historical sites extirpated; ALA, LAK, MNT, NAP, PLA, SC, SCL, SHA, SJQ, SMT, SOL, SON, STA*, TEH, YUB	April-June
Bristly leptosiphon *Leptosiphon acicularis*	--/--/4.2	Grassy areas in woodland and chaparral; mostly coastal distribution.	170-5300 feet	Nearest occurrences are very old and general collections from Hayward and unspecified location in Alameda County. Range: ALA, BUT, HUM, LAK, MRN, MEN, NAP, SMT, SON	April -- May
Serpentine leptosiphon *Leptosiphon ambiguus*	--/--/4.2	Cismontane woodland, coastal scrub, valley and foothill grassland, usually on sparse serpentinite substrate., SMT, STA	390-3800 feet	Nearest records are in the Goat Rock area in upper Alameda Creek watershed. Range: ALA, CCA, MER, SBT, SCL, SCR, SJQ	March-June
Mt. Hamilton coreopsis *Leptosyne hamiltonii*	–/–/1B.2	Cismontane woodland; rocky sites; steep shale talus with open southwestern exposure	1800-4300 feet	Nearest record is Cedar Mountain Ridge in the Mt. Hamilton Range; ALA, SCL, STA	March-May
Woolly-headed lessingia *Lessingia hololeuca*	--/--/3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland; clay, serpentinite soils	40-1100 feet	ALA, MNT, MRN, NAP, SCL, SM, SOL, SON, YOL	June-October
Arcuate bush-mallow *Malacothamnus arcuatus*	–/–/1B.2	Chaparral and cismontane woodland; in gravelly alluvium	40-1200 feet	Nearest record is Alum Rock Park, San Jose; SCL, SCR, SMT	April-September
Hall's bush-mallow *Malacothamnus hallii*	–/–/1B.2	Chaparral and coastal scrub; some populations on serpentinite	30-2500 feet	Nearest record is along Alviso Slough; CCA, LAK, MEN, MER, SCL, SMT, STA	May-October
San Antonio Hills *Monardella antonina* ssp. *antonina*	–/–/3	Chaparral, cismontane woodland.	1700-3300 feet	Nearest records are from McGuire Peaks, Sunol Regional Wilderness, Palomares Canyon. Range: ALA?, CCA?, MNT, SBT?, SCL?	June – August
Little mousetail *Myosurus minimus* ssp. *apus*	--/--/3.1	Valley and foothill grassland, vernal pools; alkaline substrate	60-2100 feet	ALA, CCA, COL, LAK, MER, RIV, SBD, SDG, SOL, TUL, YOL	March-June
Adobe navarretia *Navarretia nigelliformis* ssp. *nigelliformis*	--/--/4.2	Valley and foothill grassland, sometimes vernal pools; vernally mesic sites on clay, sometimes serpentinite	320-3300 feet	ALA, BUT, CCA, COL. FRE, KRN, MER, MNT, PLA, SUT, TUL	April-June

SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT (Continued)

Common Name Scientific Name	Listing Status FESA/ CESA/CNPS	Habitat and Distribution	Elevation Range	Potential for Species Occurrence Within the Survey area	Blooming Period
OTHER PLANT SPECIES OF CONCERN (cont.)					
Prostrate vernal pool navarretia *Navarretia prostrata*	–/–/1B.1	Coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools; alkaline, vernally moist sites	5-4000 feet	Nearest records are at Don Edwards NWR and Dublin; ALA, FRE, LAX, MER, MNT, ORA, RIV, SBD*?. SBT, SCL, SDG, SLO	April-July
Hairless popcornflower *Plagioborhtys glaber*	–/–/1A	Meadows and seeps, marshes and swamps; alkaline or coastal salt marsh sites	40-600 feet	Last confirmed sighting in 1954; ALA*, MRN*, SBT; SCL*	March-May
Oregon polemonium *Polemonium carneum*	–/–/2B.2	Coastal prairie, coastal scrub, lower montane coniferous forest	0-6100 feet	Approximate record on Stonybrook Creek is nearest known occurrence; ALA, DNT, HUM, MRN, SFO, SIS, SMT, SON; OR, WA	April-September
California alkali grass *Puccinellia simplex*	--/--/1B.2	Meadows and seeps, saline flats; chenopod scrub, valley and foothill grasslands, vernal pools. Nearest record is 5 miles south of Livermore in Vallecitos area. Range: ALA, BUT, CCA, COL, GLE, KRN, KNG, LAK, LAX, FRE, MAD, MER, NAP, SCL, SCR, SOL, STA, SBD, SLO, YOL.	0-3050 feet	**Not observed.** Alkaline soils, vernal pools, and chenopod scrub are unknown from the project area; species not found during suitably-timed focused surveys.	March-May
Maple-leaved checkerbloom *Sidalcea malachroides*	--/--/4.2	Broadleafed upland forest, coastal prairie, coastal scrub, North Coast coniferous forest, riparian woodland; often on disturbed areas	0-2400 feet	Nearest record is from Alum Rock Park in San Jose; many localities in DNT, HUM, MEN, MNT, SCL, SCR, SON	March-April
Most beautiful jewel-flower *Streptanthus albidus* ssp.*peramoenus*	–/–/1B.2	Chaparral, coastal scrub woodland, and grassland; outcrops and barren areas on south- and west-facing exposures on ridges and slopes; serpentine soils.	300-3300 feet	Nearest records are from Sunol Regional Wilderness, Goat Rock, and east of Calaveras Reservoir. Range: ALA, CCA, SCL, MNT, SLO.	April – September, uncommonly in March and October
Slender-leaved pondweed *Stuckenia filiformis* ssp. *alpina*	–/–/2B.2	Shallow freshwater marshes and swamps., SOL, AZ, NV, OR, +	980-7050 feet	Record from Niles quadrangle is from Alameda Creek Area in Fremont. Range: ALA, BUT, CCA, ELD, LAS, MER, MON, MOD, MPA, PLA, SCL* SIE, SHA, SMT, SON	May – July
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Marshes and swamps, valley and foothill grassland, vernal pools; mesic, alkaline sites	0-1000 feet	Nearest records are from Alviso, Don Edwards NWR and Springtown in Livermore; ALA, CCA, COL?, LAK, MNT, NAP, SAC, SBT, SCL, SCR, SJQ, SLO, SMT, SOK, SON, YOL	April-June
Capter-fruited tropidocarpum *Tropidocarpum capparideum*	–/–/1B.1	Valley and foothill grassland; alkaline hills	3-1500 feet	Thought to be extinct, then rediscovered in 2000 on Ft. Hunter Liggett; ALA*, CCA*, FRE, GLE*, MNT, SCL*, SJQ*, SLO	March-April

SPECIAL-STATUS PLANTS CONSIDERED, ALAMEDA CREEK RECAPTURE PROJECT (Continued)

STATUS CODES:

FEDERAL ENDANGERED SPECIES ACT (FESA)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FC = Candidate to become a *proposed* species.

CALIFORNIA ENDANGERED SPECIES ACT (CESA)/ CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW)
CE = Listed as Endangered by the State of California.
CT = Listed as Threatened by the State of California.
CC= Candidate to become a *proposed* species.
CSC = California Species of Special Concern.

California Rare Plant Rank (Formerly known as CNPS List):
1A = Plants presumed extinct in California.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed.
4 = Plants of limited distribution.

An extension reflecting the level of threat to each species is appended to each CRPR as follows:
.1 – Seriously threatened in California.
.2 – Moderately threatened in California.
.3 – Not very threatened in California.

[b] Distribution range is based on County codes, as follows:

County abbreviations: AMA--Amador; BUT-- Butte; CAL-- Calaveras; CCA--Contra Costa; COL—Colusa; DNT--Del Norte; ELD—El Dorado; FRE—Fresno; GLE—Glenn; HUM—Humboldt; KRN—Kern; LAK—Lake; LAS—Lassen; LAX--Los Angeles; MAD—Madera; MOD—Modoc; MEN—Mendocino; MER—Merced; MNT—Monterey; MPA—Mariposa; MRN—Marin; NEV—Nevada; ORA—Orange; PLA—Placer; PLU—Plumas; RIV—Riverside; SAC—Sacramento; SBA--Santa Barbara; SBD--San Bernardino; SBT--San Benito; SCL--Santa Clara; SCR--Santa Cruz; SCT--Santa Catalina Island; SCZ--Santa Cruz Island; SDG--San Diego; SFO--San Francisco; SHA—Shasta; SIE—Sierra; SIS—Siskiyou; SJQ--San Joaquin; SMI--San Miguel Island; SMT--San Mateo; SNI--San Nicolas Island; SOL—Solano; SON—Sonoma; SRO--Santa Rosa Island; TEH—Tehama; TRI—Trinity; TUL—Tulare; VEN—Ventura; YOL—Yolo; YUB—Yuba
* indicates species presumed extirpated from county; ? indicates questionable record

SOURCES:

California Department of Fish and Wildlife (CDFW), California Natural Diversity Database (CNDDB) Rarefind version 5, data request for the Niles, La Costa Valley, Calaveras Reservoir, Milpitas, Newark, Hayward, Mountain View, Livermore, and Dublin U.S. Geological Survey 7.5-minute topographic quadrangles, commercial version, information retrieved 5/10/2015.

California Native Plant Society (CNPS), CNPS Electronic Inventory, version 8, data request for La Costa Valley U.S. Geological Survey 7.5-minute topographic quadrangles, online application, http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Html?item=checkbox.htm, information retrieved 5/21/2015.

Consortium of California Herbaria, collection records for plants listed in table, http://ucjeps.berkeley.edu/consortium/, information retrieved May 7, 2015.

U.S. Fish and Wildlife Service, query for project area showing listed species, migratory birds and critical habitat. http://ecos.fws.gov/ipac/project/FSFVRBVMYVGJ3G2H2BHCRZPOOQ/resources; information retrieved April 27, 2015.

May & Associates, Inc., 2008. 2008 Botanical Survey Report, San Antonio Backup Pipeline Project, Final Draft. San Francisco. November.

San Francisco Planning Department (SF Planning Dept.), 2009. New Irvington Tunnel Draft Environmental Impact Report Volumes 1 and 2. San Francisco. May.

San Francisco Public Utilities Commission (SFPUC). 2008. GIS data relating to special-status species and other biological resources, supplied by SPFUC for the project vicinity.

San Francisco Public Utilities Commission (SFPUC). 2010. Email communication with Kimberly Stern, Environmental Project Manager. January 7.

This page intentionally left blank

APPENDIX E

List of Wildlife Species Observed within the Survey Area

WILDLIFE SPECIES OBSERVED WITHIN THE SURVEY AREA

Common Name	Scientific Name
Amphibians	
Sierran treefrog	*Pseudacris sierra*
Reptiles	
Western fence lizard	*Sceloporus occidentalis*
San Francisco alligator lizard	*Elgaria coerulea coerulea*
Birds	
Western grebe	*Aechmophorus occidentalis*
Red-winged blackbirds	*Agelaius phoeniceus*
Mallard	*Anas platyrhynchos*
Western scrub jay	*Aphelocoma californica*
Golden eagle	*Aquila chrysaetos*
Great blue heron	*Ardea herodias*
Ring-necked duck	*Aythya collaris*
Canada goose	*Branta canadensis*
Bufflehead	*Bucephala albeola*
Red-tailed hawk	*Buteo jamaicensis*
Turkey vulture	*Cathartes aura*
Killdeer	*Charadrius vociferus*
American crow	*Corvus brachyrhynchos*
Snowy egret	*Egretta thula*
White-tailed kite	*Elanus leucurus*
Brewer's blackbird	*Euphagus cyanocephalus*
American coot	*Fulica americana*
Cliff swallow	*Petrochelidon pyrrhonota*
Song sparrow	*Melospiza melodia*
Savannah sparrow	*Passerculus sandwichensis*
Double-crested cormorant	*Phalacrocorax auritus*
California towhee	*Pipilo crissalis*
Bushtit	*Psaltriparus minimus*
Black phoebe	*Sayornis nigricans*
Say's phoebe	*Sayornis saya*
Western meadowlark	*Sturnella neglecta*
Robin	*Turdus migratorius*
Mammals	
Black-tailed jackrabbit	*Lepus californicus*
Mule deer	*Odocoileus hemionus*
Raccoon	*Procyon lotor*

APPENDIX F

List of Plant Species Observed within the Survey Area

TABLE F-1
PLANTS OBSERVED IN THE SURVEY AREA

Family, Genus, Species	Synonymy	Common Name
ADOXACEAE		MUSKROOT FAMILY
Sambucus nigra ssp. *caerulea*	*Sambucus mexicana*	Blue elderberry
AGAVACEAE		AGAVE FAMILY
Chlorogalum pomeridianum var. *pomeridianum*		Common soaproot
ANACARDIACEAE		SUMAC OR CASHEW FAMILY
Toxicodendron diversilobum		Poison oak
APIACEAE		CARROT FAMILY
Conium maculatum		Poison hemlock
Foeniculum vulgare		Fennel
Heracleum maximum	*Heracleum lanatum*	Common cowparsnip
Sanicula crassicaulis		Pacific sanicle
Torilis arvensis		Field hedge parsley
Torilis nodosa		Wild parsley
APOCYNACEAE		DOGBANE FAMILY
Nerium oleander		Oleander
Vinca major		Vinca
ASCLEPIADACEAE		MILKWEED FAMILY
Asclepias fascicularis		Milkweed
ASTERACEAE		SUNFLOWER FAMILY
Achillea millefolium		Yarrow
Achyrachaena mollis		Blow wives
Agoseris heterophylla		Mountain dandelion
Artemisia californica		Coastal sage brush
Artemisia douglasiana		California mugwort
Baccharis pilularis ssp. *consanguinea*		Coyote brush
Baccharis salicifolia	*B. glutinosa*	Mule fat., seep willow
Brickellia californica		California brickellia
Carduus pycnocephalus ssp. *pycnocephalus*		Italian thistle
Centaurea calcitrapa		Purple star thistle
Centaurea melitensis		Tocalote
Centaurea solstitialis		Yellow starthistle
Cirsium sp.		Thistle
Cirsium vulgare		Bullthistle
Crepis vesicaria ssp. *taraxacifolia*		Weedy hawksbeard
Dittrichia graveolens		Stinkwort
Helenium bigelovii		Bigelow's sneezeweed
Helminthotheca echioides	*Picris echioides*	Bristly ox-tongue
Heterotheca grandiflora		Telegraph weed
Hypochaeris glabra		Smooth cats ear
Logfia gallica	*Filago g.*	Narrowleaf cottonrose
Madia exigua		Small tarweed
Matricaria discoidea	*Chamomilla suaveolens*	Pineapple weed, rayless chamomile
Microseris douglasii ssp. *douglasii*		Douglas' microseris
Senecio vulgaris		Common groundsel
Silybum marianum		Milk thistle
Sonchus arvensis		Perennial sow thistle
Sonchus oleraceus	*cf.*	Sow thistle
Taraxacum officinale		Red seeded dandelion
Xanthium spinosum		Spiny cocklebur
AZOLLACEAE		MOSQUITO FERN FAMILY
Azolla filiculoides		American water fern, mosquito fern
BETULACEAE		BIRCH FAMILY
Alnus rhombifolia		White alder
BORAGINACEAE		FORGET-ME-NOT FAMILY
Amsinckia menziesii		Fiddleneck
Nemophila heterophylla		Canyon nemophila

TABLE F-1 (Continued)
PLANTS OBSERVED IN THE SURVEY AREA

Family, Genus, Species	Synonymy	Common Name
BRASSICACEAE		MUSTARD FAMILY
Barbarea orthoceras		Winter cress
Capsella bursa-pastoris		Shepherd's purse
Caulanthus lasiophyllus	*Guillenia lasiophylla*	California mustard
Hirschfeldia incana		Mediterranean mustard
Lepidium nitidum	*L. n. var howellii; var. oreganum*	Shining pepper grass
Nasturtium officinale	*Rorippa nasturtium-aquaticum*	Watercress
Raphanus sativus		Jointed charlock
CAPRIFOLIACEAE		HONEYSUCKLE FAMILY
Lonicera hispidula	*L. h. var. vacillans*	Pink honeysuckle
Symphoricarpos albus var. *laevigatus*		Snowberry
CARYOPHYLLACEAE		PINK FAMILY
Cerastium glomeratum		Large mouse ears
Spergularia rubra		Purple sand spurry
Stellaria media		Chickweed
CHENOPODIACEAE		GOOSEFOOT FAMILY
Chenopodium californicum		Soaproot
Salsola tragus		Russian thistle
CONVOVULACEAE		MORNING-GLORY FAMILY
Convolvulus arvensis		Field bindweed
CRASSULACEAE		STONECROP FAMILY
Crassula connata		Sand pygmy weed
CUCURBITACEAE		MELON FAMILY
Marah fabacea	*M. fabaceus*	California man-root
CYPERACEAE		SEDGE FAMILY
Carex nudata		Torrent sedge
Cyperus eragrostis		Tall cyperus
Eleocharis macrostachya		Spike rush
Schoenoplectus sp.		Tule
DATISCACEAE		DURANGO ROOT FAMILY
Datisca glomerata		Durango root
DIPSACACEAE		TEASEL FAMILY
Dipsacus sp.		Teasel
DRYOPTERIDACEAE		WOOD FERN FAMILY
Dryopteris arguta		Wood fern
EQUISETACEAE		HORSETAIL FAMILY
Equisetum sp.		Horsetail
ERICACEAE		HEATH FAMILY
Arbutus menziesii		Madrono
FABACEAE		PEA FAMILY
Acmispon americanus	*Lotus purshianus var. p*	
Acmispon glaber	*Lotus scoparius*	Deerweed, California broom
Lathyrus vestitus		Common pacific pea
Lotus corniculatus		Bird's foot trefoil
Lupinus bicolor		Lupine
Lupinus nanus		Valley sky lupine
Medicago polymorpha		California burclover
Melilotus albus	*Melilotus alba*	White sweetclover
Melilotus indicus	*Melilotus indica*	Annual yellow sweetclover
Trifolium sp		Clover

TABLE F-1 (Continued)
PLANTS OBSERVED IN THE SURVEY AREA

Family, Genus, Species	Synonymy	Common Name
Trifolium campestre		Hop clover
Trifolium dubium		Shamrock
Trifolium fragiferum		Strawberry clover
Trifolium hirtum		Rose clover
Trifolium subterraneum		Subterranean clover
Vicia americana		American vetch
Vicia sativa ssp. *sativa*		Common vetch
FAGACEAE		OAK FAMILY
Quercus agrifolia var. *agrifolia*		Coast live oak
Quercus lobata		Valley oak
GENTIANACEAE		GENTIAN FAMILY
Zeltnera sp.		Centaury
GERANIACEAE		GERANIUM FAMILY
Erodium botrys		Big heron's bill
Erodium cicutarium		Coastal heron's bill
Erodium moschatum		Whitestem filaree
Geranium dissectum		Wild geranium
Geranium molle		Crane's bill geranium
GROSSULARIACEAE		GOOSEBERRY FAMILY
Ribes sp.		Gooseberry
IRIDACEAE		IRIS FAMILY
Sisyrinchium bellum		Blue eyed grass
JUGLANDACEAE		WALNUT FAMILY
Juglans hindsii	*Juglans californica var. h.*	Northern California black walnut
JUNCACEAE		RUSH FAMILY
Juncus bufonius var. bufonius		Toad rush
Juncus mexicanus		Mexican rush
Juncus xiphioides		Iris leaved rush
LAMIACEAE		MINT FAMILY
Clinopodium douglasii	*Satureja douglasii*	Yerba buena
Marrubium vulgare		White horehound
Mentha pulegium		Pennyroyal
Mentha spicata		Spearmint
Monardella villosa ssp. *villosa*		Coyote mint
Stachys ajugoides		Hedge nettle
LAURACEAE		LAUREL FAMILY
Umbellularia californica		California laurel
LILIACEAE		LILY FAMILY
Calochortus albus		White fairy lantern
LYTHRACEAE		LOOSESTRIFE FAMILY
Lythrum sp.		Loosestrife
MALVACEAE		MALLOW FAMILY
Malva parviflora		Cheeseweed
MONTIACEAE		MONTIA FAMILY
Calandrinia ciliata		Redmaids
Claytonia perfoliata ssp. *perfoliata*		Claytonia
MYRSINIACEAE		MYRSINE FAMILY
Anagallis arvensis		Scarlet pimpernel

TABLE F-1 (Continued)
PLANTS OBSERVED IN THE SURVEY AREA

Family, Genus, Species	Synonymy	Common Name
MYRTACEAE		MYRTLE FAMILY
Eucalyptus camaldulensis		Red gum
Eucalyptus globulus		Blue gum
OLEACEAE		OLIVE FAMILY
Olea europaea		Olive
ONAGRACEAE		EVENING PRIMROSE FAMILY
Clarkia sp.		Clarkia
Clarkia unguiculata		Woodland clarkia
Epilobium brachycarpum		Willow herb
Epilobium minutum		Minute willowherb
OROBANCHACEAE		BROOMRAPE FAILY
Bellardia trixago		Mediterranean lineseed
Castilleja affinis ssp. *affinis*		Wight's indian paint brush
OXALIDACEAE		OXALIS FAMILY
Oxalis corniculata		Creeping wood sorrel
PAPAVERACEAE		POPPY FAMILY
Eschscholzia californica		California poppy
PHRYMACEAE		LOPSEED FAMILY
Mimulus aurantiacus		Sticky monkeyflower
PLANTAGINACEAE		PLANTAIN FAMILY
Collinsia heterophylla		Chinese houses
Plantago erecta		California plantain
Plantago lanceolata		Ribwort
Veronica peregrina ssp. *xalapensis*		Speedwell
PLATANACEAE		PLANE TREE FAMILY
Platanus racemosa		California sycamore
POACEAE		GRASS FAMILY
Aira caryophyllea		Silvery hairgrass
Arundo donax		Giant reed
Avena barbata		Slim oat
Avena fatua		Wildoats
Bromus diandrus		Ripgut brome
Bromus hordeaceus		Soft chess
Bromus madritensis ssp. *rubens*		Foxtail brome
Cortaderia jubata		Andean pampas grass
Cortaderia selloana		Pampas grass
Cynodon dactylon		Bermuda grass
Cynosurus echinatus		Dogtail grass
Distichlis spicata		Salt grass
Elymus glaucus ssp. *glaucus*		Blue wild rye
Festuca bromoides		Brome fescue
Festuca microstachys	*Vulpia microstachys*	Few-flowered fescue
Festuca myuros	*Vulpia myuros*	Rattail sixweeks grass
Festuca perennis	*Lolium multiflorum*	Rye grass
Hordeum marinum ssp. *gussoneanum*		Barley
Hordeum murinum ssp. *leporinum*		Farmer's foxtail
Melica torreyana		Torrey's melica
Poa annua		Annual blue grass
Polypogon monspeliensis		Annual beard grass
Stipa miliacea	*Piptatherum miliaceum*	Smilo grass
Stipa pulchra	*Nassella pulchra*	Purple needle grass
POLYGONACEAE		BUCKWHEAT FAMILY
Eriogonum nudum		Naked buckwheat
Polygonum aviculare ssp. *depressum*	*Polygonum arenastrum*	Common knotweed
Pterostegia drymarioides		Fairy mist

TABLE F-1 (Continued)
PLANTS OBSERVED IN THE SURVEY AREA

Family, Genus, Species	Synonymy	Common Name
Rumex californicus	*Rumex salicifolius var. denticulatus*	California dock
Rumex crispus		Rhubarb
POLYPODIACEAE		POLYPODY FAMILY
Polypodium calirhiza	*Check if californicum*	Licorice fern
PTERIDACEAE		BRAKE FAMILY
Adiantum jordanii		California maidenhair
Pentagramma triangularis ssp. *triangularis*		Gold back fern
RANUNCULACEAE		BUTTERCUP FAMILY
Ranunculus californicus var. *californicus*		California buttercup
RHAMNACEAE		BUCKTHORN FAMILY
Frangula californica ssp. *californica*	*Rhamnus californica ssp. californica*	California coffeeberry
ROSACEAE		ROSE FAMILY
Aphanes occidentalis		Lady's mantle
Heteromeles arbutifolia		Toyon
Rosa californica		California wild rose
Rubus armeniacus	*Rubus discolor*	Himalayan blackberry
Rubus ursinus		California blackberry
RUBIACEAE		MADDER FAMILY
Galium aparine		Cleavers
SALICACEAE		WILLOW FAMILY
Populus fremontii ssp. *fremontii*		Cottonwood
Salix exigua		Narrowleaf willow
Salix gooddingii		Gooding's willow
Salix laevigata		Polished willow
Salix lasiolepis		Arroyo willow
SAPINDACEAE		SOAPBERRY FAMILY
Acer macrophyllum		Bigleaf maple
Aesculus californica		Buckeye
SAXIFRAGACEAE		SAXIFRAGE FAMILY
Lithophragma heterophyllum		Woodland star
SCROPHULARIACEAE		FIGWORT FAMILY
Scrophularia californica		California bee plant
Verbascum thapsus		Woolly mullein
SOLANACEAE		NIGHTSHADE FAMILY
Datura wrightii		Jimsonweed
Nicotiana glauca		Tree tobacco
Solanum umbelliferum		Blue witch
THEMIDACEAE		CLUSTER LILY FAMILY
Dichelostemma capitatum		Blue dicks or wild hyacinth
Triteleia laxa		Ithuriel's spear
TYPHACEAE		CATTAIL FAMILY
Typha angustifolia		Narrow leaf cattail
URTICACEAE		NETTLE FAMILY
Urtica dioica ssp. *holosericea*		Stinging nettle
VERBENACEAE		VERBENA FAMILY
Phyla nodiflora		Common lippia

APPENDIX G

Foothill Yellow-legged Frog Habitat Assessment Data Sheets

SOURCE: ESA

SFPUC Alameda Creek Recapture Project . 209484

Figure G-1a
Location of Pools Identified in the Alameda Creek Study Area between the Discharge near Pit F2 and Downstream Confluence with Arroyo de la Laguna; October 23, 2015

0945 start

Foothill Yellow-Legged Frog

Creek Site Habitat Assessment

Date: mm 10 dd 23 yy 15 Site #: 1 Subsite #: 1 Creek Name/Location: Alameda Ck.
USGS Quad: Niles Township: ____ Range: ____ Section: ____ ¼ Section: ____ Elevation: ____
GPS File Name: ____ Weather: *Sky*: *Overcast* *(Partly Overcast)* *Clear* *Wind*: *Inclement* *Fair* *(Ideal)*
Total Site Length: ____ Creek Aspect: W Discharge (cfs) 0 Water Temp: (edgewater) — (main channel) —
Observers: BTP MEG Initial Site Visit ☒ Follow-up Site Visit ☐ Air temp: 15.5° C
Photograph # (index to notebook): 1 Roll/Disc/Card #: ____

AMPHIBIAN HABITAT TYPES

- (Pool)
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- Run
- Other ____

Site/Subsite: Length: Dry Width: ____ Approximate Area (m^2): ____

HABITAT FEATURES

% Margin Vegetation: 100% Type: forbs grass sedge rush blackberry other: willows
Dom.: ☐ ☐ ☐ ☐ ☐ ☐

% Emergent Vegetation: 0% Type: grass sedge rush pondweed other: N/A
Dom.: ☐ ☐ ☐ ☐ ☐

% Submerged Vegetation: 0% Type: algae rooted aquatic veg other: N/A
Dom.: ☐ ☐ ☐

% Cover Aquatic: 0 Type: rootwad aquatic veg. woody debris gaps between substrate other: ____
Dom.: ☐ ☐ ☐ ☐ ☐

% Cover Terrestrial: 100% Type: duff/leaf litter burrows woody debris undercut bank other: ____
Dry creek.
Dom.: ☐ ☐ ☐ ☐ ☐

% Overhanging Vegetation: N/A Type: willow blackberry alder dogwood other: ____
Dom.: ☐ ☐ ☐ ☐ ☐

% Riparian Canopy: 80% Type: willow ash alder maple oak conifer other: Sycamore, mulefat.
Dom.: ☒ ☐ ☐ ☐ ☐ ☐ ☐

Aquatic Substrate (%): silt/clay ____ sand 20 gravel/pebble 40 cobble 40 boulder ____ bedrock ____
Substrate Embeddedness: low (< 25%) moderate (25-50%) (high (> 50%))
Dominant Substrate Shape: angular sub-angular (rounded)
Creek Habitat: riffle: ____ run: ____ glide: ____ pool: ____ cascade/pool: ____ step-pool: ____ pocket water: ____ (Dry)
Creek Gradient: (low (0-2%)) moderate (2-4%) high (4-10+%)
Creek Gradient Change: (No) Yes higher lower Change in Creek Habitat: N/A
Rosgen Channel Type: A B C D DA (E) F G
Wetted Channel Width: 0 m Bankfull Width: ____
Water Turbidity: Dry low moderate high Water Color: clear discolored (tannins, etc.)
Bank Gradient: (low (<15°)) R / L mod (15-40°) R / L high (>40°) R / L Active Bank Erosion: Yes No
Tributary Nearby: (Yes) No Location: (U/S) D/S LB RB Distance: ____ Perennial (Ephemeral)

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood scrub/shrub other: Grassland, sycamore
Fish Present: Yes (No) Type: salmonid centrarchid cyprinid other: ____
Herpetofauna & Life Stage (A J T E) tree frog ____ bullfrog ____ w. pond turtle ____ garter snake ____ other: ____
Other Species Observed: ____
Impacts to Amphibian Habitat: grazing recreation industrial other: ____ low mod high
Comments: Dry at confluence with Arroyo de la Laguna. Dense riparian dominated by willows – sandbar 1° & arroyo 2°. Sparse sycamore canopy. Substrate is sandy cobble.

QA/QC (initials): BP Date: 11/5/2015

Source: ESA

Figure G-1
Typical dry habitat in Alameda Creek at the confluence with Arroyo de la Laguna
Photo date: October 23, 2015

1014 PST

Foothill Yellow-Legged Frog

Creek Site Habitat Assessment

Date: mm 10 dd 23 yy 15 Site #: 2 Subsite #: 2 Creek Name/Location: Alameda Crk.
USGS Quad: Niles Township: ____ Range: ____ Section: ____ ¼ Section: ____ Elevation: ____
GPS File Name: ____ Weather: *Sky:* (*Overcast*) (*Partly Overcast*) *Clear* *Wind: Inclement Fair* (*Ideal*)
Total Site Length: 10 m Creek Aspect: W Discharge (cfs) 0 Water Temp: (edgewater) 11° C (main channel) 11°C
Observers: BTP MEG Initial Site Visit ☑ Follow-up Site Visit ☐ Air temp 20°
Photograph # (index to notebook): ____ Roll/Disc/Card #: ____

AMPHIBIAN HABITAT TYPES

- (Pool)
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- Run
- Other ____

Site/Subsite: Length: 10 m Width: 6 m Approximate Area (m²): 60 m²

HABITAT FEATURES

% Margin Vegetation: 60 — Type: forbs grass sedge rush blackberry other: ____ — Dom.: ☑ forbs
% Emergent Vegetation: 1% — Type: grass sedge rush pondweed other: cattail — Dom.: ☐
% Submerged Vegetation: 0% — Type: algae rooted aquatic veg other: ____ — Dom.: ☐
% Cover Aquatic: 0% — Type: rootwad aquatic veg. woody debris gaps between substrate other: ____ — Dom.: ☐
% Cover Terrestrial: 50% — Type: duff/leaf litter burrows woody debris undercut bank other: grasses — Dom.: ☑ duff/leaf litter, ☑ woody debris
% Overhanging Vegetation: 10% — Type: willow blackberry alder dogwood other: ____ — Dom.: ☑ willow
% Riparian Canopy: 10% — Type: willow ash alder maple oak conifer other: ____ — Dom.: ☑ willow

Aquatic Substrate (%): silt/clay 80% sand ____ gravel/pebble ____ cobble 20% boulder ____ bedrock ____
Substrate Embeddedness: low (< 25%) moderate (25-50%) (high (> 50%))
Dominant Substrate Shape: angular sub-angular (rounded)
Creek Habitat: riffle: ____ run: ____ glide: ____ pool: ✓ cascade/pool: ____ step-pool: ____ pocket water: ____
Creek Gradient: (low (0-2%)) moderate (2-4%) high (4-10+%)
Creek Gradient Change: (No) Yes higher lower Change in Creek Habitat: ____
Rosgen Channel Type: A B C D DA (E) F G
Wetted Channel Width: 6 m Bankfull Width: 12 m
Water Turbidity: low (moderate) high Water Color: clear (discolored) (tannins, etc.)
Bank Gradient: low (<15°) R / L mod (15-40°) R / L high (>40°) R / L Active Bank Erosion: Yes No
Tributary Nearby: (Yes) No Location: (U/S) D/S LB RB Distance: ____ (Perennial) Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood scrub/shrub other: Bay / sycamore
Fish Present: Yes (No) Type: salmonid centrarchid cyprinid other: ____
Herpetofauna & Life Stage (A J (T) E) tree frog ____ bullfrog 15 w. pond turtle ____ garter snake ____ other: ____
Other Species Observed: ____
Impacts to Amphibian Habitat: grazing recreation industrial other: ____ low mod high
Comments: Site 2 - first water in creek upstream from Arroyo de la Laguna. Bullfrogs present; perhaps 50 larvae observed & 15 verified to species. No adults noted. Pool is potential CRLF breeding site. Bullfrog breeding above barrier as well
Water depth: max = 40 cm, avg. 20 cm.; 31 cm depth above barrier.
70 cm depth in large pond above barrier
No FYLF potential.

QA/QC (initials): BP Date: 11/3/2015

Source: ESA

Figure G-2

Upstream from Arroyo de la Laguna, the first pools in Alameda Creek were found above and below a concrete impoundment structure (bottom). Pool 1, downstream from the structure, is in the top photo. Photo date: October 23, 2015

1030 PST

Foothill Yellow-Legged Frog
Creek Site Habitat Assessment

Date: mm 10 dd 23 yy 2015 Site #: 3 Subsite #: ______ Creek Name/Location: Alameda Ck.
USGS Quad: Niles Township: ______ Range: ______ Section: ______ ¼ Section: ______ Elevation: ______
GPS File Name: ______ Weather: *Sky:* (Overcast) Partly Overcast Clear *Wind:* Inclement Fair (Ideal)
Total Site Length: ______ Creek Aspect: W Discharge (cfs) 0 Water Temp: (edgewater) 11° (main channel) ______
Observers: BTP MEG Initial Site Visit ☒ Follow-up Site Visit ☐
Photograph # (index to notebook): ______ Roll/Disc/Card #: ______

AMPHIBIAN HABITAT TYPES

- (Pool)
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- Run
- Other ______

Site/Subsite: Length: 25 m Width: 8 m Approximate Area (m²): ______

HABITAT FEATURES

% Margin Vegetation: 30% Type: forbs grass sedge rush blackberry other: ______
Dom.: ☒ ☐ ☐ ☐ ☐ ☐

% Emergent Vegetation: 5% Type: grass sedge rush pondweed other: cattails
Dom.: ☐ ☐ ☐ ☐ ☐

% Submerged Vegetation: 0 Type: algae rooted aquatic veg other: ______
Dom.: ☐ ☐ ☐

% Cover Aquatic: 0% Type: rootwad aquatic veg. woody debris gaps between substrate other: ______
Dom.: ☐ ☐ ☐ ☐ ☐

% Cover Terrestrial: 0% Type: duff/leaf litter burrows woody debris undercut bank other: ______
Dom.: ☐ ☐ ☐ ☐ ☐

% Overhanging Vegetation: 0% Type: willow blackberry alder dogwood other: ______
Dom.: ☐ ☐ ☐ ☐ ☐

% Riparian Canopy: 100% Type: willow ash alder maple oak conifer other: ______
Dom.: ☒ ☐ ☐ ☐ ☐ ☐ ☐

Aquatic Substrate (%): silt/clay 90% sand ____ gravel/pebble ____ cobble 10% boulder ____ bedrock ____
Substrate Embeddedness: low (< 25%) moderate (25-50%) (high (> 50%))
Dominant Substrate Shape: angular sub-angular (rounded)
Creek Habitat: riffle: ____ run: ____ glide: ____ pool: 100% cascade/pool: ____ step-pool: ____ pocket water: ____
Creek Gradient: (low (0-2%)) moderate (2-4%) high (4-10+%)
Creek Gradient Change: (No) Yes higher lower Change in Creek Habitat: ______
Rosgen Channel Type: A B C D DA (E) F G
Wetted Channel Width: ______ Bankfull Width: ______
Water Turbidity: low moderate (high) Water Color: clear (discolored) (tannins, etc.)
Bank Gradient: (low (<15°)) R / L mod (15-40°) R / L high (>40°) R / L Active Bank Erosion: Yes (No)
Tributary Nearby: (Yes) No Location: (U/S) D/S LB RB Distance: ______ (Perennial) Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood scrub/shrub other: ______
Fish Present: Yes (No) Type: salmonid centrarchid cyprinid other: ______
Herpetofauna & Life Stage (A) J (T) E) tree frog ____ bullfrog 5 w. pond turtle ____ garter snake ____ other: Unk.
Other Species Observed: Red swamp crayfish
Impacts to Amphibian Habitat: grazing recreation industrial other: ______ low mod high
Comments: Third pool, second above barrier. Lg. ranid flushed on approach. 5 bullfrog larvae observed. ¢ CRLF breeding, low ¢ FYLF

4th pool – 4 m x 25 m, depth 15 cm avg 50 cm max, bullfrog larvae, ~50+, minnows present, one sculpin and red swamp crayfish observed. ¢ CRLF breeding, low ¢ FYLF.

Dry upstream of Pool 4. Dense willow, sycamore, mulefat.

QA/QC (initials): RP Date: 11/3/2015

Source: ESA

Figure G-3
Pool 2 is a shallow feature above the concrete impoundment structure
Photo date: October 23, 2015

SFPUC Alameda Creek Recapture Project . 209484

Source: ESA

Figure G-3

Pool 3, above the concrete impoundment structure is a large perennial feature that supports bullfrog breeding. Inappropriate substrate and lack of flows indicate poor habitat quality for foothill yellow-legged frog. Photo date: October 23, 2015

1120 PDT

Foothill Yellow-Legged Frog
Creek Site Habitat Assessment

Date: mm 10 dd 23 yy 15 Site #: 4 Subsite #: ______ Creek Name/Location: Alameda Creek.
USGS Quad: Niles Township: ______ Range: ______ Section: ______ ¼ Section: ______ Elevation: ______
GPS File Name: ______ Weather: *Sky:* (**Overcast**) *Partly Overcast* *Clear* *Wind:* *Inclement* *Fair* (***Ideal***)
Total Site Length: ______ Creek Aspect: W Discharge (cfs) 0 Water Temp: (edgewater) 11° (main channel) ______
Observers: BTP MEG Initial Site Visit ☒ Follow-up Site Visit ☐
Photograph # (index to notebook): ______ Roll/Disc/Card #: ______

AMPHIBIAN HABITAT TYPES

- (**Pool**)
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- Run
- Other ______

Site/Subsite: Length: 100 m+ Width: 12 m Approximate Area (m²): ______

HABITAT FEATURES

% Margin Vegetation: 5 — Type: forbs grass sedge rush blackberry other: Cattail, willow — Dom.: ☐ ☐ ☒ ☐ ☐ ☒

% Emergent Vegetation: 0 — Type: grass sedge rush pondweed other: ______ — Dom.: ☐ ☐ ☐ ☐ ☐

% Submerged Vegetation: 0 — Type: algae rooted aquatic veg other: ______ — Dom.: ☐ ☐ ☐

% Cover Aquatic: ~~8~~ 5% — Type: rootwad aquatic veg. woody debris gaps between substrate other: ______ — Dom.: ☒ ☐ ☐ ☐ ☐

% Cover Terrestrial: 80% — Type: duff/leaf litter burrows woody debris undercut bank other: ______ — Dom.: ☒ ☐ ☒ ☐ ☐

% Overhanging Vegetation: 10 — Type: willow blackberry alder dogwood other: Cattail — Dom.: ☒ ☐ ☐ ☐ ☒

% Riparian Canopy: 70% — Type: willow ash alder maple oak conifer other: Sycamore. — Dom.: ☒ ☐ ☐ ☐ ☐ ☐ ☐

Aquatic Substrate (%): silt/clay ____ sand ✓ 50 gravel/pebble ✓ 50 cobble ____ boulder ____ bedrock ____
Substrate Embeddedness: (**low**) (<25%) moderate (25-50%) high (> 50%)
Dominant Substrate Shape: angular sub-angular (**rounded**)
Creek Habitat: riffle: ____ run: ____ glide: ____ pool: 100% cascade/pool: ____ step-pool: ____ pocket water: ____
Creek Gradient: (**low**) (0-2%) moderate (2-4%) high (4-10+%)
Creek Gradient Change: (**No**) Yes higher lower Change in Creek Habitat: ______
Rosgen Channel Type: A B C D DA (**E**) F G
Wetted Channel Width: 4 m. Bankfull Width: 12 m
Water Turbidity: (**low**) moderate high Water Color: (**clear**) discolored (tannins, etc.)
Bank Gradient: (**low**) (<15°) R / L mod (15-40°) R / L high (>40°) R / L Active Bank Erosion: Yes No
Tributary Nearby: (**Yes**) No Location: (**U/S**) D/S LB RB Distance: ______ (**Perennial**) Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood (**scrub/shrub**) other: ______
Fish Present: Yes (**No**) Type: salmonid centrarchid cyprinid other: ______
Herpetofauna & Life Stage (A J T E) tree frog ____ bullfrog ____ w. pond turtle ____ garter snake ____ other: None
Other Species Observed: ______
Impacts to Amphibian Habitat: grazing recreation industrial other: ______ low mod high
Comments: Pool # 5. Shaded pool, sand/gravel substrate. Extensive duff, clear water. No herps observed. Moderate potential CRLF breeding; high likelihood for newt breeding.
Pool # 6. Fed by quarry releases (likely), 15 cm max depth 15 m x 3 m. No amphibians, though invertebrates present - ostracods & water boatmen. Extensive algae.
Wet upstream of Pool 6. - shallow water flowing over cobble, algae-lined pools. (Pool 7) Depth is 32 cm.
1220 PDT Pool 8 - very large pool: ≤50 m x 8 m., surrounded by willow, sycamore overstory. Gambusia present - 100s; Calif. roach present, Potential CRLF breeding, no FYLF - no flow and inappropriate substrate (silty clay w/ organics). Depth > 4'. Red swamp crayfish.
QA/QC (initials): BP Date: 11/3/2015 Flow into Pool 8 is about 1/4 CFS.

Source: ESA

Figure G-4

Pool 4 is a small shallow feature above the concrete impoundment structure . Photo date: October 23, 2015

Source: ESA

Figure G-5
Pool 5 is a small, shaded perennial pool with a sand/gravel substrate, extensive organics, and tea-colored water. Photo date: October 23, 2015

Source: ESA

Figure G-6

Pool 6 (top) supports flowing water and cobble substrate, but is inappropriate for foothill yellow-legged frog; Pool 7 (bottom) does not provide appropriate conditions for this species

Photo date: October 23, 2015

Source: ESA

Figure G-7

Pool 8 is a large (>100m long) perennial feature with an extensive riparian overstory and substrate dominated by silt and organics

Photo date: October 23, 2015

Foothill Yellow-Legged Frog

Creek Site Habitat Assessment

Date: mm 10 dd 23 yy 2015 Site #: 5 Subsite #: ____ Creek Name/Location: No Creek above Pool 8
USGS Quad: Niles Township: ____ Range: ____ Section: ____ ¼ Section: ____ Elevation: ____
GPS File Name: ____ Weather: *Sky:* (Overcast) *Partly Overcast* *Clear* *Wind:* *Inclement* *Fair* (*Ideal*)
Total Site Length: 100 mt Creek Aspect: W Discharge (cfs) 0.25 Water Temp: (edgewater) 11 C (main channel) ____
Observers: BTP MEG Initial Site Visit ☐ Follow-up Site Visit ☐
Photograph # (index to notebook): ____ Roll/Disc/Card #: ____

AMPHIBIAN HABITAT TYPES

- Pool
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- (Run) shallow.
- Other ____

Site/Subsite: Length: ____ Width: ____ Approximate Area (m²): ____

HABITAT FEATURES

% Margin Vegetation: ____ Type: forbs grass sedge rush blackberry other: ____
Dom.: ☐ ☐ ☐ ☐ ☐ ☐

% Emergent Vegetation: 0 Type: grass sedge rush pondweed other: ____
Dom.: ☐ ☐ ☐ ☐ ☐

% Submerged Vegetation: 0 Type: algae rooted aquatic veg other: ____
Dom.: ☐ ☐ ☐

% Cover Aquatic: 100% Type: rootwad aquatic veg. woody debris gaps between substrate other: duff
Dom.: ☐ ☐ ☐ ☐ ☐

% Cover Terrestrial: 50% Type: duff/leaf litter burrows woody debris undercut bank other: ____
Dom.: ☑ ☐ ☐ ☐ ☐

% Overhanging Vegetation: 80% Type: willow blackberry alder dogwood other: ____
Dom.: ☑ ☐ ☐ ☐ ☐

% Riparian Canopy: ____ Type: willow ash alder maple oak conifer other: ____
Dom.: ☐ ☐ ☐ ☐ ☐ ☐ ☐

Aquatic Substrate (%): silt/clay 90% sand ____ gravel/pebble ____ cobble ____ boulder ____ bedrock ____
Substrate Embeddedness: low (< 25%) moderate (25-50%) high (> 50%) N/A
Dominant Substrate Shape: angular sub-angular rounded
Creek Habitat: riffle: ✓ run: ✓ glide: ____ pool: ____ cascade/pool: ____ step-pool: ____ pocket water: ____
Creek Gradient: (low) (0-2%) moderate (2-4%) high (4-10+%)
Creek Gradient Change: (No) Yes higher lower Change in Creek Habitat: ____
Rosgen Channel Type: A B C D DA (E) F G
Wetted Channel Width: 1.5 m Bankfull Width: 3 m
Water Turbidity: (low) ~~moderate~~ high Water Color: (clear) discolored (tannins, etc.)
Bank Gradient: (low) (<15°) R / L (mod) (15-40°) R / L high (>40°) R / L Active Bank Erosion: Yes (No)
Tributary Nearby: (Yes) No Location: (U/S) D/S LB RB Distance: ____ (Perennial) Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood (scrub/shrub) other: ____
Fish Present: (Yes) (No) Type: salmonid centrarchid (cyprinid) other: ____
Herpetofauna & Life Stage (A J T E) tree frog ____ bullfrog ____ w. pond turtle ____ garter snake ____ other: ____
Other Species Observed: ____
Impacts to Amphibian Habitat: grazing recreation industrial other: ____ low mod high
Comments: Above Pool 8, shallow flow over organics.
Pool 9 — lined w/ cattails + willows, 63 cm max depth. Silt/clay over cobble. Crayfish, minnows present

QA/QC (initials): ____ Date: ____

Source: ESA

Figure G-8

Downstream of I-580, Alameda Creek is perennially wet area and supports large pools with silt substrate and an extensive riparian overstory. Photos show habitat below I-680 (top) and Pool 9 (bottom). Photo date: October 23, 2015

Foothill Yellow-Legged Frog
Creek Site Habitat Assessment

Date: mm 10 dd 23 yy 15 Site #: 6 Subsite #: ______ Creek Name/Location: Alameda Creek above I-680
USGS Quad: Niles Township: ______ Range: ______ Section: ______ ¼ Section: ______ Elevation: ______
GPS File Name: ______ Weather: *Sky*: (Overcast) Partly Overcast Clear *Wind*: Inclement Fair (Ideal)
Total Site Length: ______ Creek Aspect: W Discharge (cfs) ~0.5 Water Temp: (edgewater) 18° C (main channel) ______
Observers: BTP MEG Initial Site Visit ☑ Follow-up Site Visit ☐
Photograph # (index to notebook): ______ Roll/Disc/Card #: ______

AMPHIBIAN HABITAT TYPES

- (Pool)
- Cascade/Pool
- Isolated/Scour Pool
- Pool Tail-Out/Pool Backwater
- Side Pool
- Bedrock Pool
- Side/Split Channel
- Low Gradient Riffle
- (Run)
- Other ______

Site/Subsite: Length: 200' Width: 10' Approximate Area (m^2): ______

HABITAT FEATURES

% Margin Vegetation: 0 Type: forbs grass sedge rush blackberry other: ______
Dom.: ☐ ☐ ☐ ☐ ☐ ☐

% Emergent Vegetation: 0 Type: grass sedge rush pondweed other: ______
Dom.: ☐ ☐ ☐ ☐ ☐

% Submerged Vegetation: 10 Type: algae rooted aquatic veg other: ______
Dom.: ☐ ☑ ☐

% Cover Aquatic: 30 Type: rootwad aquatic veg. woody debris gaps between substrate other: ______
Dom.: ☑ ☐ ☑ ☐ ☐

% Cover Terrestrial: 100 Type: duff/leaf litter burrows woody debris undercut bank other: ______
Dom.: ☑ ☐ ☑ ☐ ☐

% Overhanging Vegetation: 90 Type: willow blackberry alder dogwood other: ______
Dom.: ☑ ☐ ☐ ☐ ☐

% Riparian Canopy: 90 Type: willow ash alder maple oak conifer other: ______
Dom.: ☑ ☐ ☐ ☐ ☐ ☐ ☐

Aquatic Substrate (%): silt/clay 100 sand ____ gravel/pebble ____ cobble ____ boulder ____ bedrock ____
Substrate Embeddedness: low (< 25%) moderate (25-50%) high (> 50%) N/A
Dominant Substrate Shape: angular sub-angular rounded N/A
Creek Habitat: riffle: ____ run: ✓ glide: ____ pool: ✓ cascade/pool: ____ step-pool: ____ pocket water: ____
Creek Gradient: (low) (0-2%) moderate (2-4%) high (4-10+%)
Creek Gradient Change: (No) Yes higher lower Change in Creek Habitat: ______
Rosgen Channel Type: A B C D DA (E) F G
Wetted Channel Width: 4 m Bankfull Width: 10 m +
Water Turbidity: low moderate (high) Water Color: clear (discolored) (tannins, etc.)
Bank Gradient: low (<15°) R / L (mod) (15-40°) R / L high (>40°) R / L Active Bank Erosion: Yes No
Tributary Nearby: (Yes) No Location: (U/S) D/S LB RB Distance: ______ (Perennial) Ephemeral

Upland Habitat Type: mixed conifer foothill hardwood/conifer foothill hardwood (scrub/shrub) other: ______
Fish Present: (Yes) No Type: salmonid (centrarchid) (cyprinid) other: minnows + bass.
Herpetofauna & Life Stage (A (J) T E) tree frog ____ bullfrog 2 w. pond turtle ____ garter snake ____ other: ____
Other Species Observed: ______
Impacts to Amphibian Habitat: grazing recreation industrial, other: ______ low mod high
Comments: Upstream of I-680 Ala Ck. is full of large rootwads, stumps, + trees that form deep, complex pools. Site is fully shaded, hence not optimal for CRLF, however, two juvenile bullfrogs noted, indicating Ranid breeding habitat. Not passable by the main channel due to depth and water obstacles, plus dense riparian vegetation.

QA/QC (initials): ______ Date: ______

Source: ESA

Figure G-9

Alameda Creek above I-680 supports perennial water from the Pit F2 discharge (top); Flows maintain an extensive riparian overstory (bottom) and fine silt substrate

Photo date: October 23, 2015

APPENDIX BIO2

Alameda Creek Fisheries Habitat Assessment Report

This page intentionally left blank

Final

SAN FRANCISCO PUBLIC UTILITIES COMMISSION ALAMEDA CREEK RECAPTURE PROJECT

Alameda Creek Fisheries Habitat Assessment Report

Prepared for
San Francisco Public Utilities Commission
and
San Francisco Planning Department

November 2016

Final

SAN FRANCISCO PUBLIC UTILITIES COMMISSION ALAMEDA CREEK RECAPTURE PROJECT

Alameda Creek Fisheries Habitat Assessment Report

Prepared for
San Francisco Public Utilities Commission
and
San Francisco Planning Department

November 2016

550 Kearny Street
Suite 800
San Francisco, CA 94108
415.896.5900
www.esassoc.com

Los Angeles

Orlando

Palm Springs

Petaluma

Portland

Sacramento

San Diego

San Francisco

Santa Cruz

Seattle

Tampa

Woodland Hills

209484.04

TABLE OF CONTENTS

San Francisco Public Utilities Commission Alameda Creek Recapture Project Alameda Creek Fisheries Habitat Assessment Report

Page

Appendix

List of Figures

Page

List of Figures (continued)

List of Tables

CHAPTER 1
Introduction

1.1 Background and Purpose for the Fisheries Habitat Assessment Report

The purpose of the Fisheries Habitat Assessment Report is to identify and describe fisheries and aquatic resources in Alameda Creek adjacent to and downstream of the San Francisco Public Utilities Commission (SFPUC) Alameda Creek Recapture Project (ACRP or proposed project) area, develop sufficient information on these resources in order to provide baseline information to support California Environmental Quality Act (CEQA) environmental review of the ACRP, and to inform the development of potential avoidance and minimization measures as appropriate. This fisheries habitat assessment provides a functional assessment of aquatic habitat in Alameda Creek from its confluence with San Antonio Creek (adjacent to the project area), downstream to the Arroyo de la Laguna confluence, and farther downstream through Niles Canyon and the lower Alameda Creek Flood Control Channel. This technical report has been prepared in conjunction with the *Surface Water Hydrology Report for Proposed Alameda Creek Recapture Project*,[1] *Groundwater-Surface Water Interactions ACRP Biological Resources Study Area Technical Report*,[2] and the *ACRP Terrestrial Biological Resources Technical Report*.[3]

1.2 Project Location

The proposed ACRP is located in unincorporated Alameda County, south of the Interstate 680 (I-680)/State Route 84 (SR 84) interchange and west of Calaveras Road (**Figure 1-1**[4]). The proposed facilities would be in the Sunol Valley[5] on the east side of Alameda Creek, approximately six miles north of Calaveras Reservoir and one mile west of San Antonio Reservoir. The ACRP is located within SFPUC Alameda watershed lands[6] owned by the City and County of San Francisco (CCSF).

---

1 Orion. 2016. *Surface Water Hydrology Report for Proposed Alameda Creek Recapture Project*. Prepared for San Francisco Planning Department by Orion Environmental Associates, November 2016. (See Appendix HYD1)

2 LSCE. 2016. *Groundwater-Surface Water Interactions, ACRP Biological Resources Study Area*. Prepared for ESA and San Francisco Public Utilities Commission. November 2016 2016. Prepared by Luhdorff & Scalmanini Consulting Engineers. (See Appendix HYD2)

3 ESA. 2016. *ACRP Terrestrial Biological Resources Technical Report*. Prepared for San Francisco Public Utilities Commission. November 2016. Prepared by Environmental Science Associates. (See Appendix BIO1)

4 Figure 1-1 depicts the "Quarry Reach" of Alameda Creek, which is defined as the segment of Alameda Creek from the Alameda Siphons north to I-680.

5 The Sunol Valley is a north-south trending valley that extends approximately five miles from the confluence of Alameda and Welch Creeks in the south to Niles Canyon in the north. The Sunol Valley is drained by Alameda Creek.

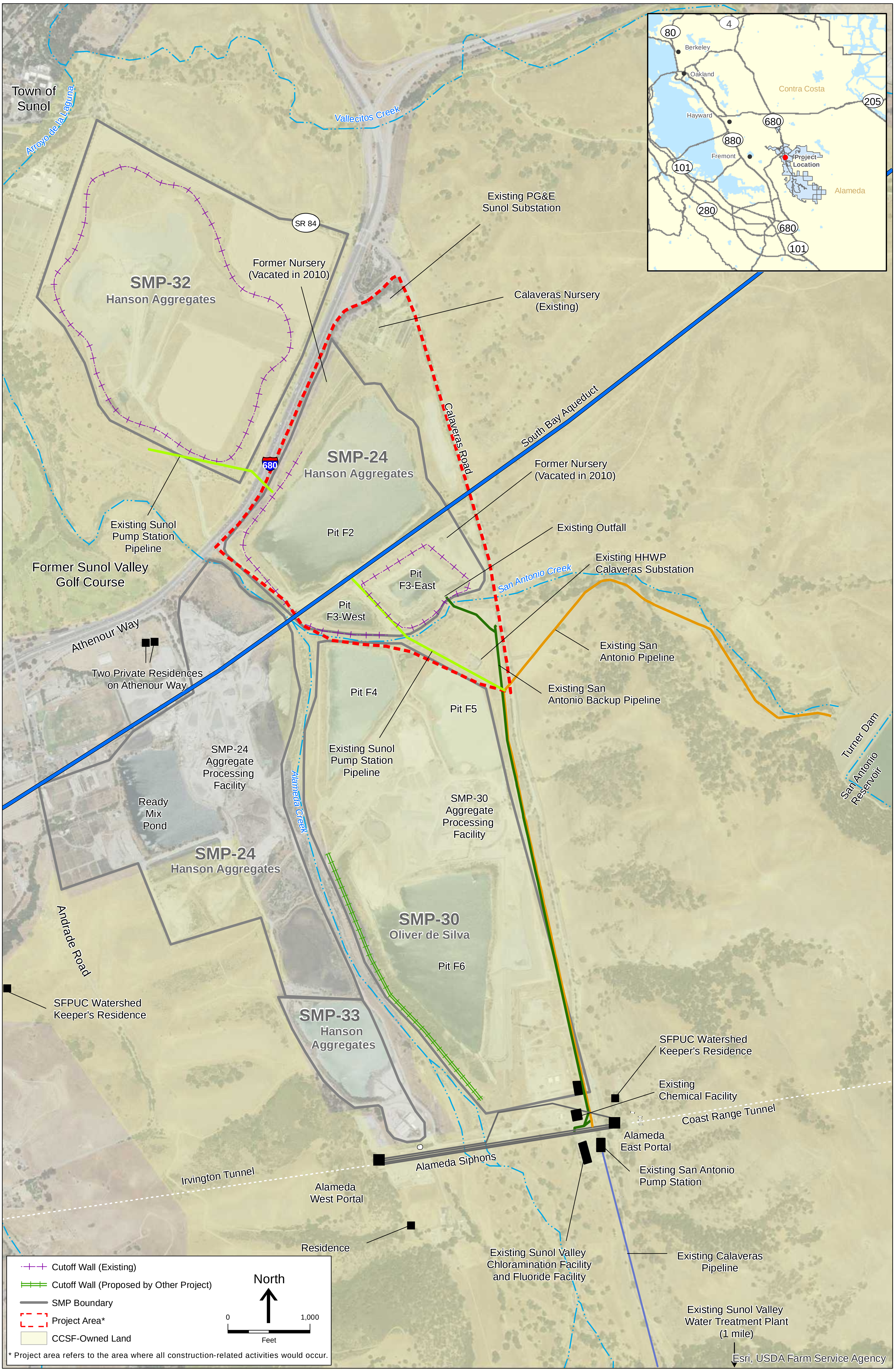
6 The Alameda watershed refers to lands owned by the CCSF and managed by the SFPUC as part of the SFPUC regional water system; the Alameda watershed lands are located within the much larger hydrologic boundary of the Alameda Creek watershed.

1.3 Project Summary

The SFPUC is proposing the ACRP to recapture an annual average of up to 7,178 acre-feet per year (ac-ft/yr) (or 2,339 million gallons per year [mgal/yr]) of water that will be released from Calaveras Reservoir and/or bypassed around the Alameda Creek Diversion Dam (ACDD) during future operation of the Calaveras Reservoir following completion of the Calaveras Dam Replacement Project (CDRP). Under the ACRP, water would be recaptured from a quarry pit, Pit F2, in the Sunol Valley located approximately six miles downstream of Calaveras Reservoir and 0.5-mile south of the I-680)/SR 84 interchange. The ACRP would recapture an amount of water equivalent to that which will be released from Calaveras Reservoir and bypassed around the ACDD in accordance with CDRP permit requirements and would have otherwise been stored in Calaveras Reservoir. The recaptured water would be transferred from Pit F2 to either the Sunol Valley Water Treatment Plant or San Antonio Reservoir for water supply uses to the SFPUC service area in the Bay Area. Proposed project components for recapture of the water from Pit F2 include construction and installation of pumps mounted on barges, pipelines extending from the pumps to shore; a new pipeline connecting to the existing Sunol Pump Station Pipeline; and ancillary facilities such as throttle valves, a flow meter, and electrical facilities. No construction would occur in the bed, bank, or channel of Alameda Creek.

The CDRP is currently under construction, with completion anticipated in 2018. Through the permitting process for the CDRP, the SFPUC, in coordination with the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS), agreed to two instream flow schedules that satisfy the requirements of the Federal Endangered Species Act (FESA) and the provisions of the California Fish and Game Code. These instream flow schedules will be implemented as part of the future operations plan for Calaveras Reservoir to be protective of Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) distinct population segment (DPS), a species listed as threatened under the FESA, in Alameda and Calaveras Creeks below the ACDD and Calaveras Dam, respectively. The instream flow schedule at the ACDD will increase bypass flows in Alameda Creek below the diversion dam, with a corresponding reduction in the amount of water that the SFPUC historically diverted from Alameda Creek into Calaveras Reservoir; the instream flow schedule for Calaveras Creek below Calaveras Dam will provide year-round releases from Calaveras Reservoir. Summaries of the proposed flow schedules below Calaveras Dam and the ACDD are presented in Section 2.2.2 below.

The proposed ACRP is one of the facility improvement projects of the SFPUC's Water System Improvement Program (WSIP), which established level of service goals and objectives related to ensuring the SFPUC has an adequate supply of water to deliver to customers during both non-drought and drought periods. By recapturing the water and returning it to the regional water supply system, the SFPUC would be able to maintain historical water diversions from the SFPUC Alameda watershed system, avoid the loss of yield to the regional water system, and improve the SFPUC's ability to meet customer water supply needs in nondrought and drought periods.



SOURCE: ESA, 2015; Date of aerial photo is 2014.

SFPUC Alameda Creek Recapture Project

Figure 1-1
Project Vicinity Map

This page intentionally left blank

CHAPTER 2
Fisheries Habitat Assessment Approach

2.1 Study Area

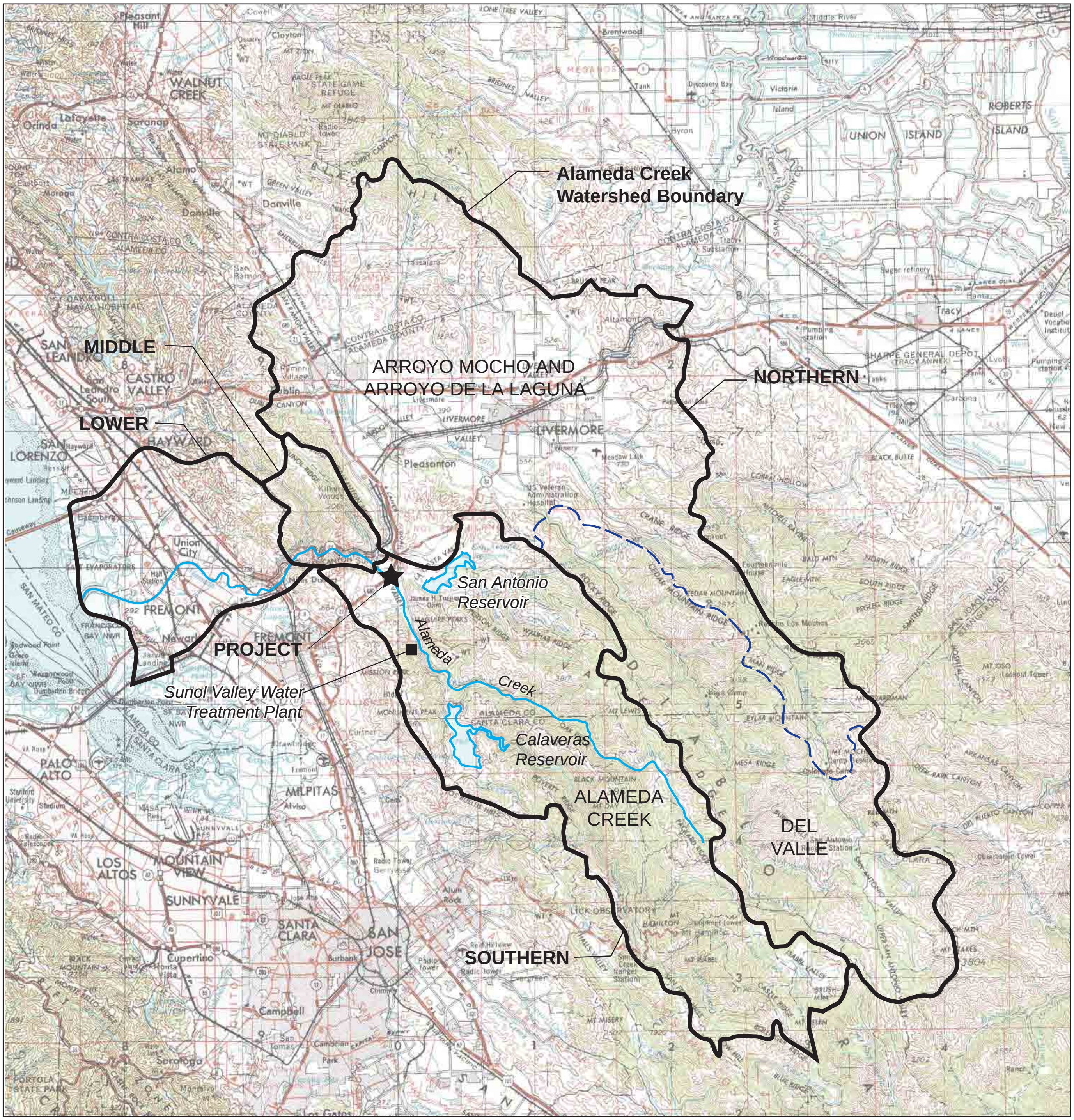
Alameda Creek originates on the northwestern slopes of the Diablo Range and drains towards San Francisco Bay. The watershed is an interior Coast Range drainage with three sub-watersheds (the lower, middle and upper sub-watersheds), and two main branches in the upper sub-watershed, Arroyo de la Laguna (northern) and Alameda Creek (southern), joining at the western end of the Sunol Valley (**Figure 2-1**). For purposes of assessing fisheries habitat in Alameda Creek, two discrete study areas have been identified; a primary area and an extended study area (see **Figure 2-2**). They consist of all fisheries habitats that could be directly or indirectly affected by the construction and operation of the ACRP.

2.1.1 Primary Study Area

Stream reaches immediately adjacent to and downstream of Pit F2 (the quarry pit from which the SFPUC proposes to recapture the water) comprise the primary study area for the fisheries habitat assessment. This area includes Alameda Creek from the confluence with San Antonio Creek downstream to the confluence with Arroyo de la Laguna. The primary study area has been further divided into Subreaches A, B, and C based on physical habitat characteristics (**Figure 2-3**).

2.1.2 Extended Study Area

The extended study area includes the Alameda Creek channel from its confluence with Arroyo de la Laguna to San Francisco Bay. Streamflows and the related fisheries habitat conditions in the extended study area are strongly influenced by operation of Del Valle Reservoir and water deliveries to the Alameda County Water District (ACWD) from the South Bay Aqueduct via Vallecitos Creek, which enters Arroyo de la Laguna just upstream of the Alameda Creek confluence. While SFPUC operations in the Alameda watershed influence flow conditions in Alameda Creek in the extended study area, the effects of SFPUC operations on streamflow are greatly diminished in the extended study area due to the effects of other water supply projects in the Arroyo de la Laguna watershed.



SOURCE: EDAW & Turnstone JV

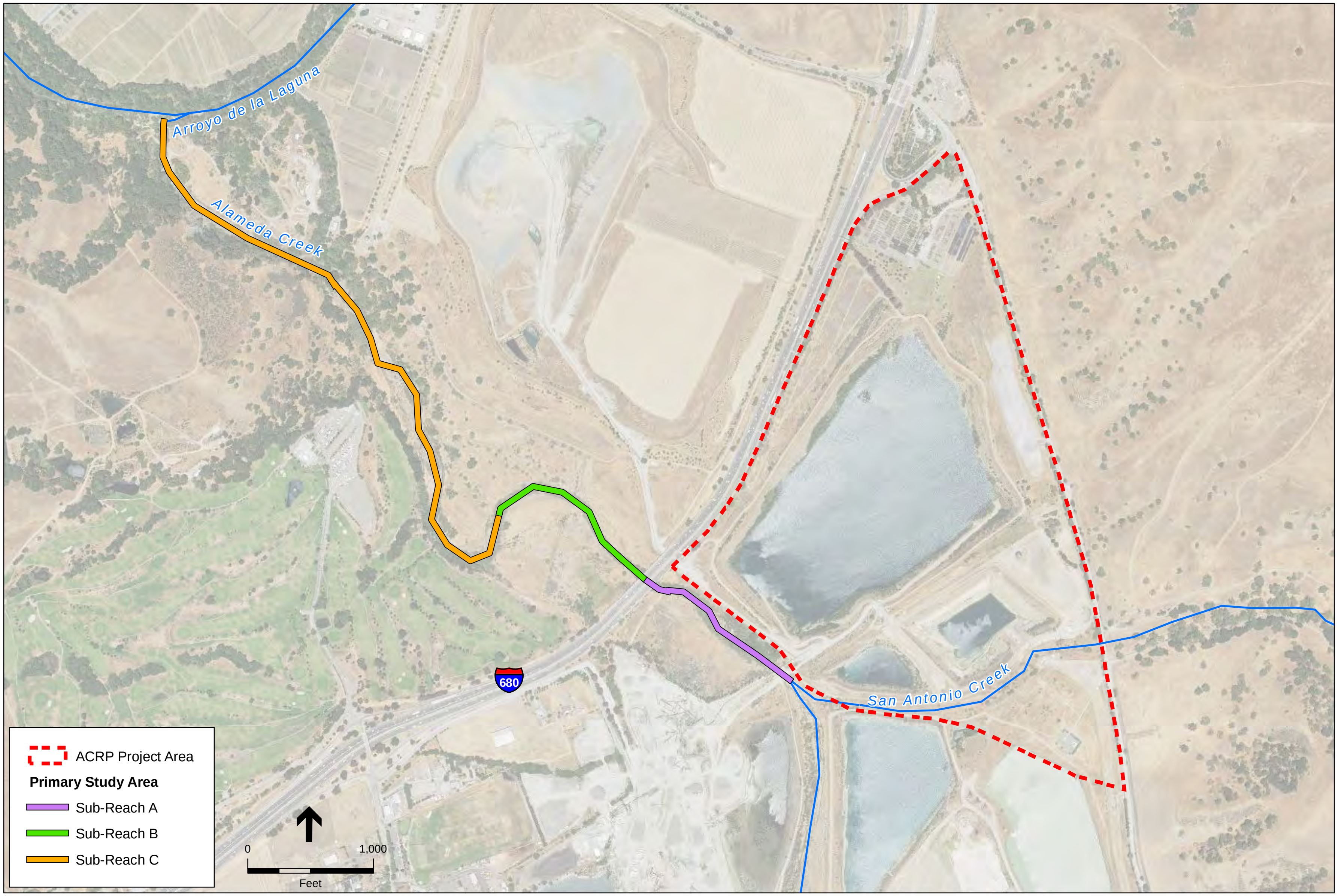
SFPUC Alameda Creek Recapture Project

Figure 2-1
Alameda Creek Watershed and Sub-watershed Areas

SOURCE: ESA, 2016; Date of aerial photo is 2014.

SFPUC Alameda Creek Recapture Project

Figure 2-2
Fisheries and Aquatic Habitat Study Area



SOURCE: ESA, 2015; Date of aerial photo is 2014.

SFPUC Alameda Creek Recapture Project

Figure 2-3

Primary Study Area Sub-Reaches

2.2 Existing and with-CDRP Conditions

As described above, operation of the ACRP would be dependent on the instream flow schedules that are required to be implemented as part of future operations of Calaveras Reservoir. ACRP operations would not commence until construction of the CDRP has been completed and the instream flow schedules are implemented. Consequently, the aquatic habitat conditions that are expected to exist in Alameda Creek when the proposed ACRP would be operated are anticipated to be different from the conditions that exist in 2015. To account for this, Chapter 3 of this habitat assessment report includes separate descriptions of conditions in 2015 and conditions that are expected to prevail at the time the proposed project would be operated. The 2015 conditions are referred to as the "existing conditions" and the conditions that are expected to prevail at the time the proposed project would be implemented are referred to as the "with-CDRP conditions." The CEQA analysis for the ACRP will use the existing and with-CDRP conditions to evaluate construction-related impacts of the ACRP as appropriate, depending on whether or not any flow-dependent resources could be affected. For the operational impacts of the ACRP on fisheries, the CEQA analysis will use the with-CDRP conditions as the baseline conditions in order to distinguish the effects of the ACRP from those of the CDRP. Each of these conditions is described in further detail Chapter 3 and defined in **Table 2-1**.

2.2.1 Existing Conditions

Existing conditions are those conditions in the Alameda Creek watershed at the time the San Francisco Planning Department published the Notice of Preparation of an Environmental Impact Report for the Alameda Creek Recapture Project (July 2015). Under the existing conditions, SFPUC operates Calaveras Dam and Calaveras Reservoir in accordance with the DSOD-imposed restrictions that have been in place since 2002, and as needed to allow for construction of the CDRP. The new Calaveras Dam has been under construction since 2011, and the CDRP instream flow schedules have not yet been implemented. Furthermore, numerous instream barriers currently present along Alameda Creek are preventing the upstream migration of steelhead from the San Francisco Bay remain in place.

2.2.2 With-CDRP Conditions

For purposes of the CEQA analysis for the operational effects of the ACRP on fisheries, the with-CDRP conditions in Alameda Creek assume completion of the CDRP and implementation of the instream flow schedules required by the CDRP permit conditions (see **Table 2-2** and **Table 2-3**, below). In addition, to be conservative, this CEQA analysis also assumes that existing human-made barriers to anadromous steelhead migration would be removed or other measures would be taken to allow fish migration; these conditions were determined to represent the worst-case scenario for fisheries resources in terms of identifying potential impacts of ACRP operations on fisheries. No attempt is made here to describe specifically what those barrier removal/bypass projects might entail, as specific adopted designs/plans are not available for certain barriers/obstacles and schedules for the removal/bypass projects are uncertain.

TABLE 2-1
ATTRIBUTES OF EXISTING AND WITH-CDRP CONDITIONS

Parameter	Existing Condition	with-CDRP Conditions
Representative year	2015	2019 to 2020 (following completion of the CDRP and the reservoir refill period)
Hydrologic period used in analysis	WY 1996 to WY 2013	
Calaveras Reservoir and Dam	New dam under construction downstream of existing dam Storage in Calaveras Reservoir restricted to one-third capacity with usable storage at 13% or 12,400 acre-feet by DSOD Maximum pool elevation = 705 feet Minimum pool elevation = 690 feet	New dam completed Historical capacity of Calaveras Reservoir restored to nominal capacity = 96,850 acre-feet Maximum pool elevation = 756 feet
Instream flow releases/spills from Calaveras Reservoir below Calaveras Dam	Frequent releases from low-flow valve or cone valve to manage water levels in the reservoir and from low flow valve for experimental purposes. Represented in ASDHM by observed flow at the USGS gage located downstream of Calaveras Reservoir	Implementation of instream flow schedule: Dry year releases: May - Oct: 7 cfs; Nov – Dec: 5 cfs; Jan – April: 10 cfs, annual average Wet/normal year releases: May – Sept: 12 cfs, Oct: 7 cfs; Nov – Dec: 5 cfs, Jan – April: 12 cfs
Alameda Creek Diversion Dam (ACDD)	No fish ladder or bypass tunnel Maximum diversion of Alameda Creek water to Calaveras Reservoir = 650 cfs	Fish ladder and bypass structure operational Minimum and Maximum diversion rates of Alameda Creek water to Calaveras Reservoir = 30 cfs to 370 cfs
ACDD bypass flows	When the gates on the diversion tunnel are open, only stream discharge greater than 650 cfs passes over the ACDD. (Note: Operations at the ACDD between WY 2002 and WY 2010 were influenced by limitations on storage at Calaveras Reservoir. As a result, the gates on the diversion tunnel were closed more frequently than they had been previously.) Under Existing Condition, the ACDD tunnel has been closed since 5/23/2012. Prior to 2012 during DSOD period SFPUC operated ACDD very infrequently. For example, they were not operated at all between 10/24/2004 to 3/7/2007. When the gates on the diversion tunnel are closed, all flow in Alameda Creek passes over the ACDD	Gate on diversion tunnel closed from April 1 to Nov 30, and all flow in Alameda Creek passes over ACDD. Diversion of up to 370 cfs from December 1 to March 31. Minimum bypass flow of 30 cfs whenever there is 30 cfs or more; if less than 30 cfs is present, entire flow passes over the ACDD
Quarry pit operations Hanson Aggregates: - SMP-24 (Pits F2, F3-East, F3-West) - SMP-32SMP-33 Oliver de Silvia: - SMP-30 (Pits F4, F5, F6)	- SMP-24 pits used only to store and manage water to support active mining on SMP-32 and aggregate processing, with excess water discharged under NPDES permit to Alameda Creek at an average annual rate of 3,436 acre-feet per year.[7] In 2015, this volume of regulated discharge was 1,206 acre-feet. - SMP-30 Pit F6 in active use for aggregate extraction, with infrequent discharges from SMP-30 to Alameda Creek.	The same as the existing condition except that as a result of the releases and bypasses it is assumed more water infiltrates to the quarries and more water is available to quarry operators for water management and subsequent NPDES discharges. It is assumed the average amount of water available for quarry NPDES discharges is an annual average of 6,620 acre-feet per year.

7 Hanson reports its regulated discharges to the RWQCB. The volumes of water reported are based on the pump rate of the pumps and not a meter at the discharge point. Because some of the water that is calculated by the pump rate is used for consumptive purposes, the amount of water discharge to Alameda Creek is likely an overestimation.

TABLE 2-1 (Continued)
ATTRIBUTES OF EXISTING AND WITH-CDRP CONDITIONS

Parameter	Existing Condition	with-CDRP Conditions
Loss of surface flow in Alameda Creek to subsurface flow downstream of Welch Creek	0 to 17 cfs (maximum) between Welch Creek and San Antonio Creek confluences and 0 to 7.5 cfs (maximum) between San Antonio Creek and Arroyo de la Laguna confluences, depending on streamflow.	

NOTE: The attributes of pre-2001 conditions are the same as those of existing conditions, except that Calaveras Reservoir was operated with its full storage of 96,850 acre-feet and SMP-24 was in active use for aggregate extraction until 2006, SMP-32 was not yet in operation, and excess water discharged under NPDES permit to Alameda Creek was at an average annual rate of 2,796 acre-feet per year. The attributes of with-project conditions are the same as those of with-CDRP conditions, except for the addition of the proposed ACRP which would include pumping an annual average of 7,178 acre-feet of water from Pit F2 and conveying it to the regional water system, and which in turn, would reduce the amount of water assumed to be available to the quarry operators and therefore less water for NPDES discharge. The average amount of water available to the quarry operators for NPDES discharge decreases to an annual average of 2,532 acre-feet per year.

TABLE 2-2
CDRP INSTREAM FLOW SCHEDULES BELOW CALAVERAS DAM

Flow Schedule Decision Date	Flow Schedule Application Period	Dry (Schedule B)		Normal/Wet (Schedule A)	
		Cumulative Arroyo Hondo flows for water year classification (MG)	Flow Release (cfs)	Cumulative Arroyo Hondo flows for water year classification (MG)	Flow Release (cfs)
N/A	October	N/A	7	N/A	7[a]
N/A	Nov 1 thru Dec 31	N/A	5	N/A	5
Dec 29	Jan 1 thru Apr 30	$\leq$ 360	10[a]	> 360	12[a]
Apr 30	May 1 thru Sept 30	$\leq$ 7,246	7	> 7,246	12

NOTE:

[a] Flows would be ramped in accordance with Table 3 of the NMFS BO.

SOURCE: National Marine Fisheries Service (NMFS), 2011. Southwest Region. Biological Opinion for Calaveras Dam Replacement Project in Alameda and Santa Clara Counties. Tracking No. 2005/07436. March 5, 2011.

TABLE 2-3
CDRP INSTREAM FLOW SCHEDULE IN ALAMEDA CREEK BELOW THE ACDD

Flow Schedule Application Period	Flow Requirements	Comment
Apr 1 – Nov 30	All unimpaired flow upstream of the ACDD	No diversions from Alameda Creek to Calaveras Reservoir (ACDD gates closed)
Dec 1 – Mar 31	Up to 30 cfs, dependent upon unimpaired flows in Alameda Creek above the ACDD. Downstream flow requirements can be met through a combination of flows released through the fish ladder, ACDD bypass tunnel, and/or over the dam crest.	Diversion of up to 370 cfs from Alameda Creek to Calaveras Reservoir (ACDD gates open).

SOURCE: National Marine Fisheries Service (NMFS), 2011. Southwest Region. Biological Opinion for Calaveras Dam Replacement Project in Alameda and Santa Clara Counties. Tracking No. 2005/07436. March 5, 2011.

Future operation of Calaveras Reservoir and Calaveras Dam will influence streamflow and the aquatic habitat and fish community in Calaveras Creek and Alameda Creek downstream of the reservoir. Under the CDRP, future operations of Calaveras Reservoir and Dam and the ACDD include the following provisions designed to improve habitat conditions for steelhead and other native fishes in the watershed:

- Bypass flows at the ACDD and releases from Calaveras Dam pursuant to the flow schedules identified in the CDRP's NMFS Biological Opinion[8] and CDFW Streambed Alteration Agreement;[9]
- Operational procedures for Calaveras Dam releases to avoid cone valve testing during spawning and egg incubation periods and implement flow release ramping criteria.

The regulatory permits for CDRP require that SFPUC implement the following flow release schedules (operation of Calaveras Dam) and flow bypasses (operation of ACDD) for steelhead as part of the proposed future operations of Calaveras Reservoir and Dam. Additional discussion on future operation of Calaveras Dam and the ACDD is provided in Section 3.3.1.

2.3 Methods

The assessment of aquatic habitat conditions in Alameda Creek relied upon: extensive literature review; analysis of 2008 survey data from the Calaveras Reservoir Experimental Water Release Habitat Characterization Study performed by the SFPUC Natural Resources and Lands Management Division, Fisheries and Wildlife Section, between May 1 and July 3, 2008; May 2015 reconnaissance-level fisheries habitat survey data collected by Environmental Science Associates; review of historical hydrologic records; and the use of the Alameda System Daily Hydrologic Model to project creek flows under the existing and with-CDRP conditions (i.e., future hydrologic conditions with implementation of CDRP instream flow schedules). Each of these data sources is discussed in further detail below.

2.3.1 Literature Review

The Alameda Creek watershed has been studied in detail. The Alameda Creek Fisheries Restoration Workgroup (ACFRW) is a multi-agency stakeholder group formed in 1999 to develop and implement a strategy to restore steelhead trout to Alameda Creek. The ACFRW is composed of numerous community and citizens' groups, local water management and flood control agencies, state and federal resource agencies, and others. Multiple studies have been prepared detailing the potential for restoration of anadromous fish within Alameda Creek, including those in support of the CDRP Environmental Impact Report (EIR). The following documents were reviewed to gather information on the existing and with-CDRP conditions as they relate to the ACRP and provide the basis for the fisheries habitat assessment presented in this document:

8 National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project*. Santa Rosa, CA.

9 California Department of Fish and Game (CDFG), 2011. *Streambed Alteration Agreement for Calaveras Dam Replacement Project.* Notification No. 1600-2010-0322-R3. June 28, 2011.

- *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* (Gunther et al., 2000);
- *Ecology, Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California. (*Leidy, 2007);
- *Calaveras Dam Replacement Project Fisheries Technical Report 2008 (ETJV 2008);*
- *Biological Assessment and Essential Fish Habitat Assessment for the Calaveras Dam Replacement Project* (ETJV, 2009);
- *Assessment of Fish Migration at Riffles in Sunol Valley Quarry Reach of Alameda Creek* (URS and HDR, 2010);
- *Technical Memorandum: Calaveras Dam Replacement Project: Cumulative Impact Analysis – Central California Coast Steelhead. Appendix J Calaveras Dam Replacement Project FEIR* (San Francisco Planning Department 2011);
- *Final Environmental Impact Report for the Calaveras Dam Replacement Project* (San Francisco Planning Department, 2011);
- *Biological Opinion for the Calaveras Dam Replacement Project* (NMFS, 2011);
- *Streambed Alteration Agreement for the Calaveras Dam Replacement Project (Notification No. 1600-2010-0322-R3)* (CDFW, 2011);
- *Evaluating Priority Life History Tactics for Reintroduced Alameda Creek Steelhead. Prepared for: Alameda Creek Fisheries Restoration Workgroup* (McBain & Trush, 2012); and
- *Joint Lower Alameda Creek Fish Passage Improvements, Draft Initial Study with Mitigated Negative Declaration/Environmental Assessment with Finding of No Significant Impacts* (Hanson Environmental, 2016).

2.3.2 Analysis of 2008 Habitat Characterization Study Survey Data

In 2008, the SFPUC conducted a detailed habitat characterization of Alameda Creek from the confluence of Alameda Creek and Arroyo de La Laguna upstream to Calaveras Dam. The habitat characterization was conducted during four successive experimental water releases from Calaveras Reservoir. The data from these surveys are summarized in this document for the reach of Alameda Creek in the primary study area, and provides insight into habitat conditions during various flow conditions that may occur under the with-CDRP conditions. Crews of five or more SFPUC biologists surveyed from the confluence of Alameda Creek and Arroyo de la Laguna, upstream in Alameda and Calaveras Creeks to Calaveras Dam. The methods were repeated during four successive experimental water releases from Calaveras Reservoir between May 1 and July 3, 2008. Continuous longitudinal measurements of habitat types were recorded, and at every tenth habitat unit, the first occurrence of a given habitat unit, and around potential migration barriers a full habitat characterization was conducted including measurements of: width and depth, substrate and shelter, band and riparian characteristics, spawning and pool tailout characteristics, barrier assessment, and streamflow measurements.

2.3.3 2015 Fisheries Habitat Surveys

Focused surveys of the primary study area and reconnaissance surveys of the extended study area were conducted on May 27, 2015 (see Figures 2-2 and 2-3) in support of the ACRP environmental review process. ESA fisheries biologists Chris Fitzer and Andy Hatch walked the entire portion of Alameda Creek from the San Antonio Creek confluence to the Arroyo de la Laguna confluence. Aquatic habitat types, riparian vegetation cover, and instream characteristics were noted and mapped. Potential habitat and barriers to movement for steelhead were also noted during the surveys. The extended study area was surveyed via spot-checks at accessible locations along Niles Canyon and the Alameda Creek Flood Control Channel.

2.3.4 Alameda Creek Hydrology

Historical Hydrological Records Review

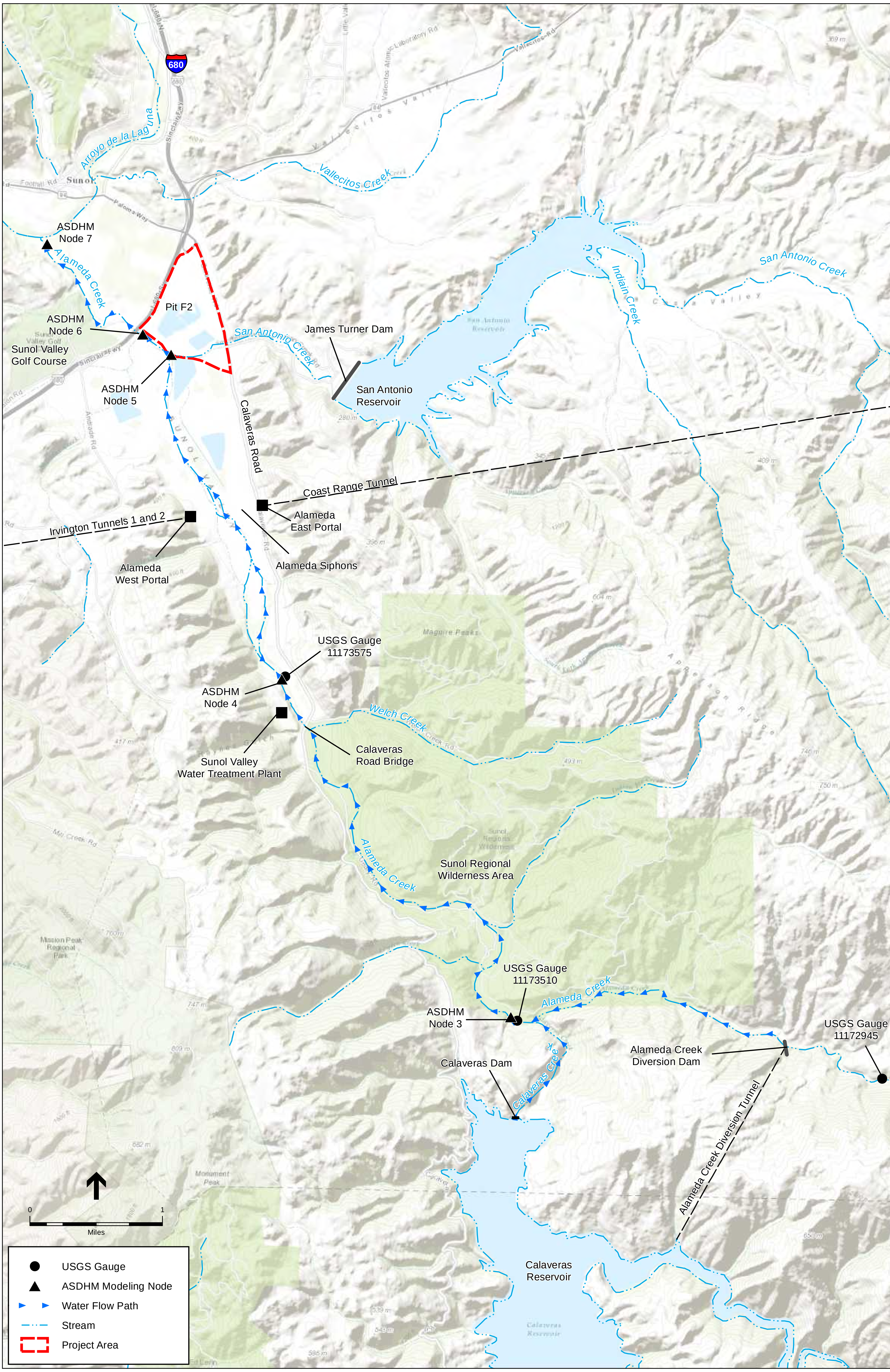
The existing conditions have been characterized based on observation of conditions on the ground and review of recent historical records of stream discharge, water discharges and water levels in surface and groundwater bodies. These sources include stream gages, monitoring wells, and quarry discharge records and are described in more detail in the *Surface Water Hydrology Report for Proposed Alameda Creek Recapture Project* (see Appendix HYD1).[10]

Alameda System Daily Hydrologic Model

Future hydrologic conditions in the Alameda Creek watershed were projected using the ASDHM. The methods used to make the projections are based are described in the *Surface Water Hydrology Report for the SFPUC Alameda Creek Recapture Project* (see Appendix HYD1). The ASDHM is a spreadsheet model that enables estimation of mean daily discharge values at various locations on Alameda Creek and one of its tributaries. The model was developed for the Alameda Creek Fisheries Restoration Workgroup, and the agencies and stakeholders that comprise the workgroup. The workgroup is attempting to restore steelhead populations in the Alameda Creek watershed. The workgroup developed a plan that called for several technical analyses including Ecosystem Diagnosis and Treatment, Numbers of Good Days and Spawning Risk. These analyses require information on hydrology, channel geometry, and water temperature. The ASDHM was developed to provide the hydrology information.

The ASDHM was first developed by the SFPUC in 2009 and has subsequently been expanded, refined, and updated to include the ACRP. The current version enables estimation of mean daily discharge values at one location (or node) in Calaveras Creek below Calaveras Dam, and 11 locations (nodes) in Alameda Creek between the Alameda Creek Diversion Dam and Coyote Hills Regional Park, close to the point at which the flood control channel discharges into San Francisco Bay (**Figure 2-4**). The model is described fully in a draft technical memorandum entitled *Overview of Methods, Models and Results to Develop Unimpaired, Impaired and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrologic Years 1996-2019* (Dhakal, Buckland and McBain, 2012).

10 Orion. 2016. *Surface Water Hydrology Report for the SFPUC Alameda Creek Recapture Project*. Prepared for San Francisco Planning Department by Orion Environmental Associates, November, 2016. (See Appendix HYD1)



SOURCES: SFPUC, 2015. Modeling node and monitoring well locations. KMZ files provided by Amod Dhakal on August 6, 2015; USGS, 2015. USGS Water Watch Google Earth Streamgages KMZ File for California. Available online at http://waterwatch.usgs.gov/index.php?m=stategage&w=kml, Accessed June 24, 2015.

SFPUC Alameda Creek Recapture Project

Figure 2-4

ASDHM Modeling Nodes Along Alameda Creek

This page intentionally left blank

The SFPUC used the ASDHM to simulate the following scenarios in support of this habitat assessment. The hydrology used in the analysis was for the 18-year period from Water Year 1996 to Water Year 2013.

- Conditions that exist in 2015 with restricted storage in Calaveras Reservoir by order of the California Department of Water Resources, Division of Safety of Dams (DSOD) (existing conditions). (*Note: This model scenario was used to augment historical hydrological records where appropriate.*)
- Conditions that will exist when construction of the CDRP is completed and in operation and the instream flow schedules are implemented (with-CDRP conditions).

Additional description of the ASDHM application to the ACRP is provided in the *Surface Water Hydrology Report for the SFPUC Alameda Creek Recapture Project* (see Appendix HYD1).

This page intentionally left blank

CHAPTER 3
Habitat Assessment Results

3.1 Alameda Creek Fisheries

Alameda Creek and its tributaries provide habitat for a diverse assemblage of native and non-native fishes. A total of 14 native and at least 13 non-native fish species have been observed in nontidal portions of the Alameda Creek watershed during the past century.[11,12,13] Several other species may have also occurred in the watershed based on collections in tidal portions, evidence from archaeological investigations, and other accounts.

Collections from the watershed include widely distributed native species typical of streams in the region, such as California roach (*Lavinia symmetricus*), Sacramento sucker (*Catostomus occidentalis*), pikeminnow (*Ptychocheilus grandis*), steelhead/rainbow trout (*Oncorhynchus mykiss*), Pacific lamprey (*Lampetra tridentata*), and prickly sculpin (*Cottus asper*). Non-native resident species present in the watershed include goldfish (*Carassius auratus*), carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), white catfish (*Ameiurus catus*), brown bullhead (*Ictalurus nebulosus*), black bullhead (*Ameiurus melas*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomois cyanellus*), western mosquitofish (*Gambusia affinis*), inland silverside (*Menidia beryllina*), and golden shiner (*Notemigonus crysaleucas*).[14,15,16]

Special-status fish species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status fish species include:

---

11 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

12 EDAW & Turnstone Joint Venture (ETJV), 2008. Calaveras Dam Replacement Project Fisheries Technical Report 2008. Prepared by Hagar Environmental Science and Thomas R. Payne and Associates for EDAW & Turnstone Joint Venture and SFPUC.

13 Leidy, R.A., 2007. Ecology, Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California. San Francisco Estuary Institute, April 2007. Contribution No. 530.

14 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

15 EDAW & Turnstone Joint Venture (ETJV), 2008. Calaveras Dam Replacement Project Fisheries Technical Report 2008. Prepared by Hagar Environmental Science and Thomas R. Payne and Associates for EDAW & Turnstone Joint Venture and SFPUC.

16 Leidy, R.A., 2007. Ecology, Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California. San Francisco Estuary Institute, April 2007. Contribution No. 530.

- Species listed as threatened or endangered under the Federal Endangered Species Act (FESA) or California Endangered Species Act (CESA);
- Species identified by NMFS or CDFW as species of special concern; and
- Species fully protected in California under the California Fish and Game Code

Three special-status fish species have been identified for review as having the potential to occur in the Alameda Creek watershed, as described in **Table 3-1** below.

TABLE 3-1
SPECIAL-STATUS FISH SPECIES WITH POTENTIAL TO OCCUR IN THE ACRP FISHERIES STUDY AREAS

	Status1			
Species	**NMFS**	**CDFW**	**Habitat Requirements**	**Potential to Occur in the ACRP Fisheries Study Areas Under Existing Conditions**
California Central Coast steelhead DPS *Oncorhynchus mykiss*	T	--	Requires cold, freshwater streams with suitable gravel for spawning. Rears in rivers and tributaries and in the San Francisco Bay.	Potential for occurrence in the primary study area is currently restricted by downstream barriers. Individuals periodically occur downstream of BART weir (downstream-most fish barrier) in the extended study area.
River lamprey *Lampetra ayresi*	--	SSC	Requires cool, freshwater streams with suitable gravel for spawning.	Not expected to occur in the study areas. A river lamprey was reported in the watershed in 1966, but there are no recent occurrences. Potential for occurrence in the study areas is limited by downstream barriers.
Sacramento perch *Archoplites interruptus*	--	SSC	Spawning has been reported to extend from spring to late summer, depending on location and water temperature. Occurs among aquatic plants or congregating in shallow waters in schools among or near inshore vegetation.	Not expected to occur in the study areas. Records indicate that Sacramento perch historically occurred in Alameda Creek (ETJV 2008); no recent known occurrences in the study areas.

ACRONYMS:
CDFW = California Department of Fish and Wildlife; DPS = Distinct Population Segment; NMFS = National Marine Fisheries Service.

[1] Legal Status Definitions:
Federal Listing Categories (NMFS):
T Threatened (legally protected)
State Listing Categories (CDFW):
SSC Species of Special Concern (no formal protection)

SOURCE: ESA, 2015; SF Planning Department, 2011

3.1.1 Central California Coast Steelhead

Regulatory Status

Central California Coast (CCC) steelhead distinct population segment (DPS) is listed as threatened under FESA only, and at present occurs downstream of the BART weir in the ACRP extended study area. Genetic testing suggests that the present self-sustaining populations of resident rainbow trout in upper Alameda Creek may be derived from migratory steelhead that were isolated in the upper part of the watershed by natural processes and by construction of dams and other passage obstacles.[17,18] This research found that these subpopulations were more similar to each other and populations of anadromous steelhead within the central California coast region than to other populations of steelhead including several widely distributed hatchery strains. In June 2005, NMFS proposed designating resident rainbow trout in the Alameda Creek watershed as threatened due to genetic similarities between resident and anadromous steelhead; however, only anadromous populations were included in the January 5, 2006 final listing determination, which reaffirmed the threatened status of CCC steelhead DPS under FESA. Specifically, the final listing determination stated "*under our final approach of delineating steelhead-only DPS of O. mykiss, the resident populations, including those in Upper Alameda Creek and the Livermore-Amador Valley, are not considered part of the listed DPSs*"[19] While the resident rainbow trout are not designated under FESA or otherwise, these fish may be considered "special status" under CEQA due to their genetic similarities to the listed species and agency interest.

Life History

Steelhead have a highly flexible life history and may follow a variety of life-history patterns including residents (non-migratory) at one extreme and individuals that migrate to the open ocean (anadromous) at another extreme. Intermediate life-history patterns include fish that migrate within the stream (potamodromous), fish that migrate only as far as estuarine habitat, and fish that migrate to near-shore ocean areas. These life-history patterns do not appear to be genetically distinct.[20] Steelhead are unique among Pacific salmon in that ocean migrating individuals may return to the ocean after spawning and return to freshwater to spawn one or more times.

Migration

Some of the best information on steelhead life history comes from a multi-year study in Waddell Creek in the Santa Cruz mountains.[21] Behavior of steelhead/rainbow trout in Waddell Creek is probably typical for most Central California populations. Steelhead along the Central California coast enter freshwater to spawn when winter rains have been sufficient to raise streamflows and breach the sandbars that form at the mouths of many streams during the summer. Increased streamflow during runoff events also appears to provide cues that stimulate migration and allows better conditions for fish to pass obstructions and shallow areas on their way upstream. The season for upstream migration of steelhead adults lasts from late October through the end of May, but typically the bulk of migration (over 95 percent in Waddell Creek) occurs between mid-December and mid-April.[22]

[17] Nielsen, J., 2003. *Population Genetic Structure of Alameda Creek Rainbow/Steelhead Trout – 2002.* U.S.
[18] National Marine Fisheries Service (NMFS), 2004. *Proposed Listing Determinations for 27 ESUs of West Coast Salmonids:* Proposed Rule June 14, 2004 69 FR 113, pages 33102-33179.
[19] 71 Federal Register [FR] 841, January 5, 2006
[20] Shapovalov, L. and A.C. Taft. 1954. *The Life Histories of the Steelhead Rainbow Trout and Silver Salmon.* State of California, Department of Fish and Game. Fish Bulletin No. 98.
[21] Shapovalov, L. and A.C. Taft. 1954. *The Life Histories of the Steelhead Rainbow Trout and Silver Salmon.* State of California, Department of Fish and Game. Fish Bulletin No. 98.
[22] Shapovalov, L. and A.C. Taft. 1954. *The Life Histories of the Steelhead Rainbow Trout and Silver Salmon.* State of California, Department of Fish and Game. Fish Bulletin No. 98.

Steelhead have strong swimming and leaping abilities that allow them to ascend streams into small tributary and headwater reaches. Steelhead can swim at rates of up to 4.5 feet per second (fps) for extended periods of time and can achieve burst speeds of 14 to 26 fps during passage through difficult areas.[23] Leaping ability is dependent on the size and condition of fish and hydraulic conditions at the jump. Given satisfactory conditions, a conservative estimate of steelhead leaping ability is a height of 6 to 9 feet,[24] though other estimates range from 11 feet[25] to as high as 15 feet.[26]

Trout of various ages migrated out of Waddell Creek in all months of the year but the majority migrated in April, May, and June. Downstream migration of young-of-year fish (less than a year old) extended from late-April through the spring; however this movement constitutes dispersal to downstream rearing areas and not a true seaward migration. Downstream migration of one-year old steelhead was from April through late June and two-year old fish from March through late May, generally the age at which steelhead undergo physiological transformation for life in seawater (smoltification). In addition to temperature and flow conditions, smolts are subject to predation, primarily by birds including cormorants, mergansers, and herons, but also predatory fish. Predation by birds can increase under conditions where smolts have to traverse shallow sections of streams without cover. With clear water, birds can be particularly effective predators. Conditions favoring predation by birds occur in channel reaches modified for flood control where the channel is maintained in a wide, shallow configuration and is largely devoid of instream large woody debris and riparian vegetation. Behavioral adaptations of smolts including nocturnal migration may moderate the effects of predation.

Steelhead that survive spawning return downstream to re-enter the ocean. As many as 20 percent of adult spawners may be repeat spawners and some fish may return to spawn up to three or four times.[27] In some streams fish return downstream immediately after spawning while in others they may remain for a period up to several months. After spawning, these fish do not typically resume feeding while in freshwater. In Waddell Creek, the bulk of adults returned downstream from April through June. Fish that remain in the stream for any period of time generally reside in deeper pools. Adequate cover and cool temperature are critical habitat variables for adults that hold over for the entire summer.

Based on information from Waddell Creek, other central California coastal steelhead streams, and SFPUC's studies of adfluvial *O. mykiss* above Calaveras and San Antonio Reservoirs, the expected migration timing for each steelhead life stage is presented in **Table 3-2**.

---

23 Bell, M. C., 1986. *Fisheries handbook of engineering requirements and biological criteria.* U.S. Army Corps of Engineers, Office of the Chief of Engineers, Portland, OR.

24 Bjornn, T. C. and Reiser, D. W., 1991. Habitat Requirements of Salmonids in Streams. In *Influences of Rangeland Management on Salmonid Fishes and Their Habitats* (Meehan), Ed., American Fisheries Society, Bethesda, MD.

25 Bell, M. C., 1986. *Fisheries handbook of engineering requirements and biological criteria.* U.S. Army Corps of Engineers, Office of the Chief of Engineers, Portland, OR.

26 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

27 Shapovalov, L. and A.C. Taft. 1954. *The Life Histories of the Steelhead Rainbow Trout and Silver Salmon.* State of California, Department of Fish and Game. Fish Bulletin No. 98.

TABLE 3-2
EXPECTED MIGRATION TIMING FOR STEELHEAD IN ALAMEDA CREEK

Life Stage	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Adult Immigration			■	■	■	■	■					
Juvenile Emigration						■	■	■	■			
Post-spawn Adult Emigration				■	■	■	■	■	■			

SOURCE: Gunther et al. 2000; Moyle 2002; SFPUC 2004, NMFS 2011

Spawning

Steelhead select spawning sites with gravel substrate and with sufficient flow velocity to maintain circulation through the gravel and provide a clean, well-oxygenated environment for incubating eggs. Preferred flow velocity is in the range of 1 to 3 feet per second for steelhead and preferred gravel substrate is in the range of 0.25 to 4 inches in diameter.[28]

Typically, sites with preferred features for spawning occur most frequently in the pool tail/riffle head areas where flow accelerates out of the pool into the higher gradient section below. In such an area, the female will create a pit, or redd, by undulating her tail and body against the substrate.

Steelhead have relatively high fecundity with a 22-inch-long female producing around 4,800 eggs and a 30-inch fish producing an average of 9,000-10,000 eggs.[29] Even a 12-inch non-anadromous rainbow trout may produce 1,000 eggs or more. Survival of fertilized eggs through hatching and emergence from the gravel are most often limited by severe changes in flow that can dislodge eggs from the substrate, result in sedimentation, or de-water incubation sites.

Rearing

After emergence from the gravel, fry inhabit low velocity areas along the stream margins. As they feed and grow they gradually move to deeper and faster water. Steelhead juveniles (parr) of 4 to 6 inches (generally in their second year of life) may be commonly found in riffle habitat, particularly in warmer streams. Parr larger than 6 inches are more often found in deeper waters where low velocity areas are in close proximity to higher velocity areas and cover is provided by boulders, undercut banks, logs, or other objects. Heads of pools generally provide classic conditions for older trout. Trout can inhabit quite small streams, particularly in coastal streams. Often habitat may be far more limiting for older juveniles than habitat for younger fish. The critical period is during base flow conditions that generally occur between May and October in central California. Streamflow can drop to very low levels with loss of depth and velocity in riffle and run habitats, or in the extreme, only isolated pools with intervening dry sections of stream.

---

28 Bjornn, T. C. and Reiser, D. W., 1991. Habitat Requirements of Salmonids in Streams. In *Influences of Rangeland Management on Salmonid Fishes and Their Habitats* (Meehan), Ed., American Fisheries Society, Bethesda, MD.

29 Shapovalov, L. and A.C. Taft. 1954. *The Life Histories of the Steelhead Rainbow Trout and Silver Salmon.* State of California, Department of Fish and Game. Fish Bulletin No. 98.

Any diversion or other depletion of streamflow during this critical period can be potentially damaging to rearing juvenile steelhead.

Although standard definitions of good trout rearing habitat often include conditions such as baseflows of at least 25 percent to 50 percent of the average annual daily flow, 1:1 riffle-to-pool ratios, and depths of a foot or more, these conditions may not always be achieved in central California streams that still support relatively good steelhead/rainbow trout populations. Steelhead/rainbow trout populations in central California can occur in streams with relatively low baseflow and in streams varying widely in terms of standard evaluation parameters such as pool:riffle ratio and mean depth. Steelhead juveniles respond to stream conditions that limit habitat for older trout by leaving the small streams to complete the maturation process in the more accommodating ocean environment.

Food and cover are key factors for rearing steelhead.[30] Food availability, in terms of production of aquatic and terrestrial insects, is influenced by substrate composition, extent of riffles, and riparian vegetation. The highest production of aquatic invertebrates is in gravel and cobble substrate with low amounts of fine sediments, often occurring in riffle type habitats. Bjornn et al. (1977)[31] found that the density of rearing steelhead and Chinook salmon in artificial channels was reduced in nearly direct proportion to increased cobble embeddedness. Response to increased embeddedness was even greater during the winter. During the high flows, reduced food abundance, and lower temperatures occurring in winter, steelhead may move into the substrate or other cover. Backwater habitat, small tributaries, or other low velocity areas may also be important winter habitat.

Temperature is also an important factor for steelhead/rainbow trout, particularly during the over-summer rearing period.[32,33] The upper lethal temperature for Pacific salmonids is in the range 23.9 to 25°C for continuous long-term exposure.[34] Some researchers indicate an upper lethal temperature for Pacific salmonids as low as 22.9°C;[35] however, steelhead can survive for short periods at elevated temperatures, especially if abundant food and dissolved oxygen exist. Temperature data suggest that summer and early-fall temperatures in Niles Canyon are within the range considered to be highly stressful or unsuitable for juvenile steelhead.[36]

---

30 Shapovalov, L. and A.C. Taft. 1954. *The Life Histories of the Steelhead Rainbow Trout and Silver Salmon.* State of California, Department of Fish and Game. Fish Bulletin No. 98.

31 Bjornn, T.C., M.A. Brusven, M.P. Molnau, J. H. Milligan, R.A. Klamt, E. Chacho, and C. Schaye, 1977. *Transport of granitic sediment in streams and its effects on insects and fish.* University of Idaho, Forest, Wildlife and Range Experiment Station Bulletin 17, Moscow.

32 Gunther, A.J., J.M. Hagar, and P. Salop. 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

33 Hanson Environmental Inc. 2002. *Air and Water Temperature Monitoring Within Alameda Creek: 2001-2002.* Draft October 1, 2002.

34 Gunther, A.J., J.M. Hagar, and P. Salop. 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

35 Hanson Environmental Inc. 2002. *Air and Water Temperature Monitoring Within Alameda Creek: 2001-2002.* Draft October 1, 2002.

36 Hanson Environmental Inc. 2002. *Air and Water Temperature Monitoring Within Alameda Creek: 2001-2002.* Draft October 1, 2002.

Steelhead Life History Tactics in Alameda Creek

The following discussion presents different life history tactics that steelhead could use in the Alameda Creek watershed in the future. As discussed above, steelhead are the anadromous form of *O. mykiss* and have a highly flexible and complex life history. They may follow a variety of life history patterns and strategies. Historical steelhead life history tactics within the Alameda Creek watershed likely occurred in two broad categories:[37] (1) fry born in the upper tributaries reared for 1 or 2 years, then migrated rapidly to San Francisco Bay, and (2) following emergence in the upper tributaries, fry moved downstream and reared in the main stem and/or Niles Canyon before entering the estuary and San Francisco Bay. The success of a given tactics likely varied year to year and depended upon several factors (e.g., precipitation and flow, temperatures, food availability). Historically (pre-1900s), headwater tributaries likely contributed large smolts directly to San Francisco Bay, especially during consecutive wet years, but many additional large smolts were likely produced by slower migrating juveniles that grew on their way downstream through the main stem channels, before smolting and entering the Alameda Creek estuary and then San Francisco Bay.

Assuming fish passage barriers are remedied and steelhead regain access to the upper watershed in the future, a critical period occurs during juvenile freshwater residency. Juvenile fish may remain in the watershed from less than a year to more than two years. Those residing in freshwater and/or an estuary less than a full year from the time of egg deposition are categorized as ‘0+ juveniles’. Juveniles that spend one complete winter in freshwater and/or an estuary are categorized as ‘1+ juveniles’ and those that remain for two complete winters in freshwater and/or an estuary are categorized as ‘2+ juveniles’. Prior to entering the Pacific Ocean, all juveniles physiologically transform into salt-tolerant smolts. Smolts mature into adults and may remain in the Pacific Ocean from 1 to 3 years (or more) before returning to their natal streams to spawn. In California, most adult steelhead returning to spawn have spent at least one full winter rearing as juveniles (i.e., as 1+ juveniles) in their natal watershed.[38,39]

Often each unique period of juvenile freshwater residency (i.e., staying less than a year, more than one full year, and slightly more than two full years in the watershed) is considered a separate life history tactics. While helpful, the juvenile residency categories do not sufficiently differentiate patterns of watershed use. For example, a juvenile steelhead spending one winter in Alameda Creek (a ‘1+ juvenile’) might reside high in the headwaters then migrate rapidly to San Francisco Bay, or it might move far downstream shortly following emergence to spend the entire winter in Niles Canyon (if suitable conditions exist) before migrating to San Francisco Bay in late-spring. Both would enter San Francisco Bay as 1+ smolts, but their life history tactics within the watershed would have been fundamentally different.[40,41]

---

37 McBain and Trush, 2008, *Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead.* Prepared for the Alameda Creek Fisheries Restoration Workgroup.

38 McBain and Trush, 2008, *Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead.* Prepared for the Alameda Creek Fisheries Restoration Workgroup.

39 McBain and Trush, 2012. *Evaluating Priority Life History Tactics for Reintroduced Alameda Creek Steelhead.* Prepared for: Alameda Creek Fisheries Restoration Workgroup.

40 McBain and Trush, 2008, *Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead.* Prepared for the Alameda Creek Fisheries Restoration Workgroup.

41 McBain and Trush, 2012. *Evaluating Priority Life History Tactics for Reintroduced Alameda Creek Steelhead.* Prepared for: Alameda Creek Fisheries Restoration Workgroup.

A key factor in determining steelhead survival and recovery success is the growth of juveniles during freshwater residency and smolt transition. Fish size at smolting is important to steelhead survival, and big smolts are much more likely to return as spawning adults than small smolts.[42,43] Growth rates during the juvenile rearing period are greatly influenced by both the availability (e.g., access and quantity) and quality (e.g., favorable water temperature and forage availability) of oversummer rearing habitat in the Alameda Creek watershed.

Status in the Primary and Expanded Study Areas

Steelhead formerly inhabited the Alameda Creek watershed prior to construction of dams and other water resource and flood control infrastructure.[44,45] The presence of migratory barriers, notably a grade control weir at the BART crossing, prevents upstream movement of steelhead to potential spawning and rearing habitat, and currently, steelhead can no longer complete their lifecycle in the watershed.

Sightings of migratory *O. mykiss* have been reported downstream of the BART weir, adjacent to the inflatable dam operated by the ACWD. In 1998, individuals were captured by citizens groups and released in the mouth of Niles Canyon upstream of the inflatable diversion dam. There are also reports of migratory *O. mykiss* spawning in Alameda Creek downstream of the middle inflatable dam, and in 1998 fertilized eggs were collected from this area immediately downstream of the BART weir. The eggs hatched successfully and the resulting fry were released into Alameda Creek in Sunol Park.[46]

Steelhead along the central California coast enter freshwater to spawn when winter rains have been sufficient to raise streamflows. Increased streamflow during runoff events also appears to provide cues that stimulate migration and allows better conditions for fish to pass obstructions and shallow areas on their way upstream. If anadromous steelhead become re-established in Alameda Creek, operation of the ACDD and Calaveras Dam would influence streamflow and water temperature in Alameda Creek, which in turn would influence steelhead during its various life history stages. Higher flows may enable upstream migrating adults and downstream migrating adult steelhead and steelhead smolts to pass critical riffles and other migration obstacles. Reduced streamflows may result in higher water temperature, while releases from a restored Calaveras Reservoir may result in lower water temperatures, and could affect steelhead migrating later in the spring.

---

42 McBain and Trush, 2008, *Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead.* Prepared for the Alameda Creek Fisheries Restoration Workgroup.

43 McBain and Trush, 2012. *Evaluating Priority Life History Tactics for Reintroduced Alameda Creek Steelhead.* Prepared for: Alameda Creek Fisheries Restoration Workgroup.

44 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

45 Leidy, R.A., 2007. Ecology, *Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California.* San Francisco Estuary Institute, April 2007. Contribution No. 530.

46 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

Both the primary and extended study areas are anticipated to function only as migratory habitat for steelhead if they are restored to the upper watershed, with adults migrating through both study areas during winter months, and the majority of repeat spawners, young-of-year, or older smolt returning downstream in late spring. The primary limiting factors for all life stages of steelhead in Alameda Creek are water temperature and both natural and man-made barriers. In both the primary and extended study areas, currently water temperatures are generally too high during summer months to support steelhead rearing, and over-summering steelhead are not expected to occur in these portions of Alameda Creek.[47] This expectation has been supported by fisheries data which shows that both the primary and extended study areas support a warm-water fish assemblage.[48]

3.1.2 Other Fisheries in Alameda Creek

As discussed above, collections from the watershed include widely distributed native and non-native species typical of streams in the region;[49,50,51] however, no data on fish presence are available for the reach of Alameda Creek in the primary study area because no known sampling has taken place within this reach. Largemouth bass and bluegill were observed (visually) in a few of the deeper pools in this reach during the 2015 habitat assessment survey. It is unknown whether they are transients in this reach rather than part of a self-sustaining population. Largemouth bass are predatory species that may preclude the year-round presence of native species such as Sacramento sucker or roach, which might otherwise occur in this low gradient, warm-water reach.

3.2 Past and Present Influences on Habitat Conditions

The hydrologic and fisheries habitat conditions in Alameda Creek adjacent to and downstream of the proposed ACRP have been and are currently influenced by a number of historical and existing facilities and operations under the jurisdiction of the SFPUC, Alameda County Water District (ACWD), Alameda County Flood Control and Water Conservation District (ACFCWCD), Department of Water Resources, and Zone 7 Water Agency, among others. The natural and unimpaired flow conditions that existed pre-20th century have been substantially altered by the construction and current operation of many of these facilities. Some of these facilities are direct barriers to fish migration, while other facilities pose various degrees of control/influence over habitat conditions. The major structures, facilities, and fish passage barriers or obstacles are listed below (see **Figure 3-1**):

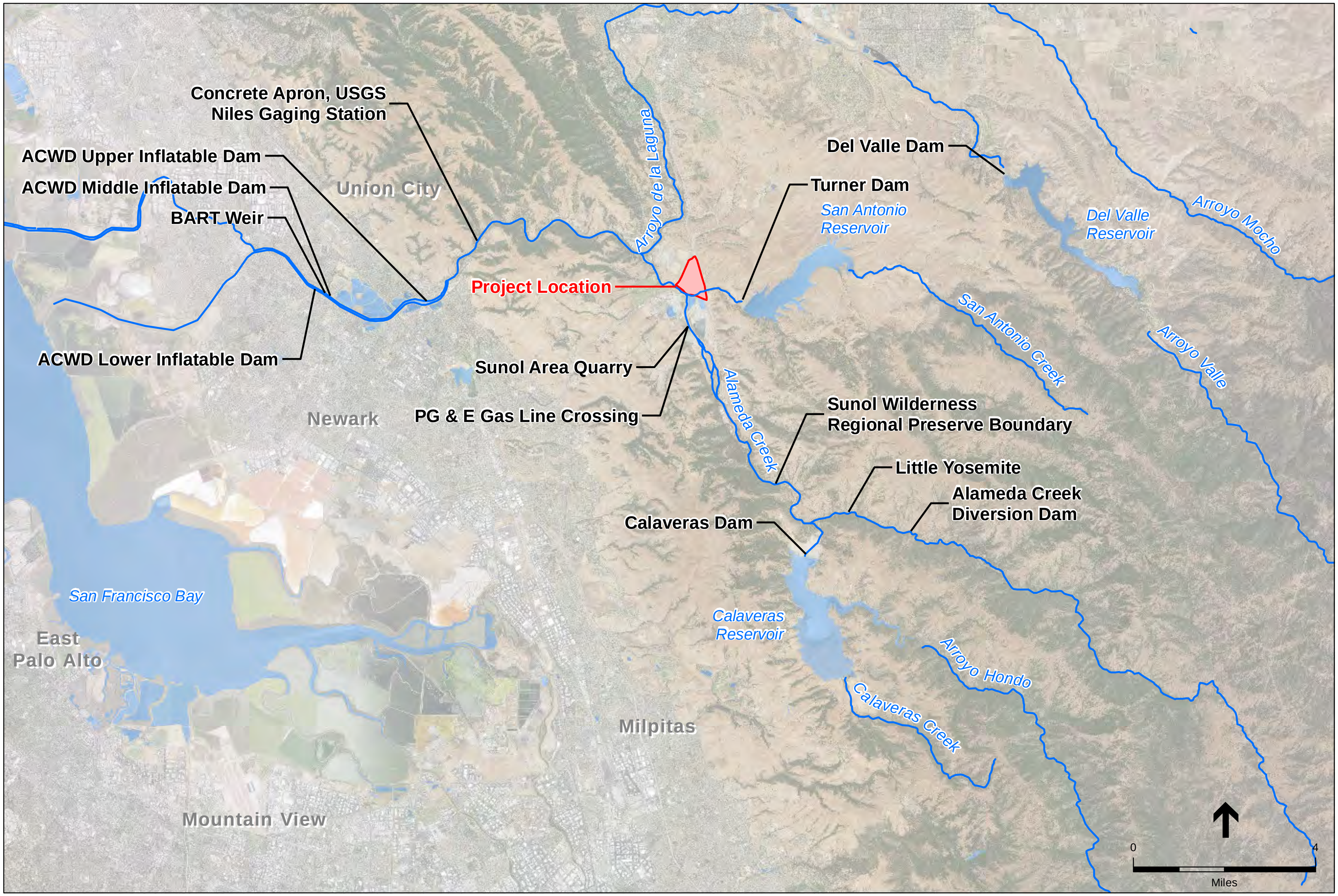
47 EDAW & Turnstone Joint Venture (ETJV), 2008. *Calaveras Dam Replacement Project Fisheries Technical Report 2008*. Prepared by Hagar Environmental Science and Thomas R. Payne and Associates for EDAW & Turnstone Joint Venture and SFPUC.

48 Leidy, R.A., 2007. Ecology, *Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California.* San Francisco Estuary Institute, April 2007. Contribution No. 530.

49 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

50 EDAW & Turnstone Joint Venture (ETJV), 2008. Calaveras Dam Replacement Project Fisheries Technical Report 2008. Prepared by Hagar Environmental Science and Thomas R. Payne and Associates for EDAW & Turnstone Joint Venture and SFPUC.

51 Leidy, R.A., 2007. Ecology, Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California. San Francisco Estuary Institute, April 2007. Contribution No. 530.



SOURCE: ESA, 2015

SFPUC Alameda Creek Recapture Project

Figure 3-1
Major Facilities and Fish Passage Barriers/Obstacles in the Alameda Creek Watershed

- Upstream of or adjacent to the proposed ACRP:
  - Calaveras Dam and Reservoir;
  - ACDD and diversion tunnel;
  - Sunol Valley aggregate mining operations;
  - Sunol Valley historic stream relocation and channelization;
  - Turner Dam and San Antonio Reservoir (barriers to fish passage in upper San Antonio Creek);
  - Sunol Valley infiltration galleries; and
  - PG&E gas pipeline crossing protection covering (concrete mat).
- Downstream of the proposed ACRP:
  - Del Valle Dam and Reservoir/South Bay Aqueduct, including DWR SWP releases;
  - Quarry Lakes recharge facilities;
  - Various channelized and culverted stream segments;
  - Expanding urban development of the Tri-Valley Area;
  - USGS Niles gaging station (11179000) weir/apron;
  - ACWD's inflatable dams;
  - BART Weir; and
  - ACFCWCD channelization project.

3.3 Alameda Creek Habitat Conditions

3.3.1 Hydrology

Existing Conditions

Over the last century, the natural hydrology of the Alameda Creek watershed has been altered by water supply system operations, gravel mining, urban development and flood reduction measures. However, almost all of the urban development and flood reduction projects are located outside of the primary study area. The primary anthropogenic factors affecting the natural hydrology of Alameda Creek in the primary study area are water supply system operations and gravel mining.

Alameda Creek flows from its headwaters near Mount Hamilton northward through Sunol-Ohlone Regional Wilderness and the Sunol Valley to its confluence with Arroyo de la Laguna. Just downstream of the confluence it turns and flows westward through Niles Canyon and across the Bay Plain to San Francisco Bay. Its total length is 46 miles.

The uppermost reach of Alameda Creek flows through rugged and underdeveloped terrain from its headwaters to the ACDD. The creek channel upstream of the diversion dam slopes steeply, descending in a narrow well-defined channel at an average rate of about 125 feet per mile. Water that passes over the diversion dam continues through a steep channel, including the gorge known as Little Yosemite, to Alameda Creek's confluence with Calaveras Creek at the southern end of the Sunol Valley. The reach of the creek between the diversion dam and the confluence with Calaveras Creek descends at an average rate of about 165 feet per mile.

Downstream (north) of the Calaveras Creek confluence, Alameda Creek's channel slope becomes much flatter, descending at a rate of about 27 feet per mile through the Sunol Valley. From the confluence, Alameda Creek flows for several miles in a well-defined channel contained within the valley bottom to the Calaveras Road bridge. The channel width ranges between 100 and 250 feet in this reach, but widens out to about 500 feet downstream of the bridge. From the Calaveras Road bridge to the San Antonio Pumping Plant bridge, the creek flows in a broad sometimes braided channel. Downstream of the San Antonio Pumping Plant bridge, levees confine the channel until the creek reaches the I-680 bridge, including Subreach A in the primary fisheries study area. About 20 years ago, this section of Alameda Creek was relocated westward to facilitate gravel quarrying in the area occupied by the creek's historical channel.

Downstream (north) of I-680, the creek flows along the west side of the Sunol Valley to its confluence with Arroyo de la Laguna (Subreaches B and C of the primary study area). Beyond the confluence (extended study area), the channel steepens as Alameda Creek flows through Niles Canyon, before flattening again as the creek flows across the Bay Plain. The most downstream reach of Alameda Creek flows through an urbanized area and is confined between levees.

From its headwaters to the ACDD, discharge in Alameda Creek has been largely unaffected by human activities; below the diversion dam it is affected by SFPUC's water supply operations. If the gates on the tunnel entrance at the diversion dam were open and the creek discharge was less than 650 cfs, all the water in the creek was historically diverted through the tunnel to Calaveras Reservoir. Stream discharge in excess of 650 cfs passed over the diversion dam and continues down Alameda Creek. Typically, discharge only exceeds 650 cfs for a few hours during storms. If the gates to the tunnel are closed the entire discharge passes over the diversion dam and continues down Alameda Creek.

Downstream of the ACDD, Alameda Creek flows to its confluence with Calaveras Creek. Calaveras Creek adds water to Alameda Creek as a result of stormwater runoff to Calaveras Creek below Calaveras Dam, and releases or spills from the dam. Releases and spills from the dam have been infrequent and irregular.

Below its confluence with Calaveras Creek, Alameda Creek flows through the Sunol Valley. The creek gains water from tributary streams and loses water to streambed gravels in this reach. The characteristics of the alluvium in this reach of the creek suggest that losses to subsurface water bodies have always occurred, but have likely been increased by the proximity of gravel pits to the creek. The creek gains water near the proposed project area when gravel quarry operators pump excess water out of gravel pits and discharge it to the creek (for more information, see subsequent section entitled "Subsurface Water").

The Arroyo de la Laguna joins Alameda Creek about two miles downstream of the proposed project area. The Arroyo de la Laguna drains a much larger area than the upper reaches of Alameda Creek. Flow in Alameda Creek below the Arroyo de la Laguna confluence increases substantially as a result of runoff from the larger drainage basin. It is further increased by releases of water from Del Valle Reservoir, south of the city of Livermore. Del Valle Reservoir is a component of the California State Water Project. Del Valle Reservoir stores local runoff and water diverted from the Sacramento-San Joaquin Delta. Water released from Del Valle Reservoir flows down Arroyo de la Laguna to Alameda Creek where it is recaptured by Alameda County Water District, a state water contractor, as it exits Niles Canyon.

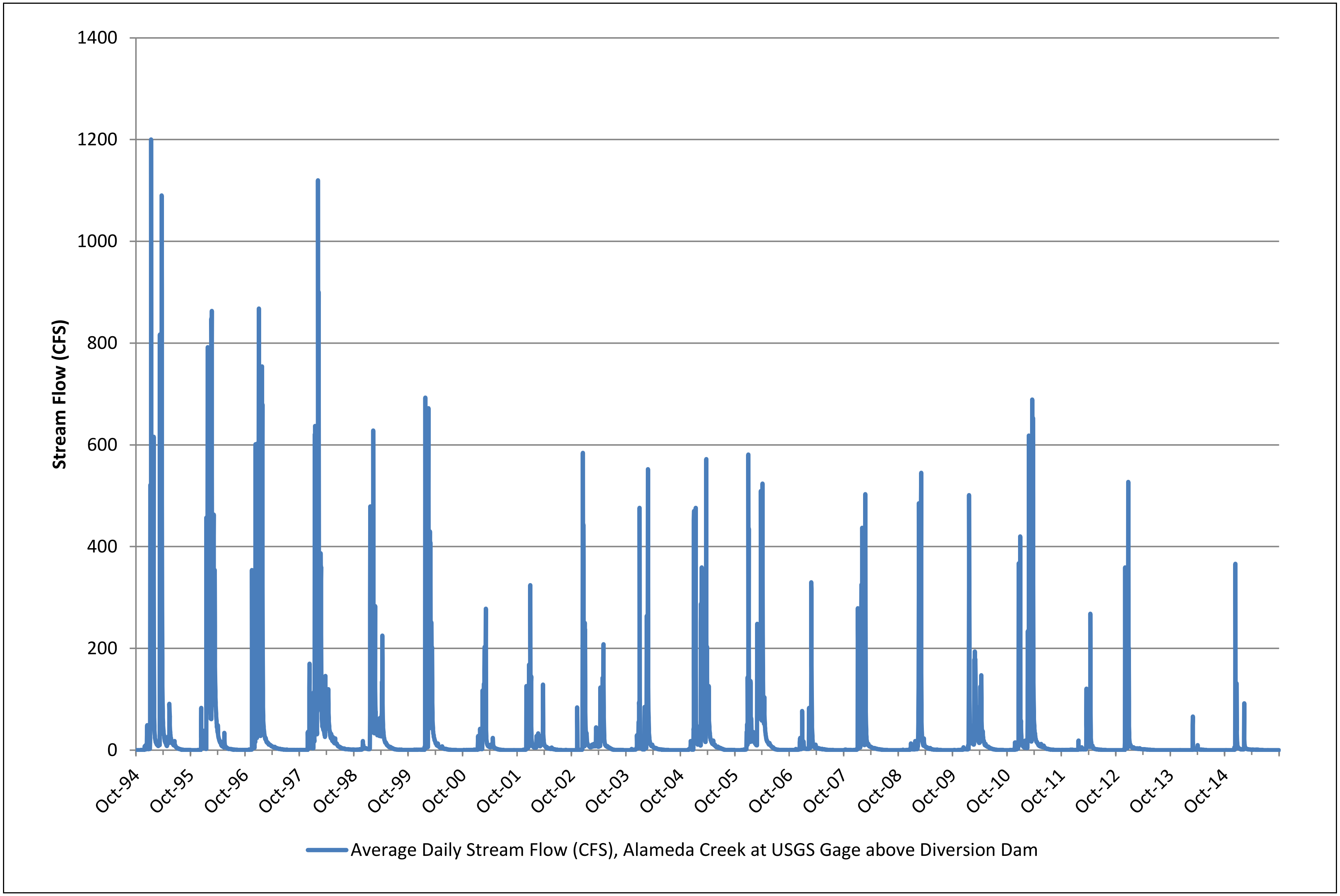
The USGS measures discharge at five stream gages located along Alameda Creek: (1) upstream of the Alameda Creek Diversion Dam; (2) below the Calaveras Creek confluence; (3) below the Welch Creek confluence; (4) at the downstream end of Niles Canyon; and (5) in the section of the creek confined between levees near the I-880 bridge.

The USGS stream gage just upstream of the Alameda Creek Diversion Dam has been in place since 1995. **Figure 3-2** is a plot of gauging data from 1995 until 2013. The gage records unimpaired flow from the upper Alameda Creek watershed; that is, flow largely unaffected by the SFPUC's water supply system operations or other human activities. The plot shows that Alameda Creek is a naturally flashy stream. A flashy stream is one where discharge can vary greatly from day-to-day and even hour-to-hour in response to rainfall over the watershed.

Measured discharge (i.e., creek flow) at the other four USGS gages on Alameda Creek is affected by the SFPUC's municipal water system operations. The effects of the SFPUC's water system operations on flow in Alameda Creek are different for the three periods: (1) Before 2001, the SFPUC operated Calaveras Reservoir in a manner that took advantage of its full storage, except for a limitation that the reservoir could not normally be drawn down below elevation 690 feet to prevent entrainment of fish in the outlet works; (2) In 2001, the DSOD imposed restrictions on storage in Calaveras Reservoir. From 2001 until 2011, the SFPUC operated Calaveras Reservoir in accordance with the storage restrictions; and (3) In 2010, construction of the new Calaveras Dam began and in 2011 the SFPUC began making releases from the reservoir to accommodate construction activities.

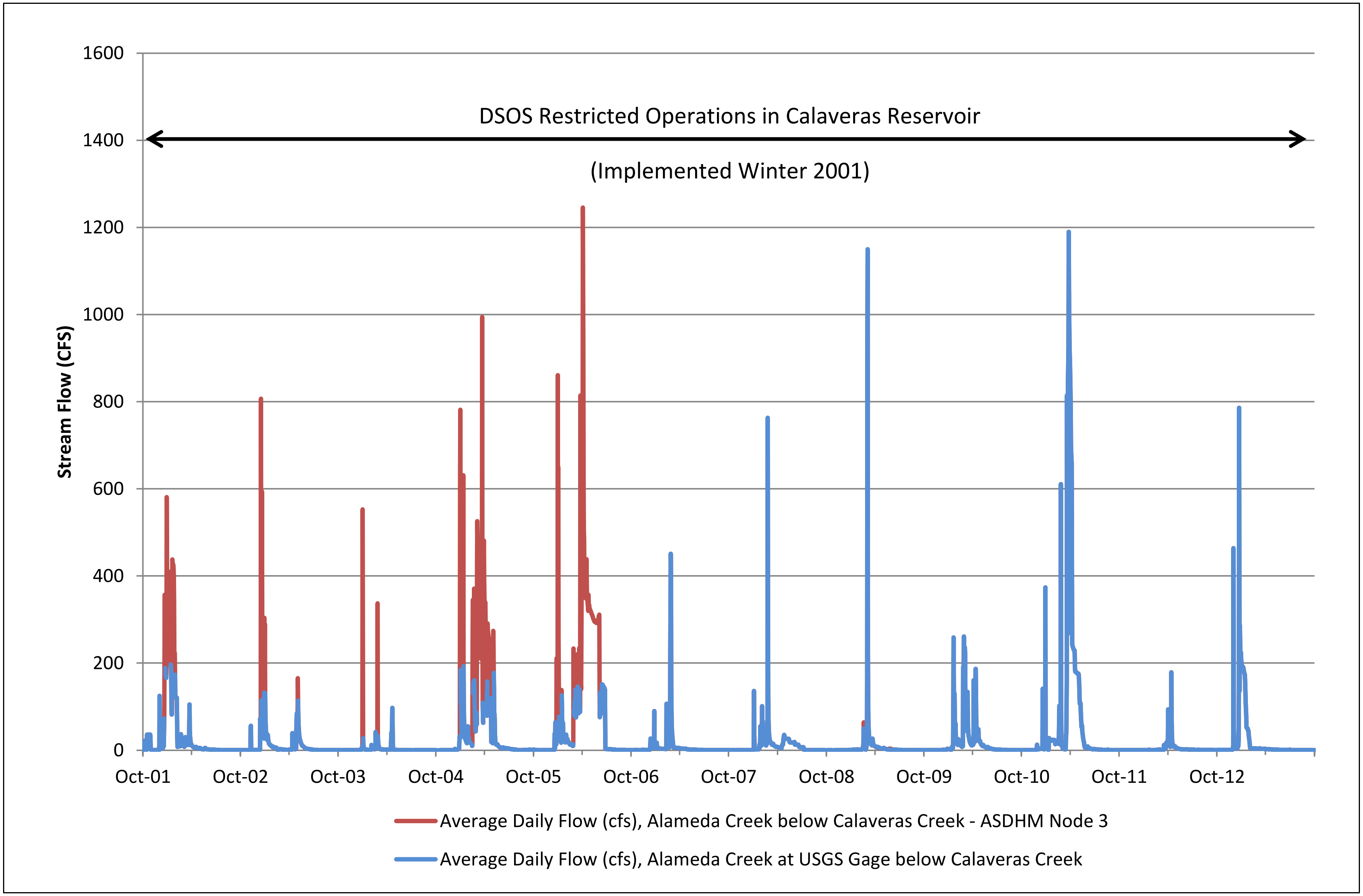
Since 2001, when the DSOD imposed storage restrictions, the SFPUC has captured less water from the watershed upstream of Calaveras Reservoir and has diverted less water from Alameda Creek to the reservoir than it would have in the absence of the storage restrictions.

Figure 3-3 shows flow in Alameda Creek at the USGS gage just downstream of the Calaveras Creek confluence for the period from Water Year 2002 to Water Year 2010. The gage could not record discharges above 200 cfs until September 2006. Flow in Alameda Creek at the USGS gage just downstream of the Welch Creek confluence for the period from 2000 until 2013 and at Niles for the period 1996 to 2015 is shown in **Figure 3-4**. The USGS gage on Alameda Creek at Niles is strongly influenced by flows from the large Arroyo de la Laguna watershed, including water released from the State Water Project's Del Valle Reservoir to the Arroyo de la Laguna watershed above its confluence with Alameda Creek.



SOURCE: USGS, 2015. Mean daily discharge values for USGS Gage 11172945, Alameda Creek Above Diversion Dam Near Sunol, CA. Text file retrieved from USGS website October 08, 2015.

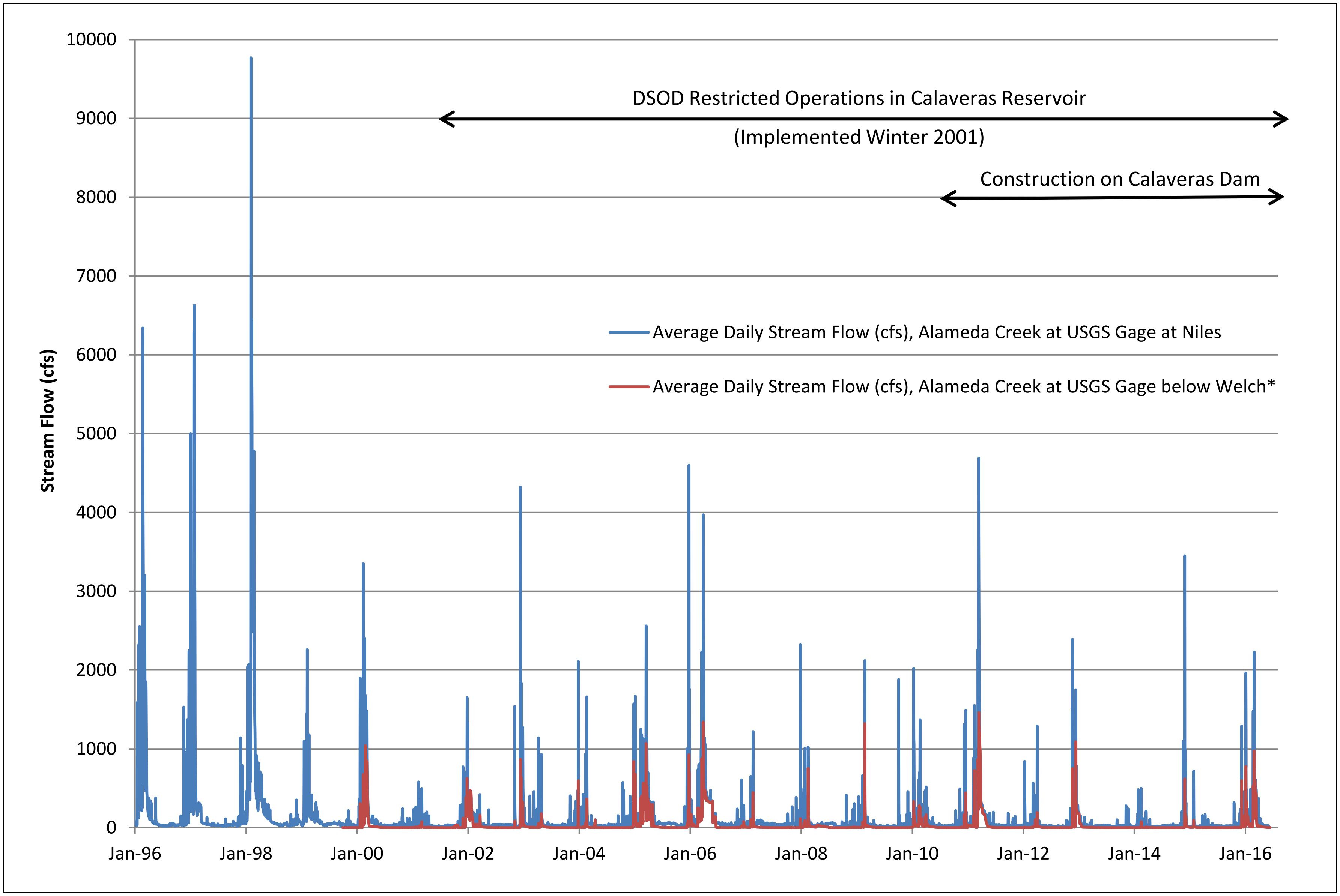
Figure 3-2
Alameda Creek Discharge at the USGS Gage Upstream of the Alameda Creek Diversion Dam



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Mean daily discharge values for USGS Gage 11173510. Alameda Creek Below Calaveras Creek Near Sunol, CA. Text file retrieved from the USGS website on July 7, 2016.

NOTE: USGS records were restricted to <200 cfs from October 2001 to September 2006. Discharge estimates for the Existing Condition scenario from the ASDHM have been included for reference

Figure 3-3
Alameda Creek Discharge at the USGS Gage Below the Confluence with Calaveras Creek



SOURCE: USGS, 2016. Mean daily discharge values for USGS Gage 11173575, Alameda Creek Below Welch Creek Near Sunol, CA. Text file retrieved from USGS website on June 26, 2016.

USGS, 2016. Mean daily discharge values for USGS Gage 11179000, Alameda Creek Near Niles, CA. Text file retrieved from USGS website on June 26, 2016.

*Records only available for WY 2000 - 2016

Figure 3-4
Historical Alameda Creek flow measured at the USGS Gage below Welch Creek and at Niles

Table 3-3 is a summary of monthly discharge at the USGS gage above the Alameda Creek Diversion Dam from Water Year 1996 through Water Year 2013 expressed in cubic feet per second (cfs). The period Water Year 1996 through Water Year 2013 was chosen as the best period for comparisons of measured flows with simulated future flows. **Tables 3-4**, **3-5** and **3-6** show similar information for the USGS gages on Alameda Creek downstream of the Calaveras Creek confluence, downstream of Welch Creek confluence, and at Niles. The maximum flow at the gage above the ACDD typically occurs in February. The maximum flow at the three downstream gages typically occurs in March.

TABLE 3-3
ALAMEDA CREEK ABOVE ACDD –
USGS AVERAGE DAILY VALUES WATER YEARS 1996-2013 (cfs)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	0.2	2.3	26.4	60.1	82.1	50.4	25.2	7.4	2.6	0.8	0.3	0.2
Max Daily Average	1.5	354	602	868	1120	689	524	208	14	5.8	2.6	1.5
Min Daily Average	0.0	0.0	0.0	0.4	1.2	1.5	2.4	0.5	0.0	0.0	0.0	0.0
% of Av. Annual Flow	0.1	0.9	10.2	23.3	31.8	19.5	9.8	2.9	1.0	0.3	0.1	0.1

SOURCE: USGS, 2016. Mean daily discharge values for USGS Gage 11172945, Alameda Creek Above the Alameda Creek Diversion Dam Near Sunol, CA. Accessed on July 6, 2016.

TABLE 3-4
ALAMEDA CREEK BELOW CALAVERAS CREEK –
USGS AVERAGE DAILY VALUES WATER YEARS 1996-2010 (cfs)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	1.5	1.4	18.7	26.0	28.7	50.8	34.2	11.8	8.2	1.1	0.5	0.3
Max Daily Average	36.0	57.0	786	259	763	1190	858	178	151	7.1	4.4	2.9
Min Daily Average	0.0	0.0	0.1	0.3	0.5	0.7	0.8	0.2	0.1	0.0	0.1	0.0
% of Av. Annual Flow	0.8	0.8	10.2	14.2	15.7	27.7	18.7	6.4	4.5	0.6	0.3	0.2

SOURCE: United States Geologic Survey (USGS), 2016. Annual mean discharge values for USGS Gage 11173510, Alameda Creek Below Calaveras Creek Near Sunol, CA. Accessed on July 6, 2015.

TABLE 3-5
ALAMEDA CREEK BELOW WELCH CREEK –
USGS AVERAGE DAILY VALUES WATER YEARS 2000-2013 (cfs)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	1.7	1.3	37.8	53.3	45.2	103.2	85.4	38.3	12.7	1.1	0.5	0.3
Max Daily Average	34.0	83.0	1090	699	1040	1460	1340	345	335	7.3	2.3	1.9
Min Daily Average	0.0	0.0	0.1	0.7	0.8	2.0	1.4	0.6	0.2	0.1	0.0	0.0
% of Av. Annual Flow	0.5	0.3	9.9	14.0	11.9	27.1	22.4	10.1	3.3	0.3	0.1	0.1

SOURCE: United States Geologic Survey (USGS), 2016. Mean daily discharge values for USGS Gage 11173575, Alameda Creek Below Welch Creek Near Sunol, CA. Accessed on July 6, 2016.

TABLE 3-6
ALAMEDA CREEK NEAR NILES - USGS AVERAGE DAILY VALUES WATER YEARS 1996-2013 (cfs)

Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	42.5	56.6	166.8	307.7	491.7	287.8	172.8	74.2	42.7	33.0	32.0	31.1
Max Daily Average	1880	1540	4600	6630	9770	4690	3970	928	340	68.0	112	152
Min Daily Average	7.1	7.6	12.0	12.0	14.0	18.0	12.0	10.0	8.0	7.7	5.9	3.8
% of Av. Annual Flow	2.4	3.3	9.6	17.7	28.3	16.5	9.9	4.3	2.5	1.9	1.8	1.8

SOURCE: USGS, 2016. Mean daily discharge values for USGS Gage 11179000, Alameda Creek Near Niles, CA. Accessed on July 6, 2016.

Table 3-7 presents the average annual flow and the average annual volume at the four gages. Flow generally increases in a downstream direction. The total volume of flow in Alameda Creek below the Calaveras Creek confluence is lower than it is above the ACDD because the SFPUC diverts some of the water in the creek to Calaveras Reservoir at the diversion dam. **Figure 3-5** shows annual hydrographs for Water Years 2006 and 2007, respectively representative normal/wet year and dry years at the gage located above the ACDD.

TABLE 3-7
COMPARISON OF ANNUAL ALAMEDA CREEK GAGE DATA, WATER YEARS 1996-2013

Gauge Location	Average Annual Flow (cfs)	Average Annual Volume (acre-feet)
Alameda Creek above ACDD	20.7	15,026
Alameda Creek below Calaveras Creek	14.5	10,494
Alameda Creek below Welch Creek*	31.7	22,972
Alameda Creek near Niles Canyon	143.1	103,660

* records only available for WY 2000 to WY 2013

SOURCE: USGS, 2016. Mean daily discharge values for USGS Gages. Accessed on July 6, 2016.

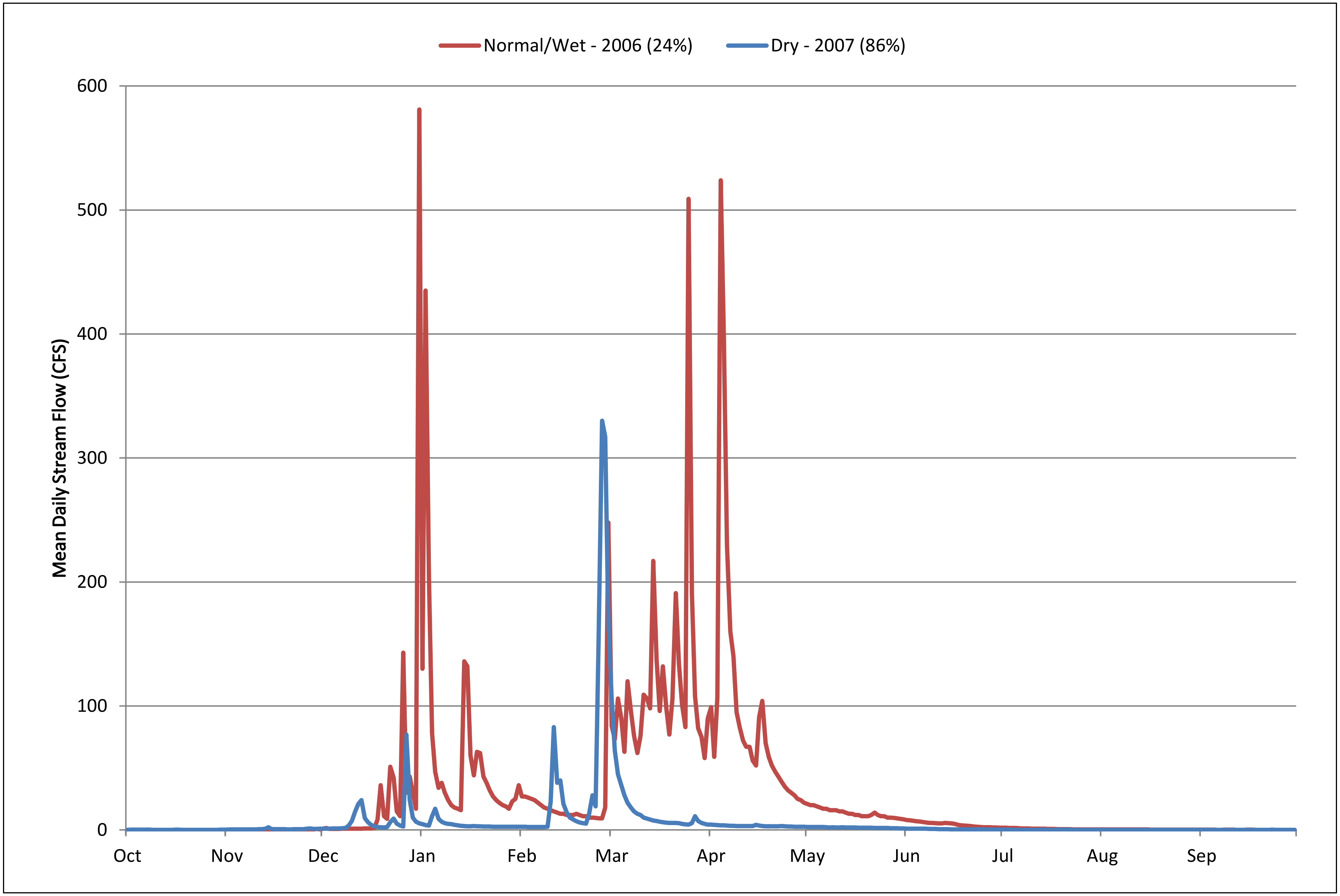
Surface and Subsurface Water Interactions

Below Welch Creek, Alameda Creek streamflow splits into surface and subsurface components as surface water percolates through unsaturated alluvial materials.[52] Water in the saturated zone then flows under the prevailing down-valley gradient and is governed by the hydraulic properties of the alluvium and other underlying aquifer materials. For the ACRP study area setting, subsurface flow is constrained within the shallow stream channel gravels as the fines content in the deeper, older alluvium and Livermore gravels impedes deeper groundwater recharge and movement.

The component of streamflow that enters the subsurface in Alameda Creek above the quarry reach follows two pathways. First, a fraction seeps (documented at a maximum rate of 17 cfs)[53] into quarry pits connected through the shallow, transmissive stream channel gravels. This pathway is evident through seepage faces on the walls of the quarry excavations and it is measurable through the rise in

52 Alluvial materials are loose, unconsolidated (not cemented together into a solid rock) soil or sediments, which have been eroded, reshaped by water in some form, and redeposited.

53 Dhakal, Buckland and McBain. 2012. *Overview of Methods, Models and Results to Develop Unimpaired, Impaired and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrologic Years 1996-2019.*



SOURCE: 7. USGS, 2015a. Mean daily discharge values for USGS Gauge 11172945, Alameda Creek Above Diversion Dam Near Sunol, CA. Text file retrieved from USGS website October 08, 2015; USGS, 2015b. Annual mean discharge values for USGS Gauge 11173200, Arroyo Hondo Near San Jose, CA. Text file retrieved from USGS website on August 21, 2015.

NOTE: Exceedance probabilities (in parentheses) were calculated using data from the Arroyo Hondo gauge for Water Years 1969-2015 (longest gauge record for upper watershed).

Figure 3-5

Normal/Wet (2006) and Dry (2007) Water Year Hydrographs for Alameda Creek Above ACDD water levels in pits. Water that seeps into the pits generally has no outlet unless the pit levels rise above the boundary between the shallow stream channel gravels and the underlying older alluvium/Livermore gravels units. Therefore, water that seeps into a pit is stored (bound by the less transmissive older alluvium/Livermore gravels) unless it is removed by pumping (i.e., operator discharges to the creek or consumptive use through processing), lost through evaporation, or it seeps out of pits if levels rise above the base of the stream channel gravels and shallow subsurface water elevation. A second pathway for the subsurface component of flow follows the stream channel past the quarry reaches and ultimately to the confluence of Alameda Creek and Arroyo de la Laguna. Along this pathway, multiple studies have observed an additional loss of flow to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences (documented at a maximum rate of 7.5 cfs) depending on streamflow.[54,55]

In the lower subreaches (B and C) of the primary study area, some water would be consumed through evapotranspiration where groundwater was exposed or near the ground surface and another fraction intercepted in the Sunol Filter Gallery. Moving down gradient, the remaining subsurface water would eventually drain from the valley as outflow down Alameda Creek past the confluence with Arroyo de la Laguna where it will continue as underflow until the shallow stream channel gravels become confined. At that point, which is generally the upper extent of Niles Canyon, groundwater and surface water components are nearly completely rejoined as surface flow.

During winter and spring months, precipitation-generated streamflows in Alameda Creek fill shallow aquifer space within the stream channel gravels and groundwater seeps into mining pits and, above a maximum loss rate threshold (17 cfs) between Welch and San Antonio Creeks,[56] would move past the pits to the lower reaches. As the shallow aquifer space fills and reaches saturation, the loss rate of surface water into the subsurface decreases, resulting in a larger portion of the flow remaining as surface water and flowing downstream through the Sunol Valley. This saturation flux and associated changing loss rate varies year-to-year with different streamflows (i.e., magnitude, timing, and duration of bypasses at ACDD and releases from Calaveras Dam), carryover alluvium capacity, pit water surface conditions, and quarry discharges to Alameda Creek.

Additional discussion of surface and subsurface water interactions is provided in *Groundwater-Surface Water Interactions, ACRP Biological Resources Study Area Technical Report*.[57]

54 Trihey and Associates, Inc., 2003. *Sunol Valley Surface Flow Study, Fall 2001*. Prepared for the Office of the City Attorney, City and County of San Francisco.
55 Entrix, Inc., 2006. *Alameda Creek Streamflow Study*. Prepared for Kennedy/Jenks Consultants.
56 Dhakal, Buckland and McBain. 2012. *Overview of Methods, Models and Results to Develop Unimpaired, Impaired and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrologic Years 1996-2019*.
57 LSCE. 2016. *Groundwater-Surface Water Interactions, ACRP Biological Resources Study Area*. Prepared for ESA and San Francisco Public Utilities Commission. November 2016. Prepared by Luhdorff & Scalmanini Consulting Engineers. (See Appendix HYD2)

Water Quality

Data on water quality in Alameda Creek upstream of its confluence with the Arroyo de la Laguna are limited, but the available data are sufficient to conclude that water quality is generally good and as much as would be expected from a watershed that consists of undeveloped rangeland, parkland and land set aside as a water supply catchment. Upstream of the quarry reach, there are no point sources of wastewater discharge to Alameda Creek and water primarily enters the creek as surface runoff during storms.

The SFPUC gathered water quality data at several locations along Alameda Creek between 1998 and 2007, as part of a multi-year monitoring program to characterize conditions in the creek. The monitoring program was a provision of a Memorandum of Understanding (MOU) between the SFPUC and CDFW, formerly California Department of Fish and Game.

Water quality data were obtained in the course of electro-fishing surveys that were a part of the monitoring program. The surveys were conducted in October of each year. **Table 3-8** shows average data from a sampling station in Alameda Creek located about 500 feet downstream of the Calaveras Creek confluence and about six miles upstream of the proposed project area. Data were taken in two habitat types, a pool flowing into a glide and a low-gradient riffle. **Table 3-9** shows average data from a sampling station located just downstream of the Calaveras Road Bridge and about three miles upstream of the proposed project area. Data were taken from three habitat types: a glide flowing into a deep pool that flowed back into a glide, a low gradient riffle flowing into a run, and a continuous run. Data from the two sites provide some insight into water quality in the fall when average daily streamflow is low, typically only 1 or 2 cubic feet per second. However, the data are the result of instantaneous measurements and offer no information on temporal variation of water quality characteristics.

TABLE 3-8
WATER QUALITY CHARACTERISTICS:
ALAMEDA CREEK BELOW CALAVERAS CREEK CONFLUENCE

Year	Temperature, Degrees C	Turbidity, NTU	pH	Dissolved Oxygen Content, mg/l	Conductivity, mmhos/cm
1998	NR	1.0	7.9	9.5	664
1999	15.0	2.0	7.3	NR	619
2000	10.2	0.6	8.1	8.1	NR
2001	NR	NR	NR	NR	NR
2002	16.1	1.3	8.1	8.1	NR
2003	14.9	0.4	7.9	8.4	580
2004	13.9	0.7	7.4	6.1	1,030
2005	13.6	0.5	8.0	9.0	793
2006	14.2	0.4	8.2	8.2	599
2007	13.9	0.8	8.1	NR	828

SOURCE: SFPUC.

TABLE 3-9
WATER QUALITY CHARACTERISTICS:
ALAMEDA CREEK BELOW CALAVERAS ROAD BRIDGE

Year	Temperature, Degrees C	Turbidity, NTU	pH	Dissolved Oxygen Content, mg/l	Conductivity, mmhos/cm
1998	NR	NR	7.1	9.4	NR
1999	16.6	1.0	7.0	NR	515
2000	14.8	0.6	7.9	8.5	NR
2001	15.7	1.1	7.4	4.3	NR
2002	13.4	2.0	7.7	6.3	NR
2003	17.5	0.4	7.3	6.4	978
2004	16.0	0.4	7.4	6.8	596
2005	17.5	1.2	7.4	6.4	538
2006	16.3	0.7	7.7	5.5	566
2007	13.7	0.9	7.7	NR	522

SOURCE: SFPUC.

Alameda Creek water was fairly free of turbidity or suspended material at both sampling stations and its pH was in the normal range for natural waters. Dissolved oxygen content was higher at the upstream station and usually in compliance the state's objective for cold-water fish. At the downstream station, dissolved oxygen content was usually in compliance with the state's objective for warm-water fish but was rarely in compliance with the cold-water fish objective. Electric conductivity of surface water at the upper station averaged 752 mmhos/cm; at the downstream station it averaged 629 mmhos/cm. These values correspond roughly with total dissolved solids contents of 500 mg/l and 420 mg/l, respectively, and are considerably above the state's objective of 250 mg/l. Creek water was warmer at the downstream sampling station than it was at the upstream one.

As part of the monitoring program, the SFPUC installed continuously-recording water temperature measuring devices at several locations along Alameda Creek. The highest water temperatures at all locations on Alameda Creek were recorded in the months of July, August, and September. **Table 3-10** summarizes water temperature data obtained from a device located in Alameda Creek about 500 feet downstream of the Calaveras Creek confluence. Temperatures were measured every 15 minutes and exhibited considerable fluctuation during the day. The greatest fluctuations occurred in the warmest months.

In March 2008, SFPUC biologists measured turbidity in Alameda Creek at three locations close to the proposed project area: just above the San Antonio Creek confluence, at the confluence, and just below the confluence. The measurements all range between 0.84 and 2.7 NTU indicating that creek water at these locations was fairly free of suspended material.[58]

[58] SFPUC, 2008. San Francisco Public Utilities Commission, *San Antonio Creek Pre-discharge Monitoring Technical Memorandum*. March 2008.

TABLE 3-10
WATER TEMPERATURE AND DIURNAL TEMPERATURE FLUCTUATION IN ALAMEDA CREEK BELOW CALAVERAS CREEK CONFLUENCE (degrees C)

Year	Water Temperature			Diurnal Water Temperature Fluctuation		
	Average	Maximum	Minimum	Average	Maximum	Minimum
2000	17.9	24.0	7.3	8.0	12.7	1.7
2001	19.6	24.2	10.6	8.6	13.5	0.7
2002	15.4	21.3	6.6	7.1	13.4	1.1
2003	18.0	23.0	9.2	7.0	10.2	2.0
2004	19.2	23.7	9.6	8.4	12.0	2.0
2005	18.4	26.1	10.2	6.0	8.2	1.7
2006	18.0	24.1	18.0	5.4	9.9	1.8
2007	16.8	29.3	4.2	4.7	7.8	1.0

SOURCE: SFPUC.

With-CDRP Conditions

When compared to the 2015 existing conditions, future operation of new Calaveras Dam and Reservoir following completion of the CDRP will alter the water levels in some surface water bodies, streamflow in Alameda Creek, and subsurface flow in the stream channel gravels and alluvium underlying the creek.

Surface Water Bodies

Calaveras Reservoir

Construction of the CDRP is expected to be completed in 2019 and the reservoir’s nominal capacity of 98,650 acre-feet will be restored. If a wet winter follows project completion the reservoir could fill in a single season; if drier conditions prevail then it may take several seasons to fill the reservoir. Once construction is complete, the SFPUC will operate it much as it did before the DSOD’s restrictions were imposed, except that releases will be made from the reservoir to support aquatic life in Calaveras and Alameda Creeks and less water will be diverted to the reservoir from Alameda Creek. The release schedule for Calaveras Reservoir is shown in Table 2-1. Release schedules are different for dry and normal/wet years, with the classification of the year based on cumulative inflow from Arroyo Hondo into Calaveras Reservoir. Years are expected to be classified as dry 40 percent of the time. Based on the release schedule, the total annual release in dry years would be approximately 5,540 acre-feet; in normal or wet years it would be7,545 acre-feet.

When the CDRP is completed and the reservoir’s capacity is restored, the SFPUC will fill and draw down the reservoir much as it did before the imposition of storage restrictions in 2001, but the magnitude of the dry season drawdown will be greater than formerly. In addition to SFPUC transferring water stored in the reservoir to the SVWTP to meet water demand, water will be released to Calaveras Creek and water will be bypassed at the ACDD in accordance with the instream flow schedules set forth by the CDRP permit requirements. As a result of the releases, without recapture, water surface elevations in Calaveras Reservoir will be lower than they were prior to 2001 (although they will be much higher than they have been since the DSOD imposed storage restrictions in 2001).

Alameda Creek

Physical modifications at the ACDD and at Calaveras Dam that are a part of the CDRP will enable bypass of water at the former structure and release of water from the latter structure to benefit aquatic life. The physical and operational changes will alter the flow regime in Alameda Creek compared to the existing condition.

Physical and Operational Changes at the Alameda Creek Diversion Dam. Before the DSOD imposed restrictions on Calaveras Reservoir storage, the gates on the tunnel that conveys water from the ACDD to Calaveras Reservoir were typically open for most of the winter, high flow season. During such times, there was no flow other than seepage in the reach of Alameda Creek below the diversion dam, except for brief periods when stream discharge in the upper creek exceeded 650 cfs (the capacity of the Alameda Creek Diversion Tunnel). When the gates on the diversion tunnel were closed, typically in the dry season, whatever flow reached the diversion dam from the upper watershed passed over the dam crest to the creek below. However, in the dry season, little water arrives at the diversion dam from the upper watershed and so little continues down the creek.

Under the existing condition, with storage in Calaveras Reservoir limited by DSOD restrictions, the SFPUC does not divert as much water from Alameda Creek at the ACDD as it did prior to 2001. Consequently, the gates on the tunnel are open for a briefer period and more water spills over the diversion dam and continues down Alameda Creek than it did before the storage restrictions were imposed. However, flow in the reach of Alameda Creek between the diversion dam and the Calaveras Creek confluence is still limited to dam seepage whenever the gates on the tunnel are open and stream discharge from the upper creek is less than 650 cfs.

As part of the CDRP, a fish screen is being installed at the ACDD. The fish screen will prevent fish entering the tunnel that conveys water to Calaveras Reservoir, but it will also reduce the capacity of the tunnel from 650 to 370 cfs. In addition, a bypass system and a fish ladder will be installed at the diversion dam that will enable fish passage and controlled by-pass of water to benefit aquatic life in Alameda Creek below the diversion dam. In accordance with the CDRP permit requirements, a minimum of 30 cfs will be bypassed at the ACDD whenever there is 30 cfs or more arriving at the diversion dam from the upper watershed. When there is less than 30 cfs arriving from the upper watershed the entire flow will be bypassed at the diversion dam and continue downstream in the creek. Average daily discharge flows at the USGS gage on Alameda Creek above the diversion dam typically exceeds or is close to 30 cfs from December through April, so it can be expected that after completion of the CDRP there will be substantial flow in the reach of Alameda Creek between the diversion dam and the Calaveras Creek confluence for much of the winter.

To summarize, after completion of the modifications at the ACDD, the SFPUC will be able to divert no more than 370 cfs from Alameda Creek to Calaveras Reservoir and diversion will only be permitted in the months of December, January, February, and March. In addition, the SFPUC will bypass a minimum of 30 cfs at the ACDD whenever there is 30 cfs or more of natural flow in the creek upstream of the dam. The bypass schedule for ACDD is shown in Table 2-2.

Physical and Operational Changes at Calaveras Dam and Reservoir. Prior to the imposition of storage restrictions, the SFPUC filled Calaveras Reservoir close to its spillway crest elevation whenever runoff from the watershed was sufficient. Almost all the water withdrawn from the reservoir was conveyed to the SVWTP via the Calaveras Pipeline. Although the SFPUC sought to avoid any loss of stored water, unseasonable storms over the watershed would occasionally cause water to spill over the spillway crest or necessitate a release of water from the reservoir to Calaveras Creek through the large cone valve.

Currently, with storage in Calaveras Reservoir limited, the water level is maintained far below the spillway crest elevation and no spills have occurred since 2001. Releases through a cone valve are occasionally made to manage water levels in the reservoir. Releases are also made occasionally through a temporary low-flow valve installed in 2006. The releases through the low-flow valve are made for experimental purposes, including the experiments designed to measure losses of water to the subsurface in the reach of Alameda Creek below the Welch Creek gage.

When the CDRP is completed, the SFPUC will operate the reservoir in a similar way to it did before imposition of storage restrictions, except that it will release water from the reservoir to benefit aquatic life in accordance with the fish release schedule shown in Table 2-1. The releases will be made to Calaveras Creek below Calaveras Dam using permanent low-flow valves that will be installed at the new dam. They will be made year-round and will be in the range of 5 cfs to 12 cfs, depending on the time of the year and whether the year is classified as dry or normal/ wet. As noted previously, the releases from Calaveras Reservoir will total 5,540 acre-feet per year in dry years and 7,545 acre-feet per year in normal and wet years. The total annual combined releases and bypasses from the SFPUC’s facilities to benefit aquatic life will average about 7,178 acre-feet. This includes the releases from Calaveras Reservoir, together with the bypasses at the ACDD.

Under the with-CDRP condition, downstream of the Calaveras Creek confluence, streamflow in Alameda Creek will be affected by the CDRP's physical and operational changes at the ACDD and Calaveras Reservoir.

Use of ASDHM to Predict Streamflows

The ASDHM was used to estimate flow in Alameda Creek under the existing conditions (2015) and the with-CDRP conditions at several locations along the creek. Information on streamflows was compiled and is described below.

Alameda Creek Streamflow Simulations

Estimates of daily flows in Alameda Creek under the with-CDRP conditions were made by using the ASDHM output as described in the *Surface Water Hydrology Report for the SFPUC Alameda Creek Recapture Project*.[59] **Figures 3-6** and **3-7** are hydrographs of estimated flows below the San Antonio Creek confluence (Node 6) and above the Arroyo de la Laguna confluence (Node 7), respectively, for Water Year1996 to Water Year 2013. **Figures 3-8** and **3-9** are flow duration curves for Alameda Creek below the San Antonio Creek confluence (Node 6), and above the Arroyo de la Laguna confluence (Node 7), respectively, for Water Year 1996 to Water Year2013. The figures show data for the existing conditions and the with-CDRP conditions.

Additional hydrographs were also developed for a range of Water Year Types[60] (WY 2006 – Very Wet [24% flow exceedance], WY 2003 – Wet [53% flow exceedance], WY 2008 – Dry [65% flow exceedance] WY 2007 – Very Dry [82% flow exceedance]) focusing on the specific period for steelhead migration in Alameda Creek (December through June) based on life stage timing described above (see Table 3-2 above). **Figures 3-10** and **3-11** are December through June hydrographs for Very Wet (2006), Wet (2003), Dry (2008), and Very Dry (2007) Water Year Types for Nodes 6 and 7, respectively. Theses plots show predicted hydrologic conditions that migrating steelhead would be anticipated to experience in Alameda Creek in the primary study area.

Surface and Subsurface Water Interactions

Under the with-CDRP conditions, Calaveras Dam will operate at full capacity and instream flow requirements and bypassed flow at the ACDD will be implemented. During winter and spring months when rainfall is high, Alameda Creek streamflows will exceed seepage rates (maximum of 17 cfs between Welch Creek and San Antonio Creek confluences and a maximum of 7.5 cfs between San Antonio Creek and Arroyo de la Laguna confluences)[61,62,63] into the alluvium and mining pits and eventually exceed available storage space in the shallow stream channel gravels. An active stream is expected to occur through all the subreaches with the bypass flows, with flows exceeding the capacity of the diversion at the ACDD serving as the primary flow source. Alluvium saturation and associated increases in surface flows during the winter and spring is expected to occur more regularly under the with-CDRP conditions because of implementation of the instream flows schedules.

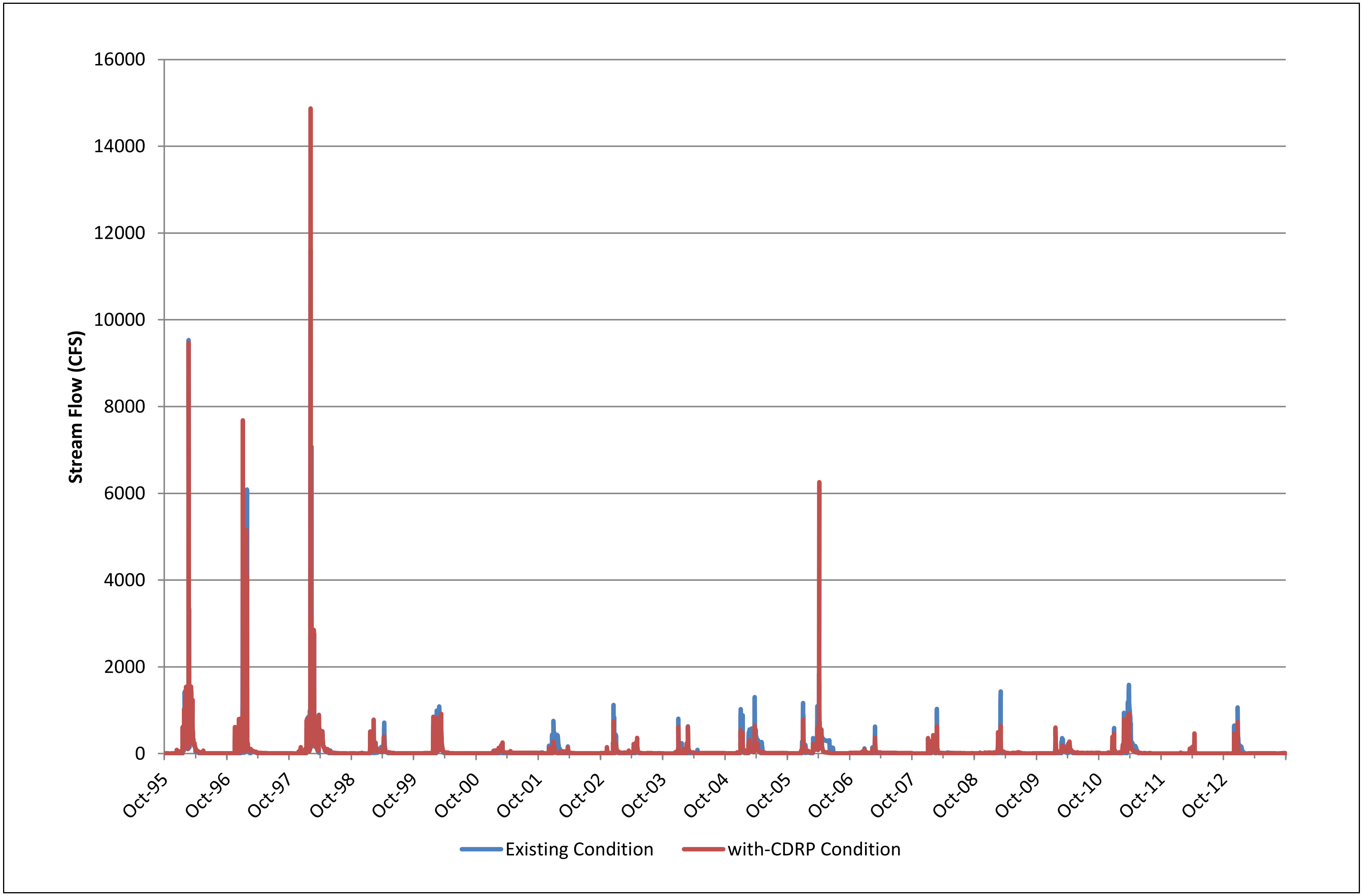
59 Orion. 2016. *Surface Water Hydrology Report for the SFPUC Alameda Creek Recapture Project*. Prepared for San Francisco Planning Department by Orion Environmental Associates, November 2016. (See Appendix HYD1)

60 Water Year types were defined based on flow exceedance probabilities.

61 Dhakal, Buckland and McBain. 2012. *Overview of Methods, Models and Results to Develop Unimpaired, Impaired and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrologic Years 1996-2019.*

62 Trihey and Associates, Inc., 2003. *Sunol Valley Surface Flow Study, Fall 2001*. Prepared for the Office of the City Attorney, City and County of San Francisco.

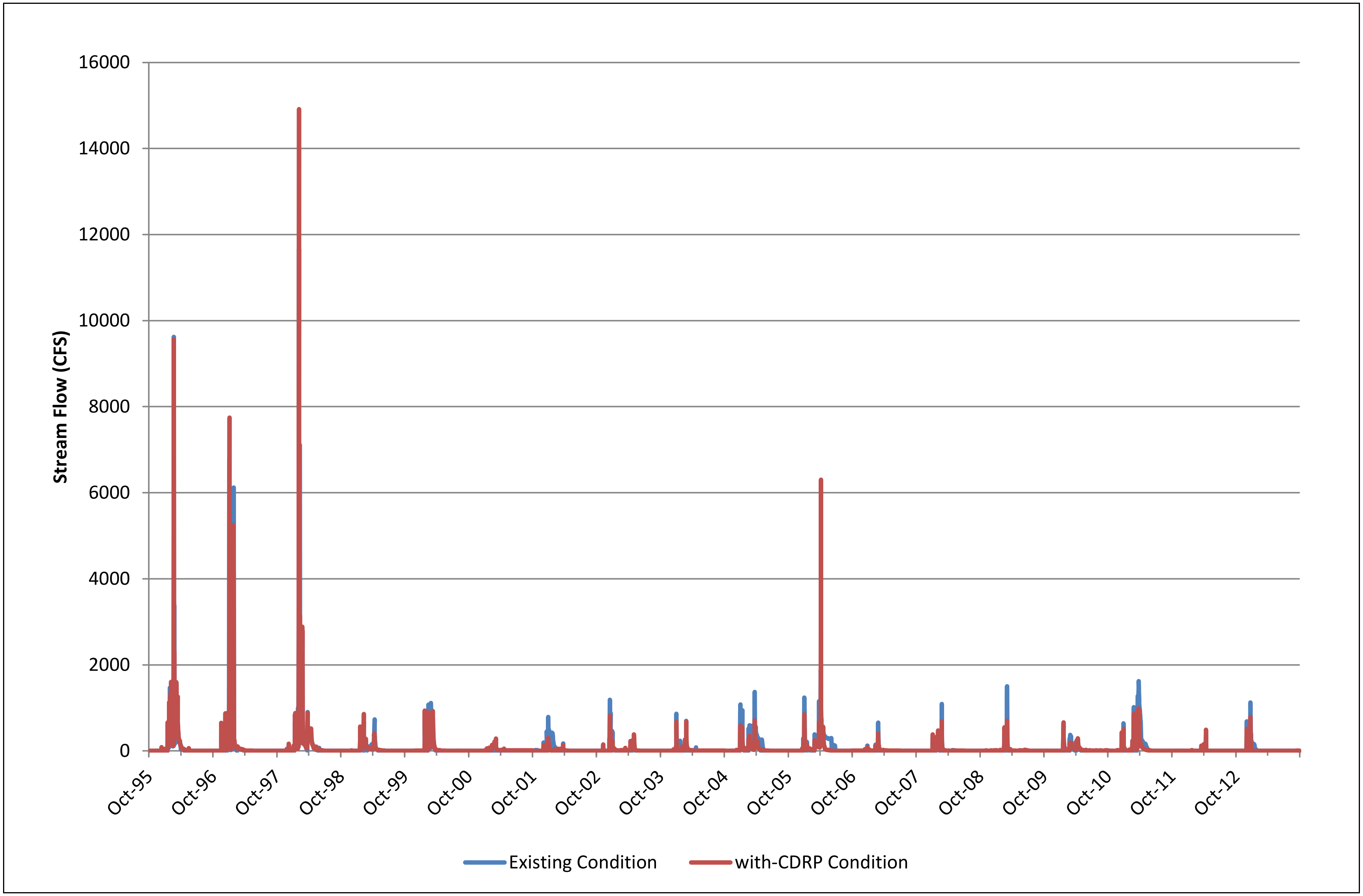
63 Entrix, Inc., 2006. *Alameda Creek Streamflow Study*. Prepared for Kennedy/Jenks Consultants.



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure 3-6
Modeled Hydrographs of Alameda Creek Below San Antonio Creek (ASDHM Node 6)

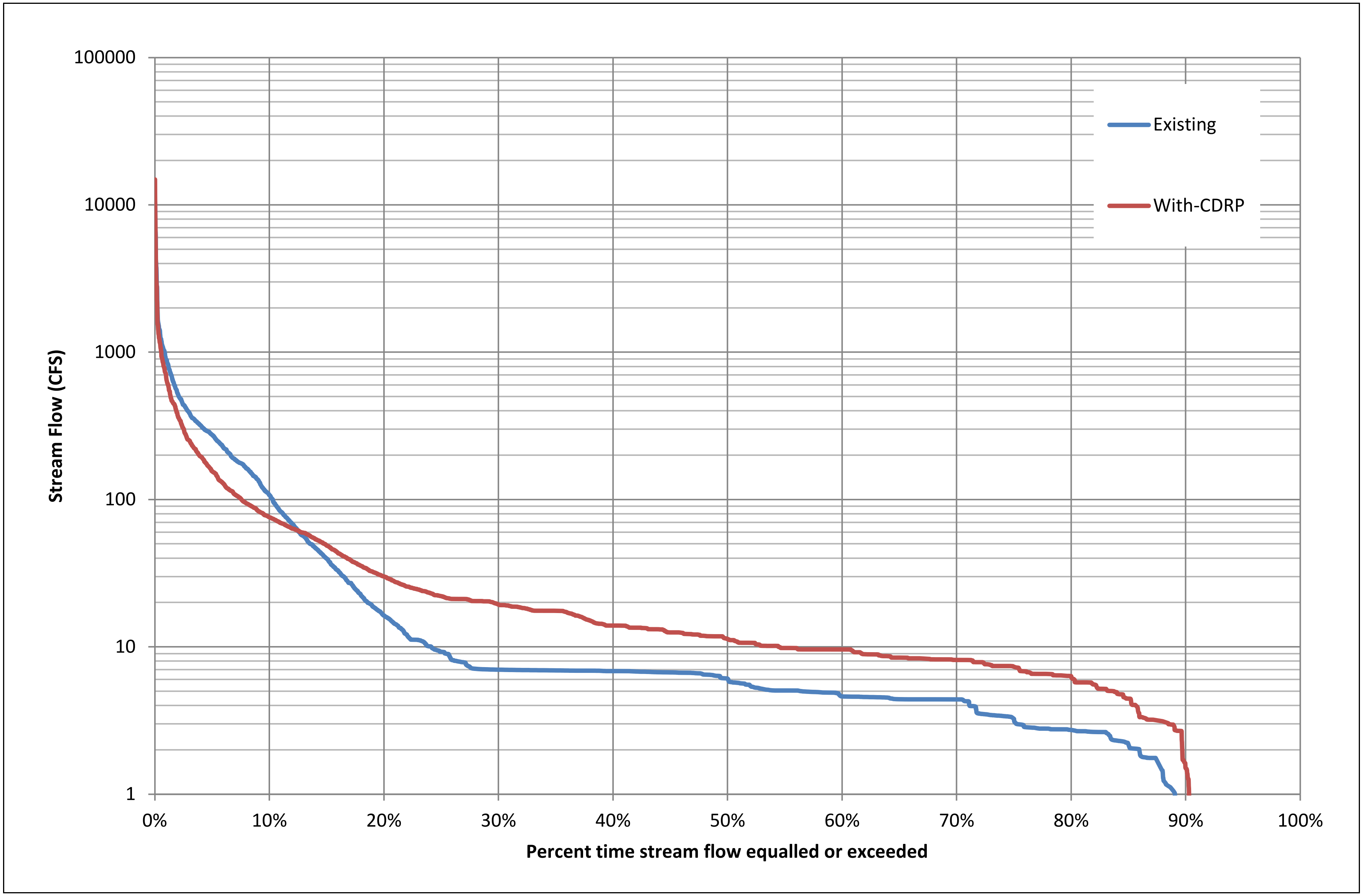


SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

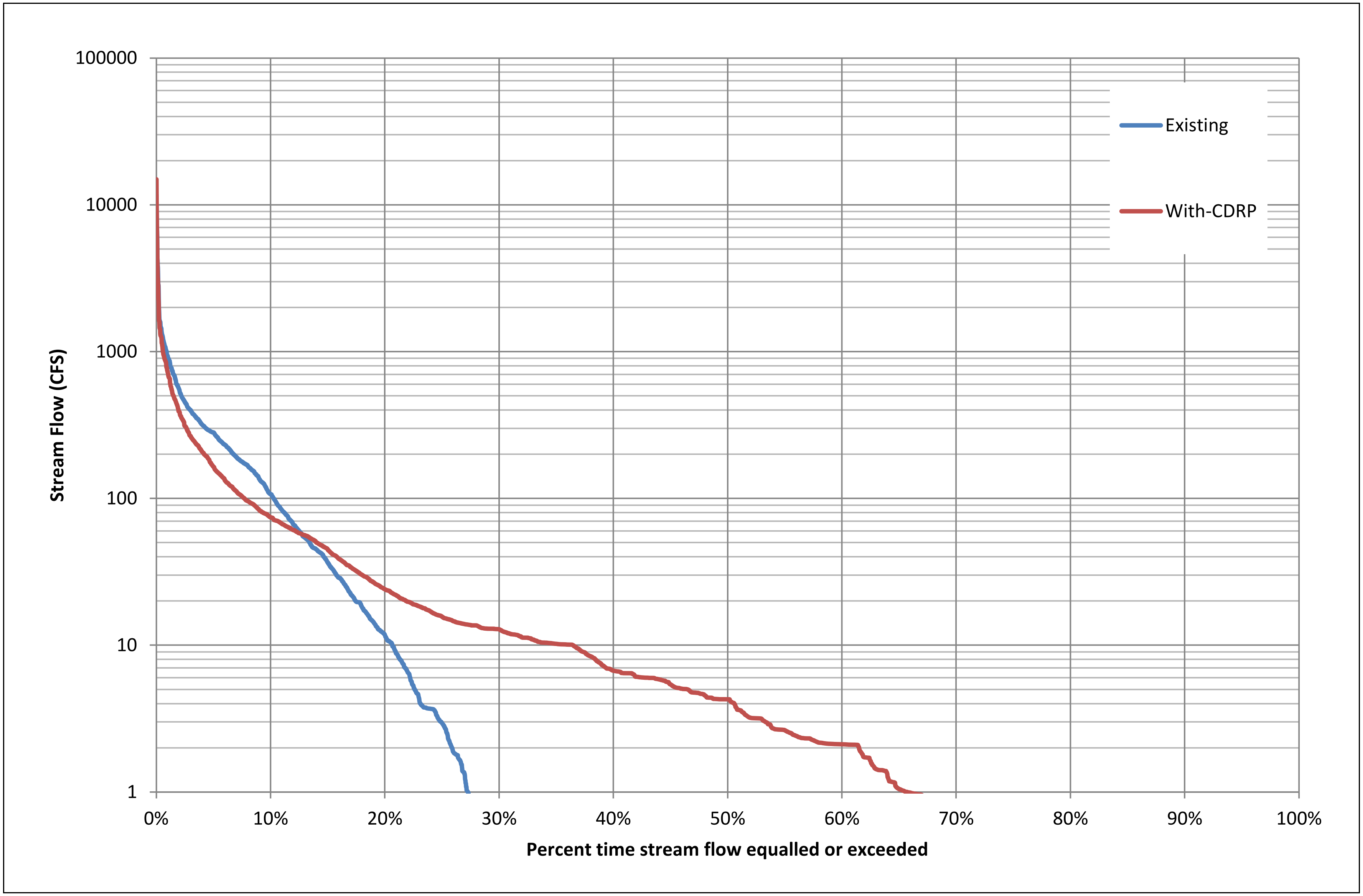
Figure 3-7

Modeled Hydrographs of Alameda Creek Above Arroyo de la Laguna (ASDHM Node 7)



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

Figure 3-8
Modeled Flow Duration Curves of Alameda Creek Below San Antonio Creek (ASDHM Node 6)

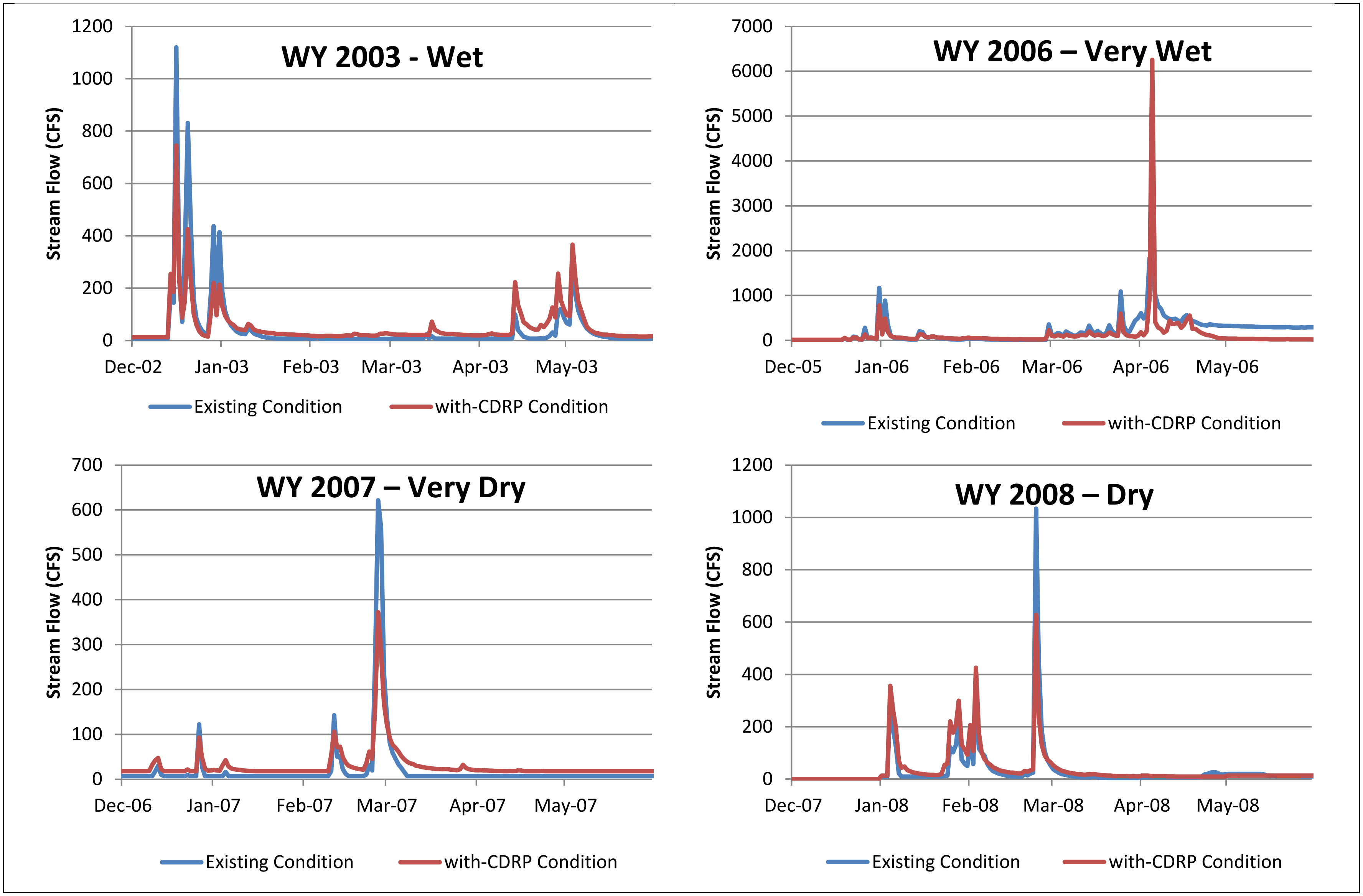


SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

SFPUC Alameda Creek Recapture Project

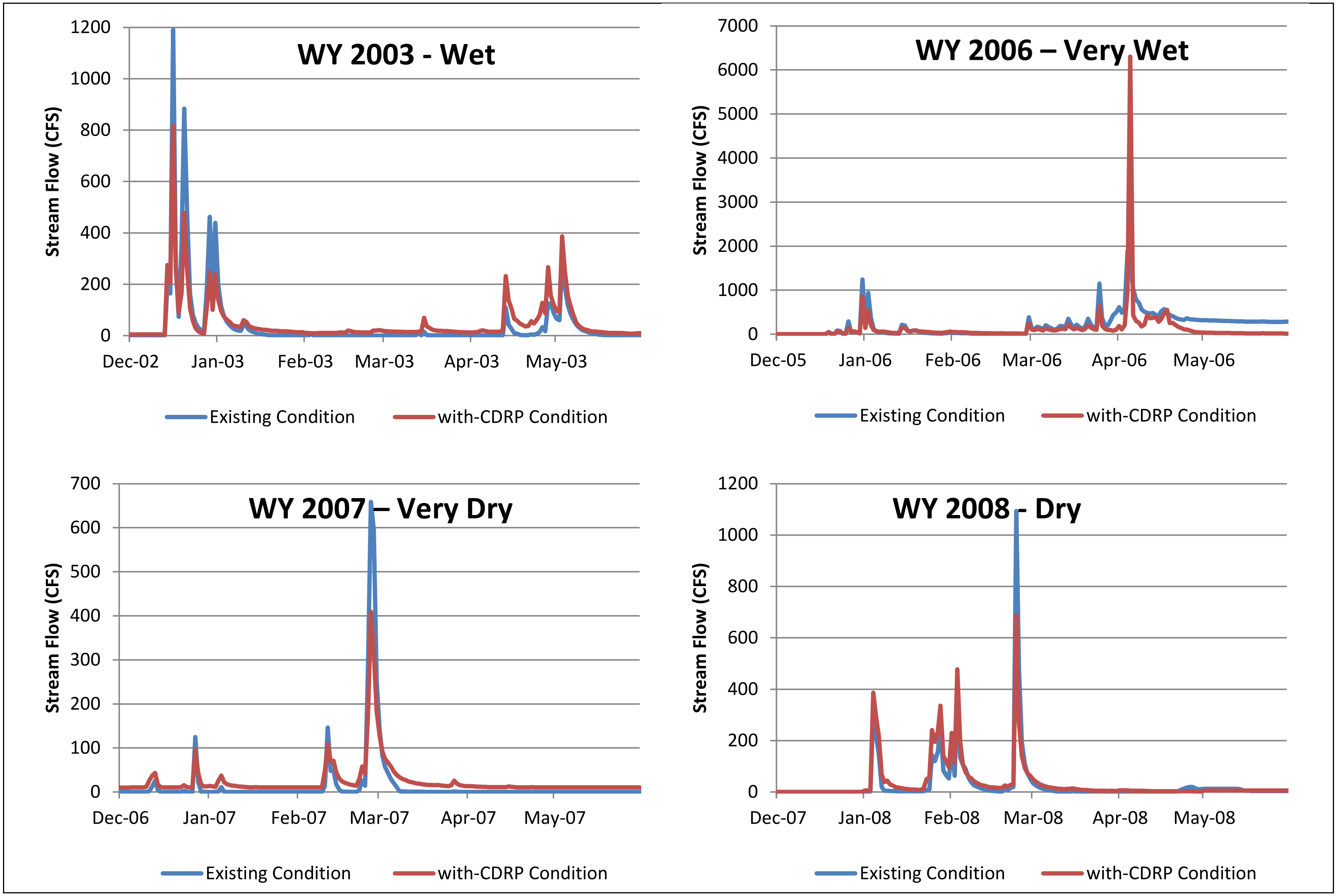
Figure 3-9

Modeled Flow Duration Curves of Alameda Creek Above Arroyo de la Laguna (ASDHM Node 7)



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

Figure 3-10
Modeled Stream Flow During the Typical Migration Period
Alameda Creek Below San Antonio Creek (ASDHM Node 6)



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

SFPUC Alameda Creek Recapture Project

Figure 3-11

Modeled Stream Flow During the Typical Migration Period
Alameda Creek Below Above Arroyo de la Laguna (ASDHM Node 7)

In dry months from April to October, after peak streamflow and subsurface levels recede, instream releases from Calaveras Dam will range from 7 to 12 cfs for dry and normal/wet schedules, respectively. At these rates, all the instream releases may seep into the alluvium and mining pits as the release are less than the maximum documented loss rate for this area. As a result, little to no surface flow would pass through the primary study area, similar to under existing conditions. Quarry operators seeking to minimize or avoid direct discharges to Alameda Creek may maintain increased storage in some pits. If this occurs, there could be elevated subsurface water levels and underflow through Subreach A, as seen in the existing condition, when Pit F4 was maintained at a higher storage capacity. The potentially higher subsurface flow would not result in a significant buildup in storage at or through Subreach C because the aquifer has a spill point (where the alluvium becomes confined near the Arroyo de la Laguna confluence) which does not allow the water elevation to rise except under very high streamflow conditions in the winter (see Appendix HYD2).

Quarry discharges near the San Antonio Creek confluence at the upper end of Subreach A have historically provided a source of water in dry months, from April to November. While these flows are highly variable and depend on quarry operations, they appear to support downstream riparian habitat conditions. However, as discussed in *Groundwater-Surface Water Interactions, ACRP Biological Resources Study Area Technical Report*,[64] subsurface water levels are as deep as 15 feet below the thalweg of the channel in this area and the lack of influences on the water table indicate that the zone of influence is the unsaturated zone beneath the streambed.

Water Quality

It is expected that water quality in Alameda Creek in the future will be very similar to current water quality. The only water quality characteristic that is expected to change from the existing condition is water temperature. Water temperature depends on a number of factors including the temperature of water released from reservoirs, solar radiation, shading, and stream discharge, velocity, and depth. Completion of the CDRP will reduce the temperature of water available for release from the reservoir. Under the existing condition the SFPUC can only store water between elevations 690 and 705 feet; under the with-CDRP condition it will store water between elevations 690 and 756 feet. Water stored at depth will remain cool during the summer and will provide a source of cool water for release from the reservoir.

Completion of the CDRP and implementation of the instream flow schedules will also alter streamflow in Alameda Creek as described above. Assuming no change in shading, solar radiation or channel geometry, an increase in discharge can be expected to reduce water temperature during warm weather and a decrease in discharge can be expected to increase it.

Because of the water releases, there will be more water in Alameda Creek between the Calaveras Creek confluence and the Welch Creek confluence under the with-CDRP condition than under the existing condition in July through November. This increase in stream discharge combined

---

64 LSCE. 2016. *Groundwater-Surface Water Interactions, ACRP Biological Resources Study Area*. Prepared for ESA and San Francisco Public Utilities Commission. November 2016. Prepared by Luhdorff & Scalmanini Consulting Engineers. (See Appendix HYD2)

with the availability of cool water from Calaveras Reservoir will likely result in a substantial reduction of water temperature in this reach of the creek compared to the existing condition. A greater proportion of the reach will likely be in compliance with the state's water quality objectives for cold-water fish.

3.3.2 Reach-by-Reach Habitat Characterization

This section presents the results of the 2015 field surveys and analysis of the 2008 SFPUC habitat characterization data in the primary study area. In general, the entire primary fisheries study area is a low-gradient alluvial valley in which Alameda Creek and its tributaries can have intermittent flows due to the hydrologic regime described above. In addition, this portion of the Sunol Valley has been heavily influenced by sand and aggregate mining activities, including relocation of the channel in some locations, pumping to dewater quarry areas, and the Sunol Infiltration Gallery (formerly used for golf course irrigation water supply through a lease with the SFPUC). As described above, no rainbow trout or steelhead have been found in this area during surveys, and are only expected to use this portion of the study area as a migration corridor, once they are restored into the upper watershed.

Primary Study Area

Existing Conditions – Subreach A

Subreach A extends from the confluence of San Antonio Creek and Alameda Creek to the I-680 culvert. During the May 2015 survey, both San Antonio Creek and Alameda Creek were dry at the confluence. Water was present in Alameda Creek approximately 50 feet below the confluence and a quarry access road that crosses Alameda Creek just below the confluence. This inflow of water was a result of pumping discharges associated with the aggregate mining operations, and generally, the quarry discharges do not follow a specific pattern, nor are they regulated to provide certain flows at any given time (although all discharges are authorized under permits issued by the RWQCB and there is a maximum discharge rate). In this area, the water was static to slow moving with abundant emergent vegetation, algae, and thick riparian vegetation surrounding isolated pools within the channel. Bullfrogs were observed in these pools. Additional flowing water was encountered downstream of these isolated pools and flows appeared to increase throughout the reach. The increases in flow are likely a result of aggregate mining operations, possibly combined with subsurface flows surfacing as Alameda Creek descends the Sunol Valley and approaches the more confined Niles Canyon.

Alameda Creek in this reach varied in wetted width, with some riffles only 6 to 8 feet wide, while some pools created by small woody debris jams were up to approximately 50 feet wide in places. In general, substrate was dominated by silt and fine sediment in pools and glide areas, which had emergent vegetation, with some gravels and more complex channel structure in the isolated riffles interspersed throughout the subreach. This observation is supported by the 2008 SFPUC data that found less than 15 percent substrate greater than 2.5 inches throughout the reach, and hundreds of linear feet of small woody debris cover. Heavy riparian vegetation and wood debris flows and debris dams in the channel combined to create pools, glides, and occasional riffles.

Steelhead migrating through Subreach A would encounter some productive riffles for macroinvertebrates, and pools with ample cover for holding, although maximum depths of these pools within this reach are not likely deep enough to provide much thermal refuge if water temperatures were a limiting factor (the maximum depth recorded during the 2008 surveys was 3.2 feet in this reach). During the 2008 SFPUC studies, temperatures were near or above thermal limits for steelhead (approximately 23 to 25°C) [65] during all experimental flow releases during May and June. Depending on flows, some of the wood debris jams or riffles could also act as potential barriers to movement through this reach. During winter migratory periods, steelhead could potentially migrate through this reach or hold in pool habitat, but conditions are less than optimal and passage through this reach would not be certain under current conditions. Habitat units in Subreach A for the different experimental flows surveyed in 2008 are spatially depicted in **Figure 3-12a** and **3-12b**.

Existing Conditions – Subreach B

Subreach B extends from the I-680 culvert downstream approximately 1,500 feet. During the 2015 survey, this reach of Alameda Creek was dominated by slow moving water (glide or pool habitat), had high levels of algal cover, dense riparian vegetation on banks, and was both lower gradient and wider than Subreach A. The 2008 surveys of this reach found no riffle habitat, less than10 percent substrate greater than 2.5 inches, and a maximum recorded depth of 4.6 feet. Temperatures during the May–June 2008 surveys conducted by SFPUC in Subreach B were also sub-optimal for steelhead, and at lower flows were above thermal limits.

The lack of habitat diversity in Subreach B probably limits the productivity of this reach and the suitability of this habitat for steelhead, although the lack of obstacles and/or barriers would make migration through this reach possible, particularly during the winter migration period when water temperature is not likely to be a limiting factor. Habitat units in Subreach B for the different experimental flows surveyed in 2008 are spatially depicted in **Figure 3-12a** and **3-12b**.

Existing Conditions – Subreach C

Subreach C begins where the primary channel of Alameda Creek becomes braided and intermittent surfacing of subsurface water joins the creek. This reach is characterized by riffle, run, pool complexes with less dense riparian vegetation on the margins, slightly greater gradient, and increased habitat complexity when compared with Subreach A or B. The 2008 surveys conducted by SFPUC showed that riffles in this reach were a more dominant habitat feature than in either Subreach A or B, and that there was more habitat complexity in this reach with sections of braided channel, and up to 15 percent boulders in some riffles along with an overall greater abundance of cobbles. Flows in this reach were unpredictable, but in general were found to increase below Subreach B where subsurface water resurfaces into the channel, then decrease throughout the remainder of the reach to the confluence of Arroyo de la Laguna. This pattern was observed during the 2015 survey, with flows midway through the reach and a completely dry

65 Gunther, A.J., J.M. Hagar, and P. Salop. 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

channel at the Arroyo de la Laguna confluence. During the June 24, 2008 survey of this reach, SFPUC biologists measured 10.35 cfs in the upstream portion of the reach, and less than 7 cfs near the confluence with Arroyo de la Laguna. The spatial variation in flows are potentially due to inputs from the aggregate mining operations, as upstream flows in Alameda Creek as measured by the USGS gage below Welch Creek were only 7 cfs. During the June 9, 2008 survey, flows in Subreach C were measured at a maximum of 4.1 cfs mid-reach, and 2.8 cfs near the confluence, while flows in Alameda Creek, as measured by the USGS gage below Welch Creek were 14 cfs. This variation in flows shows that the flows in Subreach C are the result of complex surface – subsurface interactions. Temperatures varied widely in this reach, but tended to be lower than in Subreach A or B, likely the result of thermally buffered water inputs from the subsurface.

Due to the complexity of the habitat in Subreach C, this area appears more suitable than either Subreach A or B for migrating steelhead. Pools could provide holding habitat and riffles would make macroinvertebrate food sources more abundant. The variable flows may also be less of a factor during the migratory period because greater flows would be predicted during winter months or following major precipitation events when steelhead would be likely to move through the reach.

One complicating factor for steelhead migrating up Alameda Creek at the confluence of Arroyo de la Laguna is the potential lack of connectivity within Alameda Creek at the confluence. While Alameda Creek is the mainstem and Arroyo de la Laguna is a tributary under the unimpaired condition, the creeks currently appear to function as though Arroyo de la Laguna is the mainstem, with more dominant flows and defined channel than Alameda Creek, which acts as a tributary with more intermittent flows and much less defined channel. Based on the 2015 field survey and a review of historical aerial photography, it appears that physical connectivity with clear passage into Alameda Creek (upstream of the confluence with Arroyo de la Laguna) has become increasingly limited due to sediment deposits and vegetation growth.

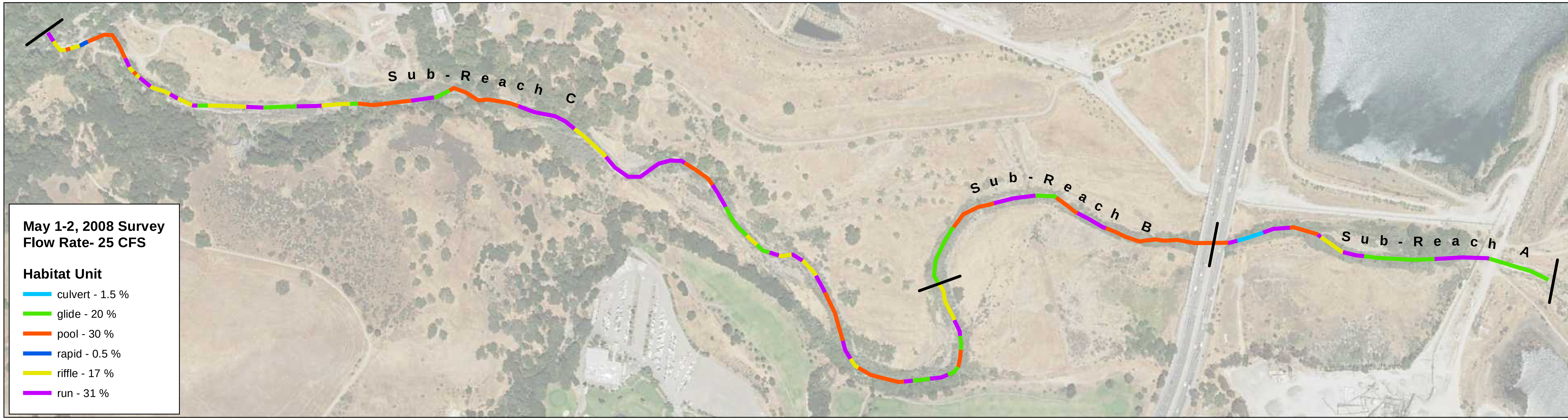
Habitat units in Subreach C for the different experimental flows surveyed in 2008 are spatially depicted in **Figure 3-12a** and **3-12b**.

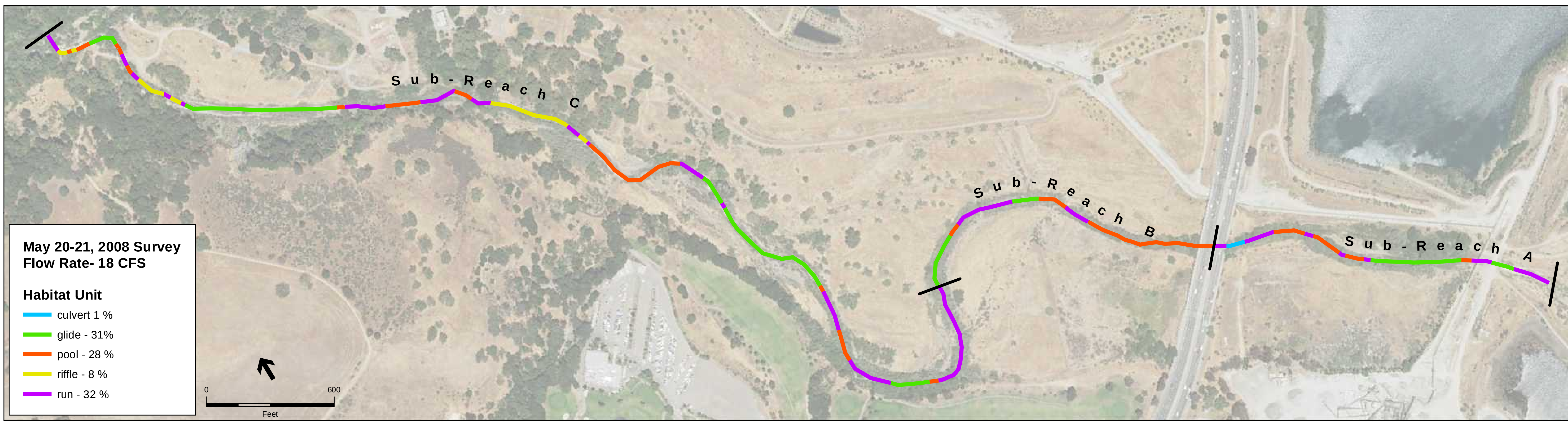
With-CDRP Conditions – Primary Study Area (Subreaches A, B, and C)

As described above, the fisheries impact analysis assumes that in addition to completion of the CDRP and implementation of the CDRP instream flow schedules, existing human-made barriers to anadromous steelhead migration would be removed or other measures would be taken to allow steelhead passage into the watershed. Due to limiting factors, specifically temperature, steelhead are not expected to spawn or rear within the primary or extended study areas, but would be expected to migrate through both study areas during winter spawning migrations and late spring outmigrations. Implementation of the instream flow schedules required by NMFS permit requirements upon completion of the CDRP are anticipated to increase the suitability of migratory habitat throughout the primary study area.[66]

---

[66] National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project.* Santa Rosa, CA.



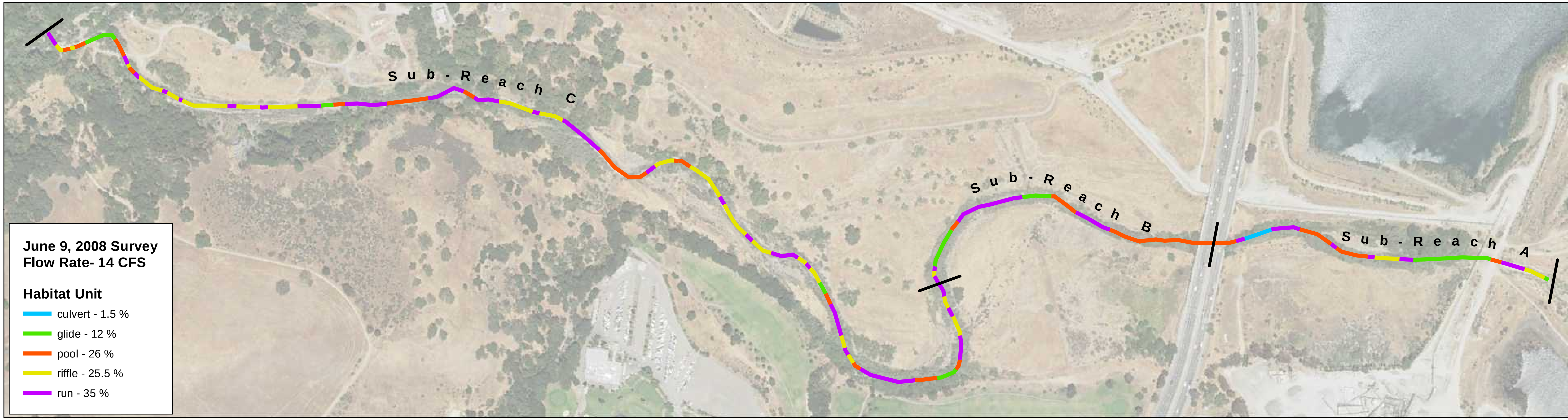


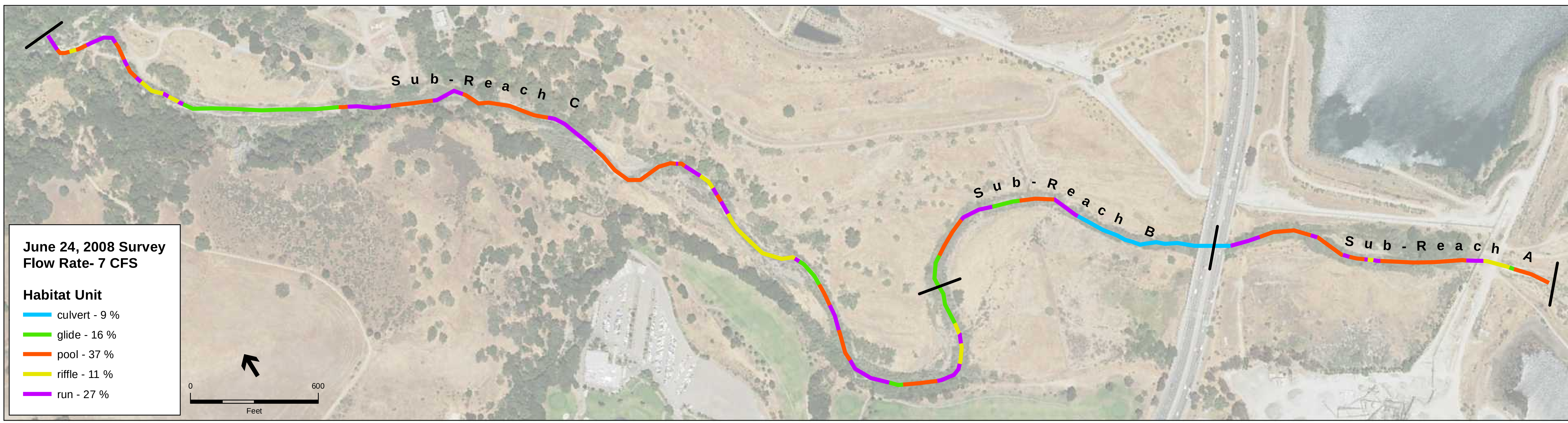
SOURCE: SFPUC, unpublished data; ESA, 2015

SFPUC Alameda Creek Recapture Project

Figure 3-12a

Habitat Units in Primary Study Area for the Different Experimental Flows Surveyed in 2008





SOURCE: SFPUC unpublished data; ESA, 2015

SFPUC Alameda Creek Recapture Project

Figure 3-12b

Habitat Units in Primary Study Area for the Different Experimental Flows Surveyed in 2008

The main migration impediments for steelhead in the Sunol Valley are located upstream of the primary study area where wide channel areas create shallow riffles under low flow conditions. Passage assessments conducted as part of the NMFS Biological Opinion for the CDRP indicate the most problematic riffles, given the current channel shape, could be passable and meet NMFS passage guidelines at 44 cfs for adult steelhead and 13 cfs for juvenile steelhead. Implementation of the NMFS instream flow schedules will increase the annual percentage of time (dry and normal/wet years) that adult steelhead (immigrating and emigrating) can pass these shallow riffle locations.[67]

To address these passage impediments in the Sunol Valley and the reduced migration opportunities caused by the historical operation of the SFPUC water system facilities in the Alameda Watershed, the SFPUC has committed, as part of the CDRP, to physically modifying locations within the Sunol Valley reach that require flows substantially greater than 40 cfs for adult steelhead passage. Physical modifications of these shallow areas are proposed to create conditions that would allow for adult upstream passage at flows of approximately 20 cfs. Because adult steelhead will not have access to upper Alameda Creek until the BART Weir fish ladder is completed, the schedule for remediating these other barriers to passage is dependent on the completion of the BART Weir fish ladder. With these future modifications, steelhead will have access to the upper watershed, and it is expected that passage opportunities for immigrating and emigrating adults through the Sunol Valley will fall within the range of the unimpaired condition. Therefore, NMFS has concluded that the combination of ACDD bypasses to Alameda Creek, releases from Calaveras Reservoir to Calaveras Creek, and the proposed modifications to passage impediments in the Sunol Valley, the number of days available for steelhead adult and juvenile passage in Alameda Creek each year is expected to fall within the range of natural hydrological variability.[68]

Extended Study Area

As described above, the extended study area includes Alameda Creek from the confluence of Alameda Creek and Arroyo de la Laguna downstream to the San Francisco Bay. This portion of Alameda Creek is driven by flows from Arroyo de la Laguna as described in Section 3.3.1, above. This section describes existing conditions and with-CDRP conditions in Niles Canyon and Lower Alameda Creek.

Existing Conditions – Niles Canyon

Beginning downstream of the Arroyo de la Laguna confluence, Alameda Creek flows approximately 6.5 miles through Niles Canyon to Niles Junction (near the crossing of Highway 238). The stream channel is relatively confined within the steep walled canyon and, with the exception of Highway 84 and a rail line, there is little development on the narrow floodplain and surrounding hills. There is a relatively well developed riparian zone throughout Niles Canyon. There are two major tributaries in this reach, Sinbad Creek and Stonybrook Creek.

67 National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project.* Santa Rosa, CA.
68 National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project.* Santa Rosa, CA.

The reach is a perennial stream characterized by large, moderately deep pools, and runs separated by short, shallow riffles. The substrate is highly variable, ranging from sand, gravel, and cobble-dominated riffles and glides to cobble-boulder and silt and sand pools.

Historically, Alameda Creek in Niles Canyon was likely an intermittent to perennial stream characterized by low flows during late summer and fall. Low dry season flows were derived primarily from upstream subsurface flows (shallow groundwater that enters the canyon below Sunol) that may have been relatively cool due the limited exposure to warm atmospheric conditions in the shady canyon. Additionally, cool groundwater may have existed historically in the lower segments of Arroyo de la Laguna due to artesian flow from the Livermore Valley. During this low flow condition, some pools may have thermally stratified and provided critical thermal refuge (cool water layer on the bottom of pools) during summer months, but overall this reach likely would not have provided desirable habitat for 1+ year-old or 2+ year-old juvenile steelhead to reside over the last half of summer and early fall.[69]

As described above, Alameda Creek through Niles Canyon now serves as a conveyance for imported water supply from the South Bay Aqueduct turnout in Vallecitos Creek, which is tributary to Arroyo de la Laguna just upstream of the Alameda Creek confluence. As a result, summer base flows in Niles Canyon have increased and become less variable, thereby increasing overall water (and pool) temperatures, reducing thermal buffering that historically occurred with subsurface flows, reducing potential pool stratification, and subsequently reducing potential rearing habitat for steelhead. However, although the stream temperatures within the reach are probably higher than predevelopment historical flows, augmented flows potentially provide atypical fast water habitat with increased forage production that may allow steelhead to obtain sufficient food to withstand warmer temperatures and associated increased metabolic rates.[70]

Because of the augmented summer flows, rearing conditions in wet hydrologic years could be improved (over natural conditions) despite higher water temperatures, assuming steelhead tolerate these higher temperatures. In some instances, with sufficient food present steelhead may tolerate warmer water temperatures. Local anglers continue to catch rainbow trout in the Niles Canyon reach, despite the cessation of trout stocking several years ago, suggesting possible successful rearing.[71] However, while rainbow trout from farther upstream could move in the Niles Canyon reach during wet years, it is likely that the conditions are generally not conducive to oversummering in this reach. Results of water temperature monitoring within the Niles Canyon reach of Alameda Creek during 2001-2002 showed summer temperatures in excess of 75 degrees Fahrenheit (°F), which would affect the ability of juvenile and adult steelhead to oversummer

---

69 McBain and Trush, 2008, *Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead.* Prepared for the Alameda Creek Fisheries Restoration Workgroup.

70 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

71 San Francisco Planning Department, 2011. *Final Environmental Impact Report for the Calaveras Dam Replacement Project*. San Francisco Planning Department File No. 2005.0161E, State Clearinghouse No. 2005102102. Certified January 27, 2011.

within the canyon reach.[72] Monitoring conducted by Hanson Environmental in 2001 and 2002 also showed that water in Alameda Creek is in thermal equilibrium by the time it flows into Niles Canyon, likely due to the prolonged solar warming occurring in Alameda Creek from the Sunol Regional Wilderness to the Niles Canyon reach and through the discharge of warm stormwater from the Livermore Valley (after warming in the open flood control channels in that area). Furthermore, operation of upstream storage facilities including Del Valle, San Antonio, and Calaveras Reservoirs has reduced winter and spring peak flows from historical conditions in this reach of Alameda Creek.

Existing Conditions – Lower Alameda Creek

Beginning downstream from the mouth of Niles Canyon, Alameda Creek flows approximately 10 miles across a broad low-gradient alluvial plain to San Francisco Bay. Historically, before extensive urbanization of the floodplain, the stream channel was relatively unconfined and the creek would migrate and form different courses and distributary channels.[73,74] These channels were tidally influenced in their lower sections and likely provided valuable estuarine habitat function for rearing juveniles or for smolts during their transition to the higher salinity of bay water.[75]

The lower Alameda Creek channel was extensively modified beginning in the 1950s as a result of floods that inundated the surrounding urbanizing area and instream aggregate extraction, and the channel served increasingly as a flood control and water conveyance facility. Following disastrous floods in Fremont in the 1950s, the lower reaches of Alameda Creek (i.e., downstream of Niles Canyon) were rerouted in the 1960s into a trapezoidal flood control channel confined between artificial levees. To maintain flood control capacity, sediment and vegetation has been periodically removed from the channel. The historical floodplain has been largely converted to residential, commercial, and industrial urban uses. Commercial salt production was carried out in an extensive system of evaporation ponds that removed historic wetlands and natural tidal channels – the ponds currently are being planned for restoration to those former conditions (South Bay Salt Ponds Restoration Project). Restoration activities have been ongoing at Coyote Hills Regional Park on the southern side of the channel for many years and flood gates connect wetlands in the park to the channel in its lower reach. Water supply and flood control structures were incorporated into the channel, including a bank-to-bank grade control structure at the BART and Southern Pacific Railway rail crossings (i.e., the BART weir) and a series of inflatable dams for water supply impoundment (including flows imported from the Sacramento – San Joaquin Delta via the South Bay Aqueduct). These features prevent fish migration and impair other habitat functions.

---

72 Hanson Environmental Inc., 2002. *Air and Water Temperature Monitoring Within Alameda Creek: 2001-2002.* Draft October 1, 2002.

73 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

74 Leidy, R.A., 2007. Ecology, *Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California.* San Francisco Estuary Institute, April 2007. Contribution No. 530.

75 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

The BART weir is a complete barrier to all migrating anadromous fish species with the possible exception of Pacific lamprey (*Lampetra tridentata*).[76] An aerial photo of the BART weir is included in Appendix A of this report. The middle and upper ACWD inflatable dams are also major migration obstacles/barriers in lower Alameda Creek. The ACWD permanently removed the lower rubber dam from the Alameda Creek flood control channel in 2009. The concrete foundation was left in place for grade control stabilization and a low-flow fish ladder was installed in a notch through the foundation to allow continuous fish passage.

Aquatic habitat conditions in lower Alameda Creek are characterized by low summer flows, high summer water temperature, substrate with a large silt component, extensive stands of emergent vegetation, and tidal mixing with increased salinity in the lower sections near the Bay and freshwater flows in the higher lying reaches above the BART weir. Some sections may be dry during the summer.[77]

With-CDRP Conditions – Niles Canyon and Lower Alameda Creek

In addition to completion of the CDRP and the implementation of the CDRP instream flow schedules, it is also assumed that all fish passage barriers would be removed and steelhead would have access to upper portions of the watershed. However, as discussed above, the reaches of Alameda Creek within the extended study area would not be expected to provide necessary spawning or rearing habitat functions for steelhead; the tidally influenced habitats toward the mouth of the creek may provide only limited transition habitat for steelhead smolts that are emigrating to the Bay.[78,79,80]

With implementation of the CDRP instream flow schedules, minimum flows necessary to meet upstream and downstream passage objectives in Niles Canyon are likely to be achieved during the winter and spring, because it is assumed that no significant barriers will remain and the augmented flows, in combination with flows from the northern (Arroyo de la Laguna) watershed, would generally not limit passage opportunities.[81] In the Alameda Creek Flood Control Channel (the lowermost 13 miles of Alameda Creek), ACWD operates two inflatable dams and several water diversions. The water diversions have a combined capacity of approximately 370 cfs. Thus, fish passage through this reach is strongly dependent on the operation of ACWD facilities. CDRP instream flows from the southern watershed when combined with flows from the northern watershed (at the confluence with the Arroyo de la Laguna) through Niles Canyon are expected to

---

76 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

77 Hanson Environmental Inc., 2002. *Air and Water Temperature Monitoring Within Alameda Creek: 2001-2002.* Draft October 1, 2002.

78 Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.

79 McBain and Trush, 2008, *Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead.* Prepared for the Alameda Creek Fisheries Restoration Workgroup.

80 National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project.* Santa Rosa, CA.

81 National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project.* Santa Rosa, CA.

provide suitable conditions for adult upstream migration and smolt downstream migration. It is assumed that these flows will arrive at the upstream end of the Alameda Creek Flood Control Channel, and furthermore, it is assumed that ACWD will provide bypass flows at their water diversion facilities for fish passage through the Flood Channel.[82]

82 National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for the Calaveras Dam Replacement Project*. Santa Rosa, CA.

This page intentionally left blank

APPENDIX A
Representative Photographs

Representative photograph of habitat conditions in study Subreach A (May 2015)

Representative photograph of habitat conditions in study Subreach A (May 2015)

Representative photograph of habitat conditions in study Subreach B (May 2015)

Representative photograph of habitat conditions in study Subreach B (May 2015)

Representative photograph of habitat conditions in study Subreach C (May 2015)

Representative photograph of habitat conditions in study Subreach C (May 2015)

Photograph of representative conditions in Niles Canyon (May 2015)

Aerial photograph of BART weir in Lower Alameda Creek (May 2015)

APPENDIX HYD1

Surface Water Hydrology Report

This page intentionally left blank

DRAFT

Surface Water Hydrology Report

for the

SFPUC Alameda Creek Recapture Project

Prepared for

San Francisco Planning Department

Prepared by

Orion Environmental Associates
with Environmental Science Associates

November 2016

Table of Contents

List of Figures

List of Figures (continued)

List of Tables

List of Tables (continued)

1. Introduction

1.1 Purpose

The purpose of this report is to determine the environmental effects of operation of the San Francisco Public Utilities Commission's (SFPUC) proposed Alameda Creek Recapture Project (ACRP) on surface water hydrology. It describes the technical analysis undertaken to delineate the hydrologic changes that would be a consequence of operation of the proposed ACRP. It also describes the implications of ACRP-caused changes in surface water hydrology for fish and other aquatic life, terrestrial wildlife, vegetation, and other users of water from Alameda Creek. The report provides the background information needed to support impact conclusions in the Environmental Impact Report (EIR) for the proposed ACRP. The EIR is being prepared to satisfy the requirements of the California Environmental Quality Act (CEQA).

1.2 Alameda Creek Recapture Project

The SFPUC is currently building the Calaveras Dam Replacement Project (CDRP). When the CDRP is completed and becomes operational the SFPUC will release water from Calaveras Reservoir and bypass water at the Alameda Creek Diversion Dam in accordance with schedules established by federal and state agencies. The releases and bypasses will benefit fish and other aquatic life. The volume of the releases and bypasses would vary from year-to-year depending on hydrologic conditions but are estimated to average 14,695 acre-feet per year.

The SFPUC would operate the ACRP to recapture water that will be released from Calaveras Reservoir and bypassed at the Alameda Creek Diversion Dam. The ACRP would be operated consistent with the overall objectives and levels of service of the SFPUC's adopted Water System Improvement Program (WSIP), including maintaining the capacity of water storage in the SFPUC water supply system that is needed in drought and non-drought periods (1). The location of the proposed ACRP is shown in **Figure HYD1-1**. The volume of water that the ACRP would recapture would vary from year-to-year depending on hydrologic conditions; the SFPUC estimates that it would average 7,178 acre-feet per year.

The ACRP would enable the SFPUC to recapture water from an existing quarry pit—Pit F2—in the northern Sunol Valley. The SFPUC would use pumps mounted on floating barges to convey water from Pit F2 to either the Sunol Valley Water Treatment Plant (SVWTP) or San Antonio Reservoir. Water levels in Pit F2 would be maintained between elevations 150 feet and 240 feet, except during extreme droughts when water levels might be lowered to elevation 100 feet. A plan of the proposed ACRP is shown in **Figure HYD1-2**.

1.3 Scenarios Analyzed

Four scenarios were examined to characterize the effects of the ACRP on surface water hydrology: pre-2001 conditions, existing conditions, with-CDRP conditions, and with-project conditions. Because hydrologic conditions are dynamic and depend on rainfall conditions, all four scenarios are based on 18 years of site-specific hydrologic data, from water years 1996 to 2013. Pre-2001 conditions are the conditions that existed before storage in Calaveras Reservoir was restricted by order of the California Department of Water Resources, Division of Safety of Dams (DSOD). The DSOD restricted storage in Calaveras Reservoir in 2001 because of concerns about the seismic safety of the dam forming the reservoir.

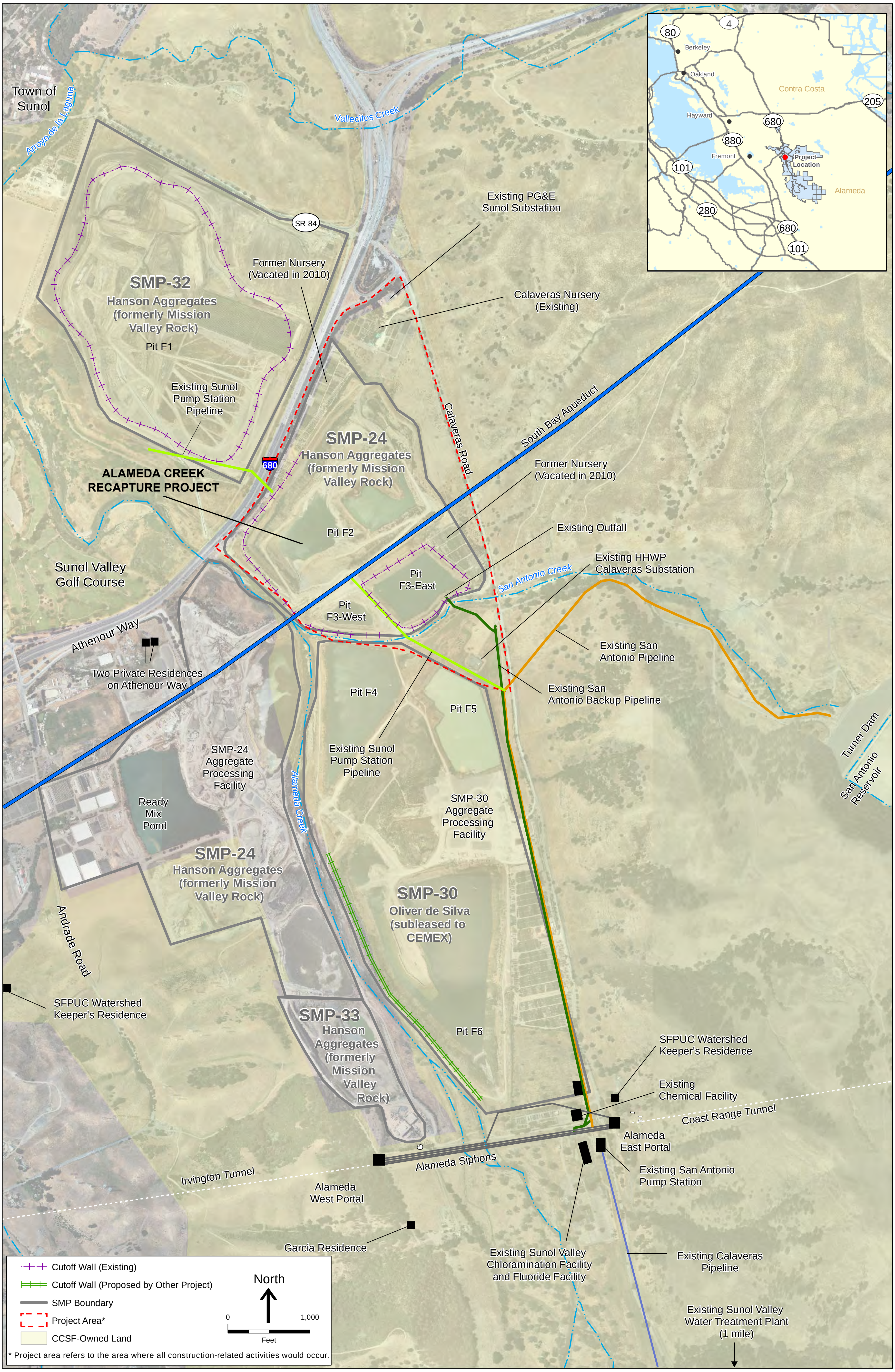
Existing conditions are the conditions that existed in 2015, the year in which the Notice of Preparation for the ACRP EIR was published. Currently, the SFPUC is operating its water system in the Alameda Creek watershed with storage in Calaveras Reservoir limited to about 38,100 acre-feet or about one third of its pre-2001 storage capacity, and has been doing so since 2001. However, the usable storage capacity is 13 percent (or 12,400 acre-feet) of pre-2001 capacity due to minimum and maximum storage elevations requirements of 690 feet and 705 feet, respectively.

With-CDRP conditions are the conditions that will exist when the CDRP has been completed and in operation. CDRP operations will include the release and bypass of the water needed to meet the instream flow schedules that are a condition of the state and federal authorizations for the CDRP (2, 3). The releases of water will be made at Calaveras Dam and the bypasses of water will occur at the Alameda Creek Diversion Dam. CDRP operations will also include lifting the DSOD storage restrictions in Calaveras Reservoir and restoring its historical capacity. With-project conditions are the conditions that would exist when both the CDRP and the ACRP are completed and are in operation.

The attributes of the four scenarios analyzed are shown in **Table HYD1-1**. The attributes of pre-2001 conditions are essentially the same as those of existing conditions, except that Calaveras Reservoir was operated with its full storage of 98,850 acre-feet. The attributes of with-project conditions are the same as those of with-CDRP conditions, except for the addition of the proposed ACRP.

Notes for Section 1

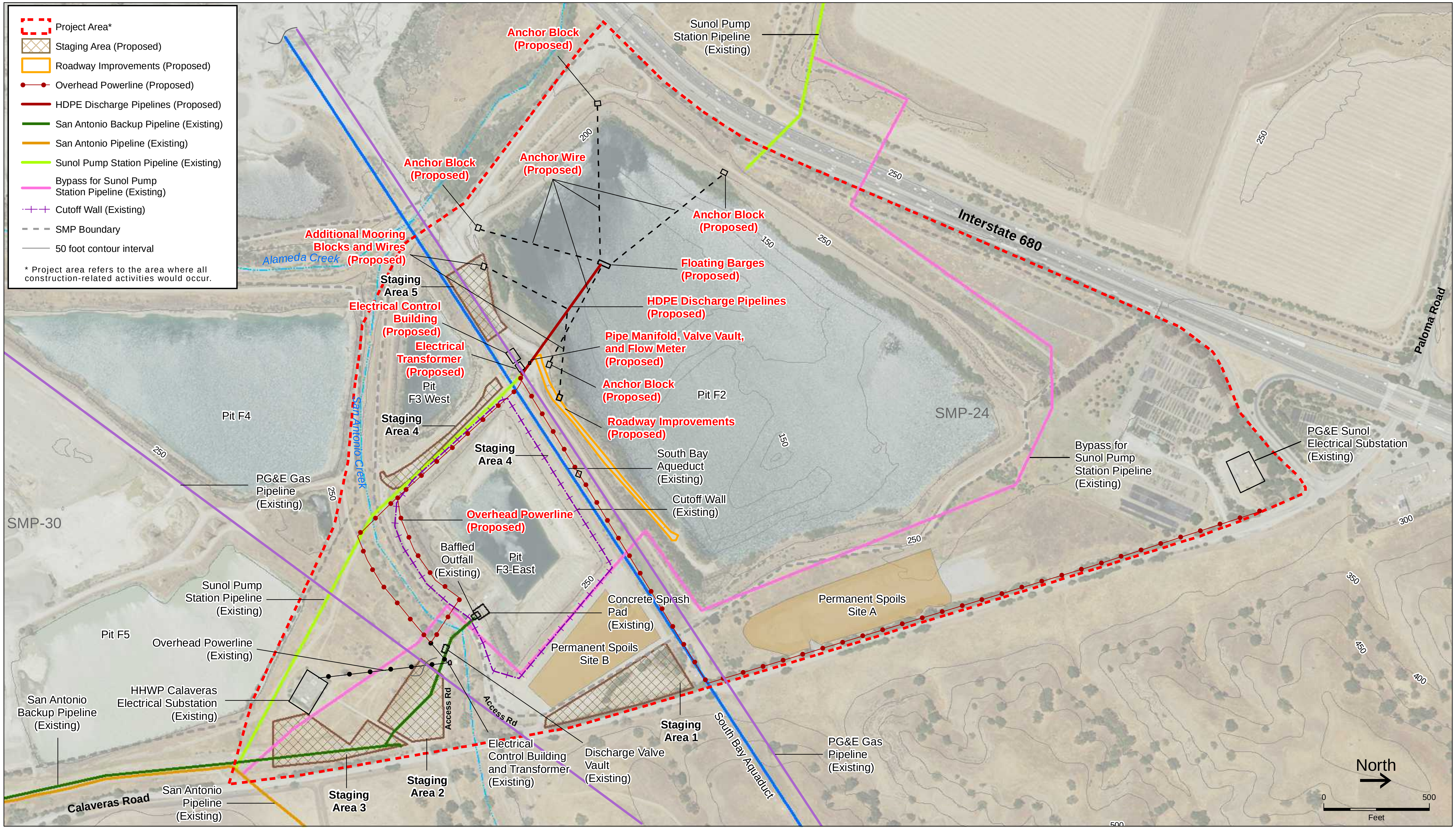
1. San Francisco Planning Department, 2008. F*inal Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*. San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.
2. National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for Calaveras Dam Replacement Project in Alameda and Santa Clara Counties*. Tracking No. 2005/07436. March 5, 2011.
3. California Department of Fish and Game (CDFG), 2011. *Streambed Alteration Agreement for Calaveras Dam Replacement Project*. Notification No. 1600-2010-0322-R3. Jane 28, 2011.



SOURCE: ESA, 2015; Date of aerial photo is 2006.

SFPUC Alameda Creek Recapture Project

Figure HYD 1-1
Location of ACRP



SOURCE: SFPUC, 2014a

SFPUC Alameda Creek Recapture Project

Figure HYD 1-2

Plot Plan of ACRP

TABLE HYD1-1
ATTRIBUTES OF FOUR SCENARIOS ANALYZED

Parameter	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Representative year	2000	2015	2019 to 2020 (following completion of the CDRP and the reservoir refill period)	
Hydrologic period used in analysis	WY 1996 to WY 2013			
Calaveras Reservoir and Dam	- Historical capacity of Calaveras Reservoir = 96,850 acre-feet - Maximum pool elevation = 756 feet	- New dam under construction downstream of existing dam - Storage in Calaveras Reservoir restricted to one-third capacity with usable storage at 13% or 12,400 acre-feet by DSOD - Maximum pool elevation = 705 feet - Minimum pool elevation = 690 feet	- New dam completed - Historical capacity of Calaveras Reservoir restored to nominal capacity = 96,850 acre-feet - Maximum pool elevation = 756 feet	
Instream flow releases/spills from Calaveras Reservoir below Calaveras Dam	None, other than spill from Calaveras Reservoir.	Frequent releases from low-flow valve or cone valve to manage water levels in the reservoir and from low flow valve for experimental purposes. Represented in ASDHM by observed flow at the USGS gage located downstream of Calaveras Reservoir	Implementation of instream flow schedule: - Dry year releases: May –Oct: 7 cfs; Nov - Dec: 5 cfs; Jan –April: 10 cfs, annual average. - Wet/normal year releases: May – Sept: 12 cfs, Oct: 7 cfs; Nov –Dec: 5 cfs, Jan – April: 12 cfs	
Alameda Creek Diversion Dam (ACDD)	- No fish ladder or bypass tunnel - Maximum diversion of Alameda Creek water to Calaveras Reservoir = 650 cfs		- Fish ladder and bypass structure operational - Minimum and Maximum diversion rates of Alameda Creek water to Calaveras Reservoir = 30 cfs to 370 cfs	
ACDD bypass flows	- When the gates on the diversion tunnel are open, only stream discharge greater than 650 cfs passes over the ACDD (Note: Operations at the ACDD between WY 2002 and WY 2010 were influenced by limitations on storage at Calaveras Reservoir. As a result, the gates on the diversion tunnel were closed more frequently than they had been previously). - Under Existing Condition, the ACDD tunnel has been closed since 5/23/2012. Prior to 2012 during the DSOD-restricted period, SFPUC operated ACDD very infrequently. For example, they were not operated at all between 10/24/2004 to 3/7/2007. When the gates on the diversion tunnel are closed, all flow in Alameda Creek passes over the ACDD		- Gate on diversion tunnel closed from April 1 to Nov 30, and all flow in Alameda Creek passes over ACDD. - Diversion of up to 370 cfs from December 1 to March 31. - Minimum bypass flow of 30 cfs whenever there is 30 cfs or more; if less than 30 cfs is present, entire flow passes over the ACDD	

TABLE HYD1-1 (Continued)
ATTRIBUTES OF FOUR SCENARIOS ANALYZED

Parameter	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Quarry pit operations Hanson Aggregates: - SMP-24 (Pits F2, F3-East, F3-West) - SMP-32 - SMP-33 Oliver de Silvia - SMP-30 (Pits F4, F5, F6)	- SMP-24 in active use for aggregate extraction until 2006 - SMP-32 not yet in operation - SMP-30 Pit F6 in active use - Excess water discharged under NPDES permit to Alameda Creek at an average annual rate of 2,796 acre-feet per year	- SMP-24 pits used only to store and manage water to support active mining on SMP-32 and aggregate processing, with excess water discharged under NPDES permit to Alameda Creek at an average annual rate of 3,436 acre-feet per year1 In 2015, this volume of regulated discharge was 1,206 acre-feet. - SMP-30 Pit F6 in active use for aggregate extraction, with infrequent discharges from SMP-30 to Alameda Creek	The same as existing conditions except that as a result of the releases and bypasses it is assumed more water infiltrates to the quarries and more water is available to the quarry operators for water management and subsequent NPDES discharges. It is assumed the average amount of water available for quarry NPDES discharges is an annual average of 6,620 acre-feet per year.	The same as existing conditions except that the ACRP reduces the amount of water assumed to be available to the quarry operators and therefore less water for NPDES discharge. The average amount of water available to the quarry operators for NPDES discharge decreases to an annual average of 2,532 acre-feet per year.
Loss of surface flow in Alameda Creek to subsurface between Welch Creek and Arroyo de la Laguna confluences	0 to 17 cfs (maximum) between Welch Creek and San Antonio Creek confluences, and 0 to 7.5 cfs (maximum) between San Antonio Creek and Arroyo de la Laguna confluences, depending on streamflow			
Alameda Creek Recapture Project	Not in operation			Pumping of water from Pit F2 by SFPUC and transfer to SVWTP or San Antonio Reservoir for municipal water supply

2. Alameda Creek Watershed

2.1 Regional Hydrology

The proposed project area lies within the Alameda Creek watershed. The watershed is shown in **Figure HYD2-1**. The Alameda Creek watershed encompasses an area of approximately 700 square miles, extending from Mount Diablo in the north, Altamont Pass in the east, Mount Hamilton in the south, and San Francisco Bay in the west. Elevations in the watershed range from about 4,000 feet near the headwaters to sea level at the point where the creek flows to San Francisco Bay (1).

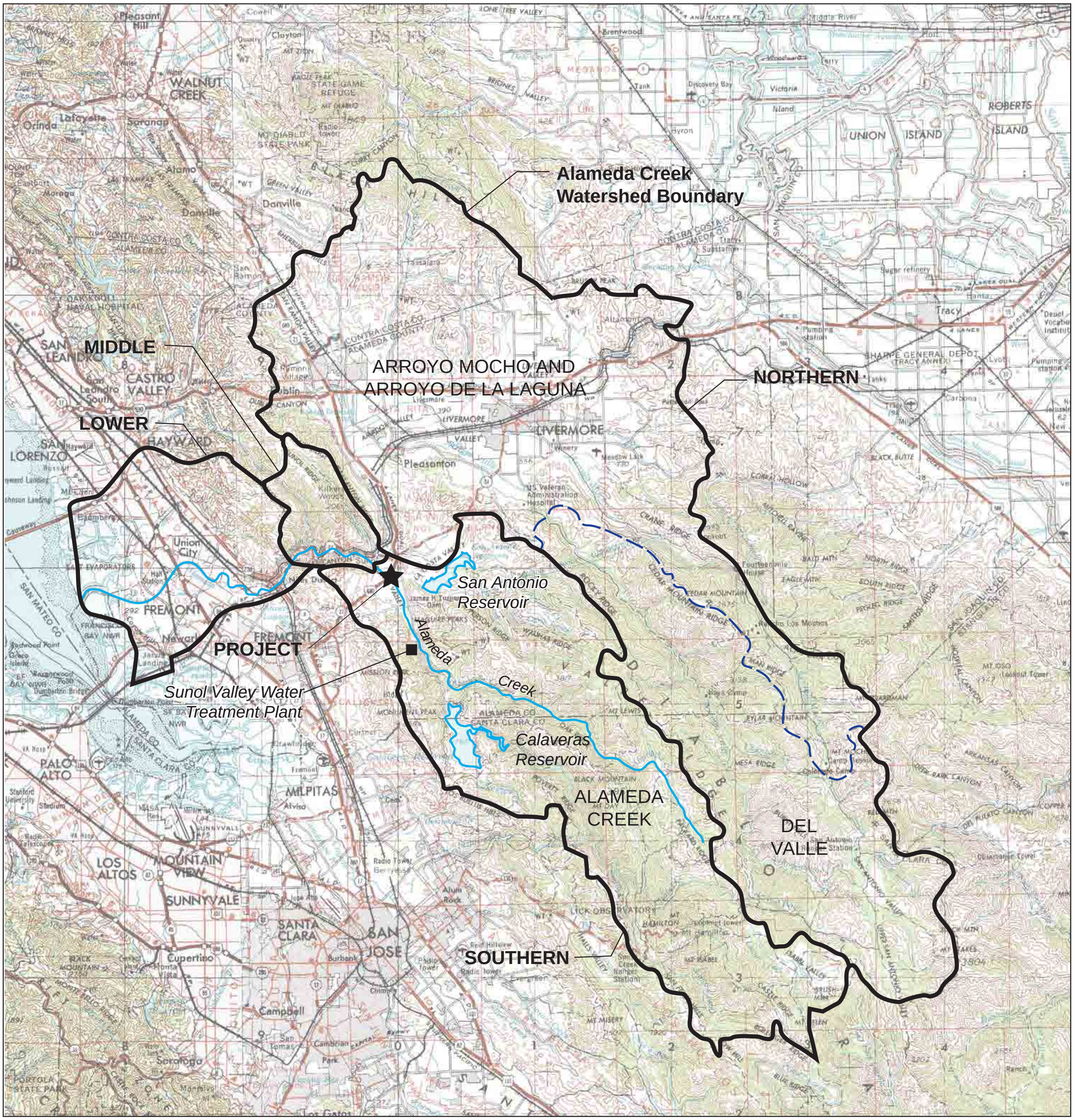
The climate of the Alameda Creek watershed is characterized by warm, dry summers and mild, rainy winters. Average temperatures range from the mid-50s in winter to the high 70s in summer (in degrees Fahrenheit [°F]). Average annual precipitation in the watershed is 20 inches, but it is higher in the headwaters (26 inches) (2).

The Alameda Creek watershed can be divided into four catchments, the larger northern and southern catchments, and the smaller middle and lower catchments. About 65 percent of the Alameda Creek watershed lies within the northern catchment. Most of the northern catchment is occupied by rangeland, cropland, and wildland, but it also contains the cities of Livermore, Pleasanton, Dublin, and San Ramon. The northern catchment drains to Arroyo de la Laguna and its tributaries, Arroyo del Valle, Arroyo las Positas, Arroyo Mocho, and San Ramon and Tassajara Creeks.

The southern catchment consists almost entirely of undeveloped wildland and rangeland. About 25 percent of the Alameda Creek watershed lies within the southern catchment. The catchment includes the Sunol-Ohlone Regional Wilderness, the SFPUC's Alameda watershed lands, and the Sunol Valley. It drains to Arroyo Hondo, upper Alameda Creek, and Alameda Creek's tributaries, including Calaveras Creek, Welch Creek, San Antonio Creek, La Costa Creek, and Indian Creek. The small middle and lower catchments comprise the remaining 10 percent of the Alameda Creek watershed.

The northern and southern catchments meet at the northern end of the Sunol Valley at the confluence of Arroyo de la Laguna and Alameda Creek. The middle catchment consists of the lands that drain to Alameda Creek as it flows through Niles Canyon. Sinbad and Stoneybrook Creeks are tributaries to the reach of Alameda Creek in the middle catchment. The lower catchment consists of the lands that drain to Alameda Creek as the creek flows across the San Francisco Bay Plain. In the lower catchment, much of the creek is confined between levees and receives runoff from urban storm drains.

Over the last century, the natural hydrology of the Alameda Creek watershed has been altered by water supply system operations, gravel mining, urban development, and flood reduction projects. However, almost all of the urban development and flood reduction projects are located in the



SOURCE: EDAW & Turnstone JV

SFPUC Alameda Creek Recapture Project

Figure HYD 2-1
Alameda Creek Watershed and Sub-watershed Areas

northern and lower catchments. The primary anthropogenic factors affecting the natural hydrology of Alameda Creek in the southern catchment are water supply system operations and gravel mining.

The proposed ACRP would lie at the northern end of the southern catchment, about 1.5 miles upstream of Alameda Creek's confluence with Arroyo de la Laguna. The following description of water resources in the vicinity of the ACRP is focused on the southern, middle, and lower catchments because that is where the potential effects of the ACRP would occur. The northern catchment would not be affected by the proposed project.

The major surface water bodies in the southern catchment are Calaveras Reservoir, San Antonio Reservoir, Alameda Creek and its tributaries, including San Antonio Creek, and several large water-filled quarry pits in the Sunol Valley. Calaveras Reservoir and San Antonio Reservoir are components of the SFPUC's water supply system. **Figure HYD2-2** shows the water bodies and the reach of Alameda Creek between the Alameda Creek Diversion Dam and the Arroyo de la Laguna.

The major surface water bodies in the middle and southern catchments are Alameda Creek and the Quarry Lakes. The Quarry Lakes are several former quarry pits that the Alameda County Water District uses for water storage and groundwater recharge. They are located on both sides of Alameda Creek, where it emerges from the Niles Canyon and begins to flow across the Bay Plain.

2.2 Calaveras Reservoir

Calaveras Reservoir is formed by Calaveras Dam, which was completed in 1925. The reservoir is located on Calaveras Creek about one mile upstream of the Calaveras Creek/Alameda Creek confluence. It collects water from Calaveras Creek and Arroyo Hondo as well as from local drainages along the western perimeter of the reservoir. Calaveras Reservoir also receives water from the upper reaches of Alameda Creek. Water from Alameda Creek is diverted at the Alameda Creek Diversion Dam and flows through a 1.8 mile long tunnel to Calaveras Reservoir. The SFPUC draws water from Calaveras Reservoir and conveys it by pipeline to the Sunol Valley Water Treatment Plant for treatment and distribution to customers, or to San Antonio Reservoir for storage.

When it first went into service, Calaveras Reservoir had a storage capacity of 96,850 acre-feet at a pool elevation of 756 feet, although the storage capacity has been reduced somewhat as a result of siltation. The SFPUC typically filled the reservoir to its capacity in the wet season, whenever there was sufficient runoff to do so. Storage was drawn down in the drier months to supply water to customers in the SFPUC's service area when demand was at its seasonal peak. For example, in the spring of 2000, the SFPUC filled the reservoir, raising the water surface elevation to 756 feet. In the following summer, fall and winter, the reservoir was drawn down, and the water surface elevation fell to 727 feet (3). The reservoir plays an important role in carryover storage for the SFPUC regional water system and as such the SFPUC maintains as much stored water in the reservoir as possible from year-to-year.

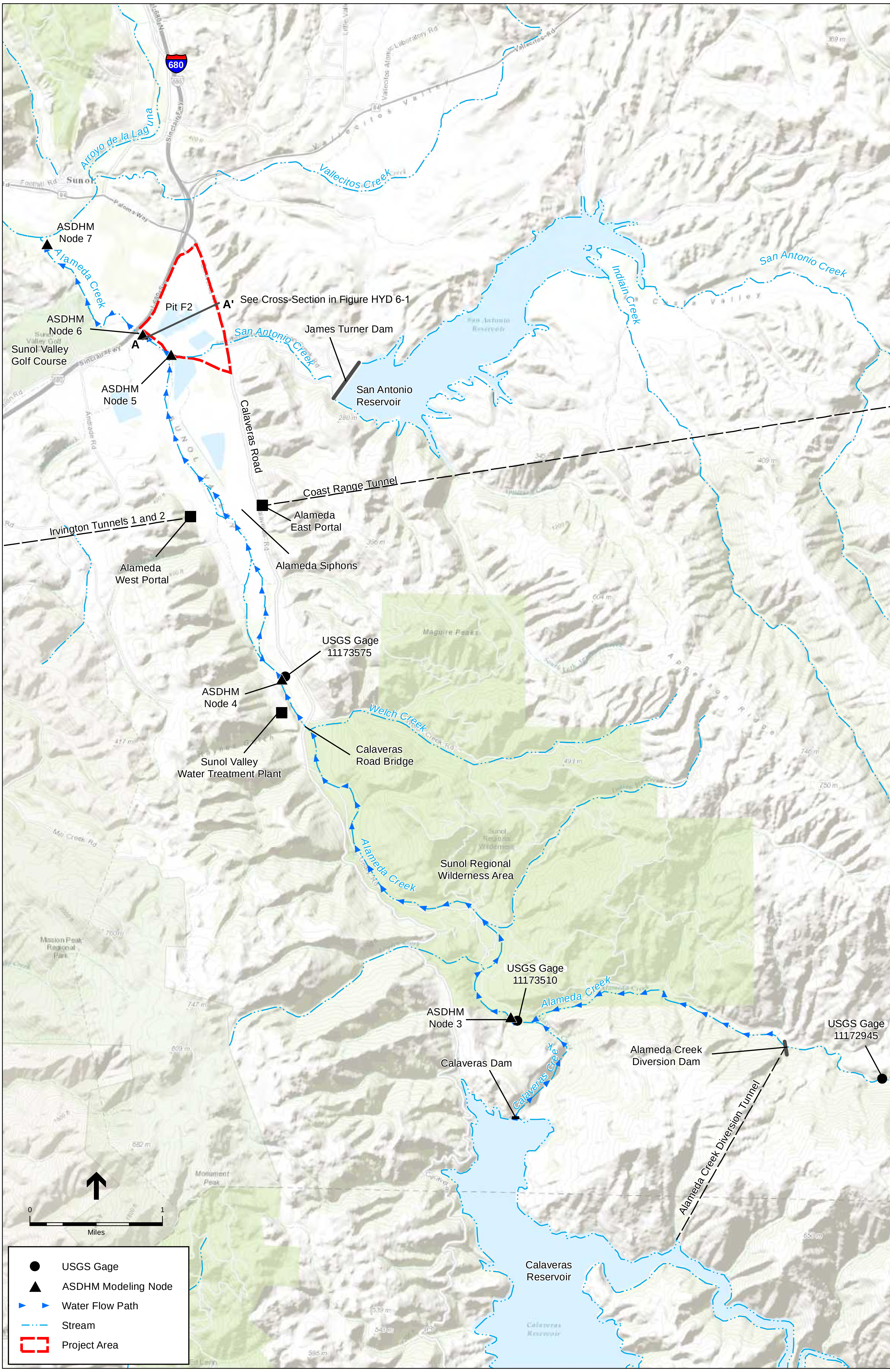
In 2001, the DSOD determined that Calaveras Dam was vulnerable to damage in an earthquake and required that the SFPUC not fill the reservoir above elevation 700, except briefly during high flow events. The elevation restriction was later raised to 705 feet. A pool elevation of 705 feet corresponds with a capacity of 38,100 acre-feet (4). With storage limited to that which can be accommodated between elevations 690 feet and 705 feet, the reservoir's usable storage became 12,400 acre-feet. The SFPUC has been operating Calaveras Reservoir with usable storage limited to 12,400 acre-feet since 2001, approximately 13 percent of the reservoir's storage capacity before the DSOD restriction was imposed.

In 2011, the SFPUC began constructing the CDRP, which consists of replacing the existing Calaveras Dam and modifying the Alameda Creek Diversion Dam. The new dam is being built immediately downstream of the existing dam, and the CDRP is scheduled for completion in 2019. During the construction period, Calaveras Reservoir is being operated with a usable capacity of 12,400 acre-feet, although this may be reduced at times to facilitate construction. The Alameda Creek Diversion Dam tunnel has also been closed since May 2012. Once the CDRP is complete, the nominal capacity of the reservoir will be restored to its original value of 96,850 acre-feet.

2.3 San Antonio Creek and Reservoir

San Antonio Creek is an intermittent stream with its headwaters about nine miles east of Alameda Creek. It joins Alameda Creek about one-third of a mile upstream of the Interstate 680 (I-680) bridge and in the reach of the creek adjacent to a number of quarry pits. San Antonio Reservoir is located on San Antonio Creek about 1.5 miles upstream of the creek's confluence with Alameda Creek. The reservoir has a storage capacity of 50,500 acre-feet and is formed by Turner Dam, which was constructed in 1965. The reservoir collects and stores runoff from the upper San Antonio Creek watershed. In addition to storing local runoff, San Antonio Reservoir can be used to store Calaveras Reservoir water, Hetch Hetchy water (from the Tuolumne River watershed), and subsurface water from Alameda Creek. Water from Calaveras Reservoir is transferred to San Antonio Reservoir as described above, and Hetch Hetchy water and Alameda Creek subsurface water is transferred to San Antonio Reservoir as described below.

The Hetch Hetchy Aqueduct conveys Tuolumne River water from Yosemite National Park to the Bay Area, and passes through the Sunol Valley about 1.5 miles south of the proposed ACRP. Hetch Hetchy water is conveyed beneath Alameda Creek in the Alameda Siphons to the Irvington Tunnels, which convey the water west towards the Bay Area to the water supply service area. Hetch Hetchy water can be diverted from the aqueduct to San Antonio Reservoir upstream of the Alameda Siphons (5). Subsurface water was formerly diverted to San Antonio Reservoir from the Sunol Infiltration Gallery, which in recent years has been used as the irrigation water supply for the Sunol Golf Course. The infiltration gallery is located about one-half mile downstream of the ACRP project area.



SOURCE: SFPUC, 2015. Modeling node and monitoring well locations. KMZ files provided by Amod Dhakal on August 6, 2015.

SFPUC Alameda Creek Recapture Project

Figure HYD 2-2

Surface water bodies in the Alameda Creek watershed between the Alameda Creek Diversion Dam and Arroyo de la Laguna

This page intentionally left blank

2.4 Alameda Creek

Alameda Creek flows from its headwaters near Mount Hamilton northward through the Sunol-Ohlone Regional Wilderness and the Sunol Valley to its confluence with Arroyo de la Laguna. Just downstream of the confluence it turns and flows westward through Niles Canyon and across the Bay Plain to San Francisco Bay. Its total length is 46 miles.

2.4.1 Channel Form

The uppermost reach of Alameda Creek flows through rugged and undeveloped terrain from its headwaters to the Alameda Creek Diversion Dam. The creek channel upstream of the diversion dam slopes steeply, descending in a narrow well-defined channel at an average rate of about 125 feet per mile. Water that passes over the diversion dam continues through a steep channel, including the gorge known as Little Yosemite, to Alameda Creek's confluence with Calaveras Creek at the southern end of the Sunol Valley. The reach of the creek between the diversion dam and the confluence with Calaveras Creek descends at an average rate of about 165 feet per mile.

Downstream (north) of the Calaveras Creek confluence, Alameda Creek's channel slope becomes much flatter, descending at a rate of about 27 feet per mile through the Sunol Valley. From the confluence, Alameda Creek flows for several miles in a well-defined channel contained within the valley bottom to the Calaveras Road bridge. The channel width ranges between 100 and 250 feet in this reach, but widens out to about 500 feet downstream of the bridge. From the Calaveras Road bridge to the Alameda Siphons, the creek flows in a broad sometimes braided channel. Downstream of the Alameda Siphons, levees confine the channel until the creek reaches the I-680 bridge. About 40 years ago, this section of Alameda Creek was relocated westward to facilitate gravel quarrying in the SMP-30 area.

Downstream (north) of I-680, the creek flows along the west side of the Sunol Valley to its confluence with Arroyo de la Laguna. Beyond the confluence, the channel steepens as Alameda Creek flows through Niles Canyon, before flattening again as the creek flows across the Bay Plain. The most downstream reach of Alameda Creek flows through an urbanized area and is confined between levees.

The proposed ACRP lies adjacent to the reach of Alameda Creek between the Alameda Siphons and I-680, commonly referred to as the quarry reach. The elevation of the creek channel's lowest point, or thalweg, varies from about elevation 274 feet at the upstream end of the quarry reach to about elevation 236 feet at the downstream end. The elevation of the thalweg at the confluence of Alameda and San Antonio Creeks, near the proposed ACRP, was between 240 and 242 feet in 2003 (6).

2.4.2 Flow Regime

From its headwaters to the Alameda Creek Diversion Dam, streamflow in Alameda Creek is largely unaffected by human activities; below the diversion dam it is affected by SFPUC's water supply operations. Operations at the diversion dam under existing conditions are different from operations before 2001, when the DSOD imposed restrictions on storage in Calaveras Reservoir. Under pre-2001 conditions, if the gates on the tunnel entrance at the diversion dam were open and streamflow was less than 650 cubic feet per second (cfs), all the water in the creek was diverted through the tunnel to Calaveras Reservoir. Streamflow in excess of 650 cfs passed over the diversion dam and continued down Alameda Creek. If the gates to the diversion tunnel were closed the entire flow passed over the diversion dam and continued down Alameda Creek. Now, with storage in Calaveras Reservoir limited by DSOD restrictions, the SFPUC keeps the gates on the tunnel entrance closed most of the time and almost all of the flow in Alameda Creek at the Alameda Creek Diversion Dam, passes over the diversion dam and continues down the creek. Since May 2012, due to the Streambed Alteration Agreement permit requirements for the CDRP, the ACDD tunnel has been closed.

Downstream of the diversion dam, Alameda Creek flows to its confluence with Calaveras Creek. Calaveras Creek contributes to flow in Alameda Creek as a result of stormwater runoff to Calaveras Creek below Calaveras Dam, and from seepage, releases, and spills from the dam. Releases and spills from the dam to Calaveras Creek were infrequent before 2001. Releases have increased in frequency since then because of the restrictions on storage in Calaveras Reservoir. No spills have occurred since 2001 because of the lowered storage level at the reservoir.

Below its confluence with Calaveras Creek, Alameda Creek flows through the Sunol Valley. The creek gains water from tributary streams and loses water to stream channel deposits in the reach between the Welch Creek and San Antonio Creek confluences. The characteristics of the substrate in this reach of Alameda Creek suggest that the losses have always occurred, but were likely increased when quarry pits were excavated alongside the creek. Some of the time, primarily during the night, surface water flow in the creek near the proposed project area is increased when gravel quarry operators pump excess water out of gravel pits and discharge it, under NPDES permit, to the creek.

Arroyo de la Laguna joins Alameda Creek about 1.5 miles downstream of the proposed ACRP. Arroyo de la Laguna drains a much larger area than the upper reaches of Alameda Creek. Flow in Alameda Creek downstream of the Arroyo de la Laguna confluence increases substantially as a result of runoff from the larger more developed catchment. It is further increased by releases of water from the South Bay Aqueduct, a component of the State Water Project, and from Del Valle Reservoir south of the city of Livermore. Water released from the South Bay Aqueduct and Del Valle Reservoir flows down Arroyo de la Laguna to Alameda Creek and on through Niles Canyon. It is recaptured by Alameda County Water District, a state water contractor, as it exits Niles Canyon.

Flow in Alameda Creek is flashy; that is, flow increases and decreases rapidly in response to precipitation over its watershed. In the dry season, there is little or no flow in the reach of the creek adjacent to the proposed ACRP. Detailed information on flow in the creek can be found below in Section 5, Alameda Creek Surface Water Hydrology.

2.5 Gravel Quarries in Sunol Valley

Several gravel quarries are located at the north end of Sunol Valley, adjacent to and on both sides of Alameda Creek. There is no direct surface water flow into the quarry pits from Alameda Creek. Water enters the pits by percolation from the surrounding ground and as rainfall. Minor amounts of surface runoff and subsurface water may also enter the pits from the eastern watershed. Water levels in the pits vary and are primarily dependent on management action by the quarry operators and the rate of seepage from the surrounding ground (see Section 3, Quarry Operations, for detailed information on the quarries).

2.6 Quarry Lakes

Quarry Lakes are several former gravel quarries located in the city of Fremont where Alameda Creek flows out of Niles Canyon. Alameda County Water District diverts water into Quarry Lakes from Alameda Creek during the wetter months of the year using temporary inflatable dams (7). The water in Quarry Lakes percolates into the ground and recharges the Niles Cone, a groundwater basin that extends under the Bay Plain from the foot of the Diablo Range to San Francisco Bay. Its northern limit is the city of Hayward boundary, and its southern limit is the Alameda/Santa Clara County line.

2.7 Subsurface Water

The following main geological units lie below the Sunol Valley: stream channel deposits, Younger Alluvium, Older Alluvium, and the Livermore Gravels are not. The Older Alluvium and Livermore Gravels underlie the Sunol Valley and consist of dense clays and gravels that are non-water-bearing. From about the Welch Creek confluence to the mouth of Niles Canyon, stream channel deposits and Younger Alluvium lie above the Older Alluvium and Livermore Gravels. Water can be readily transmitted through the stream channel deposits and Younger Alluvium.

Water enters the stream channel deposits and Younger Alluvium from Alameda Creek, Welch Creek, San Antonio Creek, and as runoff from less-defined minor drainages. For more information on subsurface water, see Appendix HYD2.

Notes for Section 2

1. San Francisco Planning Department, 2011. *Final Environmental Impact Report for the San Francisco Public Utilities Commission Calaveras Dam Replacement Project*. San Francisco Planning Department File No. 2005.0161E, State Clearinghouse No. 2005102102. Certified January 27, 2011.
2. San Francisco Planning Department, 2012. F*inal Environmental Impact Report for the San Francisco Public Utilities Commission San Antonio Backup Pipeline Project*. San Francisco Planning Department File No. 2007.0039E, State Clearinghouse No. 2007102030. Certified September 20, 2012.
3. Same as 1.
4. Same as 1.
5. San Francisco Planning Department, 2008. *Final Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*. San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.
6. Entrix, Inc, 2003. *Assessment of Alameda Creek in the vicinity of Mission Valley Rock Company including the proposed Ivaldi mining site, Sunol Valley reach of Alameda Creek*. Letter report to Mr. W.M. Calvert, Mission Valley Rock Company, January 8, 2003.
7. ACWD, 2014. *Reliability by Design: Integrated Resource Planning at Alameda County Water District*.

3. Quarry Operations

3.1 Overview of Quarry Operations

Commercial gravel quarries operated by Hanson Aggregates and Oliver de Silva (ODS) are located at the north end of Sunol Valley, between the Alameda Siphons to the south and the confluence with Arroyo de la Laguna to the north. Quarry pits lie adjacent to and on both sides of Alameda Creek. Some of the pits are active; that is, quarry operators are currently extracting aggregate from the pits under Surface Mining Permits (SMP). Aggregate extraction has been completed in some pits and the inactive pits are now used for water management in support of mining operations. Quarry operations are expected to continue until no additional aggregate can be extracted, which is estimated to occur within the next 20 years.

Quarry pit depths vary but several pits reportedly approach 250 feet below grade (1). **Figure HYD3-1** shows the quarry reach of Alameda Creek, the layout of the gravel quarries, and their location relative to Alameda Creek. The quarries occupy four plots of land, which are either owned by Hanson Aggregates or leased from the City and County of San Francisco. The four plots are designated SMP-24, SMP-30, SMP-32, and SMP-33. Hanson Aggregates operates quarries and aggregate processing facilities on the SMP-24, SMP-32, and SMP-33 areas. Quarries and aggregate processing facilities in the SMP-30 area are operated by ODS.

The operational schedule of the aggregate mines and processing facilities depends on market demand and weather conditions and may occur year round. Operations are usually suspended during wet weather. As mining proceeds, and after aggregate is extracted, the total size of the pits increases. This will enable an increase in the volume of water that can be stored in the pits in the future. When mining is completed, the pits will have a large capacity for water storage that could serve as an ancillary water storage facility for the regional water system, as called for in the SFPUC's Alameda Watershed Management Plan (2). The approximate storage capacities of the quarry pits based on current reclamation requirements and mining practices are shown in **Table HYD3-1**.

Water seeps into the quarry pits from Alameda Creek and the surrounding areas through a band of stream channel deposits that underlies the northern Sunol Valley (for more information, see Appendix HYD2). If needed to create a dry work area for aggregate extraction, the quarry operators remove water that seeps into the active pits by pumping it into inactive pits, inactive areas of active pits, and other storage ponds. The operators use some of the water that seeps into the pits to wash aggregate and produce concrete and asphalt. Wash water is returned to inactive pits and ponds where silt settles out. If the water level in a pit rises too high, the quarry operators pump the excess water into a pit or pond with available storage capacity or into Alameda Creek as a regulated discharge. Both Hanson Aggregates and ODS hold permits to discharge water to Alameda Creek that were issued by the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay RWQCB Order No. R2-2008-0011, NPDES General Permit No. CAG982001 (Aggregate Mining, Sand

TABLE HYD3-1
APPROXIMATE STORAGE CAPACITY OF MAJOR QUARRY PITS AND PONDS

Pit	Quarry Operator	SMP	Estimated Water Storage Capacity on Completion (acre-feet)	Mining Condition
F1	Hanson Aggregates	SMP-32	14,000-16,000	Active
F2	Hanson Aggregates	SMP-24	8,800	Completed and currently used for water storage
F3-East	Hanson Aggregates	SMP-24	1,350	Completed and currently used for water storage
F3-West	Hanson Aggregates	SMP-24	280	Completed and currently used for water storage
F4	Oliver de Silva	SMP-30	1,900	Active but portions of the pit are used for water storage
F5	Oliver de Silva	SMP-30	N/A	Active for silt management and mining
F6	Oliver de Silva	SMP-30	24,900	Active

SOURCE: SFPUC, 2015. Personal communication with Ellen Levin of SFPUC.

Washing, and Sand Offloading). The NPDES permits are intended to regulate the quality of the water that is discharged to Alameda Creek. The quarry operators have no requirements to discharge a minimum amount of water; however, their permits do restrict the maximum volume of water that can be discharged. The permits are updated from time to time. Future permits could include additional restrictions that may affect their ability to discharge (see EIR Chapter 5, Section 5.16.3.1 for more information on the quarry discharge permits).

The quarry operators' general practice is to conserve water within the pits for use in aggregate processing and concrete and asphalt production and to discharge water to the creek only when absolutely necessary. When discharge is necessary, it generally occurs for about 11 hours during the night when lower cost off-peak power rates are available. However, during periods of active mining, discharges can occur at any time consistent with permit conditions.

3.2 Hanson Aggregates

Hanson Aggregates extracted aggregate from the SMP-24 area until 2006. The quarry operator currently extracts aggregate from the SMP-32 area, which is located north of the SMP-24 area, on the north side of Alameda Creek between I-680 and Arroyo de La Laguna. Aggregate extraction usually occurs in the dry season (generally April through November) but may occur year-round.

Water that seeps into the pit in SMP-32 must be moved to keep the active mining area dry. Water is pumped out of the active mining area and conveyed to areas within SMP-32 that are not being actively mined or to the pits and ponds within the boundary of SMP-24, including Pit F3-West on the east side of Alameda Creek, and a pond on the west side of the creek referred to as the Ready Mix Pond. Gravel from SMP-32 is conveyed to an aggregate processing facility located in SMP-24/33, on the west side of Alameda Creek. Hanson Aggregates also collects water from a small creek and

SOURCE: ESA, 2015; Date of aerial photo is 2014.

Figure HYD 3-1
Quarry Reach of Alameda Creek

This page intentionally left blank

several springs that emerge from the hills to the west and stores it in the Ready Mix Pond and in other ponds on SMP-24. Water from these ponds is pumped to the aggregate processing facility where it is used to wash gravel. If the amount of water in the ponds is insufficient to meet the needs of the aggregate processing facility and the concrete batch plant, supplementary water is pumped to the Ready Mix Pond from Pit F2, Pit F3-East or Pit F3-West. Hanson Aggregates uses approximately three million gallons per day of water for production purposes.

Pumping from the Ready Mix Pond to the aggregate processing facility is not continuous; it only occurs when the facility is operating. The facility does not operate in wet weather. Spent wash water from the aggregate processing facility is conveyed to pits that are no longer used for aggregate extraction (inactive pits) where silt in the wash water settles out. Currently, when Hanson uses water from Pits F2, F3-East and F3 West, or discharges water to Alameda Creek, the water is first pumped to a 2,000 gallon tank. Water from the tank is then discharged under its NPDES permit to Alameda Creek or to a piping system that distributes the water for dust control and irrigation in the SMP-24 and SMP-32 areas. The 2,000 gallon tank also has an overflow structure that results in water discharging to Alameda Creek whenever the tank is used. Hanson reports its regulated NPDES discharges to the RWQCB. The volumes of water reported are based on the pump rate of the pumps and not a meter at the discharge point.

Water in Hanson Aggregates’ inactive pits and ponds must be managed to address certain risks. Water cannot be allowed to rise to levels where it poses a threat to the stability of the levees that separate the pits one from another and from Alameda Creek. Water levels are also managed to limit seepage from one pit to another or to prevent oversaturation of soils adjacent to the pits. In addition, the SFPUC uses Pit F3 East as a discharge point for Hetch Hetchy water, which is then pumped to San Antonio Reservoir. Per the lease agreement with Hanson, Hanson is required to maintain a freeboard in Pit F3 East so that there is room for a Hetch Hetchy water discharge. To maintain water levels, Hanson Aggregates pumps excess water stored in Pits F2, F3-East and F3-West and other pits it manages into other pits where water levels are lower or into Alameda Creek under its NPDES discharge permit, just downstream of its confluence with San Antonio Creek.

3.3 Oliver de Silva

ODS is actively mining gravel from Pit F6. In 2012, as part of the SMP-30 expansion project, ODS revised its surface mining permit and renewed its lease with SFPUC to allow for increasing the mining depth from 140 feet to a maximum of 400 feet below the ground surface. The ground surface in the vicinity of Pit F6 is at about elevation 260 feet. Also as part of the project, ODS expanded its mining area by 58 acres, and added a new asphalt batch plant. ODS has permits to build a new ready-mix concrete batch plant.

Water that enters the active mining area in Pit F6 is pumped to either an inactive area of Pit F6 or to Pit F4, which serves as a source of wash water for the SMP-30 aggregate processing facility, and for production of asphalt.[1] Water levels in Pit F6 and Pit F4 fluctuate. During seasons when the mine is inactive, water levels rise and can exceed elevation 220 feet. During the active mining season, the water level in Pit F6 may be held below elevation 220 feet, but the water surface elevation in Pit F4 may remain at a high elevation throughout the season. Water can overflow from Pit F4 to Alameda Creek over a weir with a crest elevation of about 247 feet so the water level in the pit can never exceed elevation 247 feet by more than a few inches. This overflow weir is one of two NPDES discharge points for ODS. ODS uses about five million gallons per day of water for aggregate, and asphalt production. Spent wash water from aggregate production is conveyed to Pit F5.

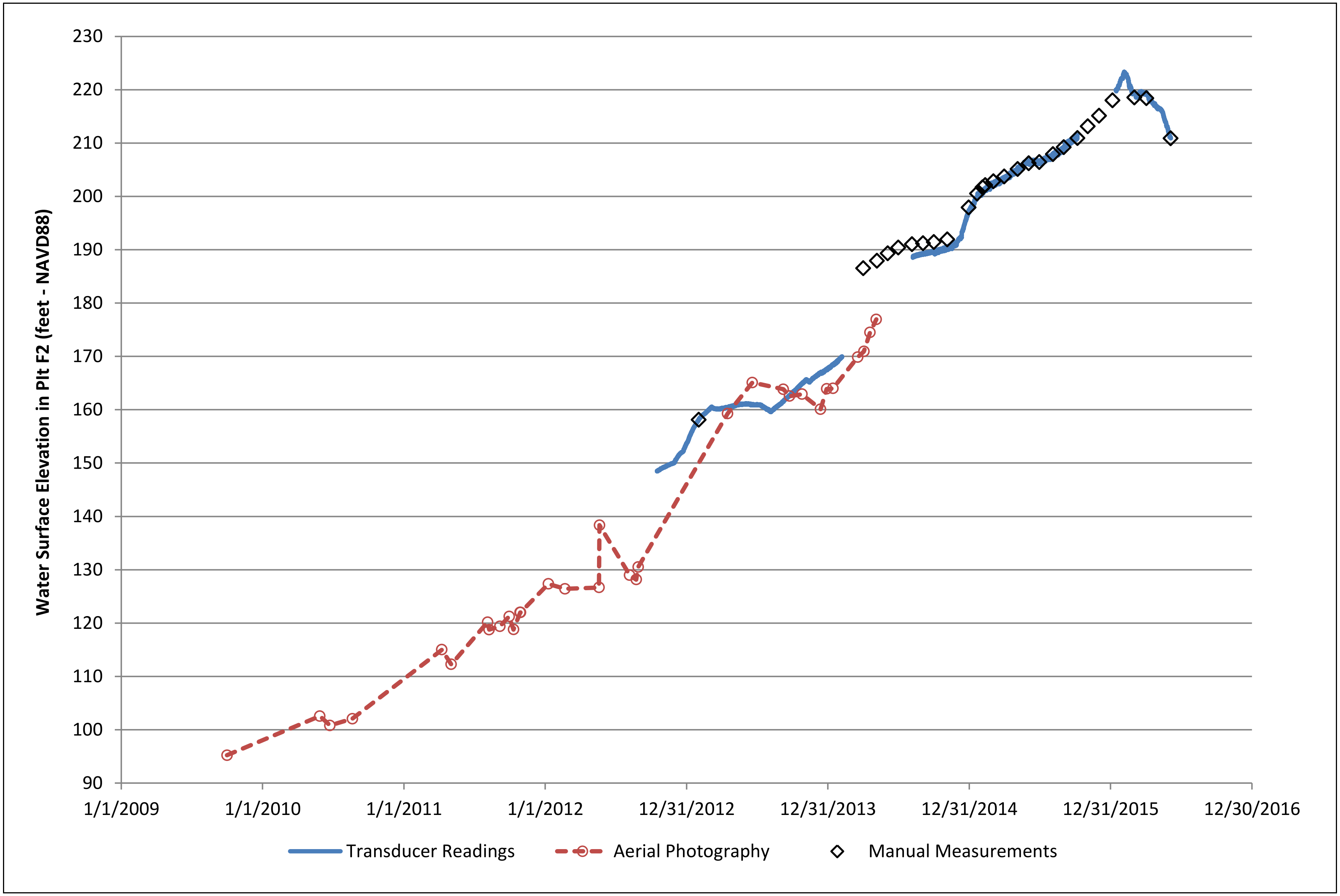
The SFPUC has the ability to discharge Hetch Hetchy water from the regional water system to Pit F6 under unplanned circumstances. If this water cannot be contained in the SMP-30 pits, ODS has an additional regulated discharge point at the southern end of SMP-30 and can discharge this water to Alameda Creek under its NPDES permit.

3.4 Water Levels in Pits

The quarry operators do not record water levels in their various pits. Because the proposed ACRP would affect water levels in Pit F2 and could affect water levels in other pits and ponds, the SFPUC has been measuring water surface elevations in four SMP-24 quarry pits—Pit F2, Pit F3-East, Pit F3-West, and the Ready Mix Pond—since early 2011 (3). Pit F2 is the site of the proposed ACRP and Pits F3-East and F3-West are adjacent to it. Pressure transducers installed in the quarry pits record water levels continuously; on occasion the transducer data are supplemented with manual measurements. Water levels in the Ready Mix Pond are not pertinent to the analysis of the ACRP and not discussed further in this report.

A plot of historical water surface elevations in Pit F2 from 2009 to the first half of 2016 is shown in **Figure HYD3-2**. Although water surface elevation monitoring in the pit did not begin until late 2012, the record of water levels was extended back to October 2009 using aerial photography and satellite imagery. In July 2009, the water surface elevation in Pit F2 was estimated to be about 95 feet. By late spring in 2010, it was at elevation 102 feet. By October 2011, the water surface elevation had risen to elevation 122 feet and a year later when measurements began, it had reached elevation 148 feet. It has risen gradually since then reaching elevation 223 feet in February 2016, before falling back to elevation 210 feet by June 2016. Hanson Aggregates stopped pumping water into Pit F2 temporarily in April, 2014, but may resume pumping water into the pit if it wishes until the time that the ACRP is commissioned. After the ACRP is commissioned, Hanson Aggregates is expected to stop pumping water into Pit F2. Hanson Aggregates continues to pump water out of Pit F2 as needed to manage water levels in the pit and for aggregate and asphalt production.

[1] ODS has approval for a concrete batch plant as well however, it has not yet been constructed.



SOURCE: Luhdorff and Scalmanini (L&S), 2016. Sunol Pit Monitoring Data Transmittal. Excel spreadsheet files and PDFs of water level figures provided by Tom Elson of L&S on September 16, 2016

SFPUC Alameda Creek Recapture Project

Figure HYD 3-2

Historical Water Surface Elevations in Pit F2

The water surface elevation in Pit F3-East varied between elevation 182 feet and elevation 227 feet during the 30-month period from March 2011 to September 2013, as shown in Figure **HYD3-3**. In the fall of 2013, the water surface elevation was lowered from elevation 225 feet to about elevation 115 feet to accommodate construction of facilities associated with the San Antonio Backup Pipeline. Since then it gradually rose to about elevation 152 feet in late 2014, before rising sharply to about elevation 237 feet in early 2015. From then until June 2016, the water surface elevation has risen and fallen between elevation 237 feet and elevation 197 feet. There is a clause in the SFPUC's lease agreement with Hanson Aggregates that calls for the latter to maintain water levels in Pit F3-East at elevation 195 feet or below so that there is always sufficient storage capacity in the pit to contain discharges of water from the Hetch Hetchy Aqueduct. The SFPUC then conveys the discharged water to San Antonio Reservoir.

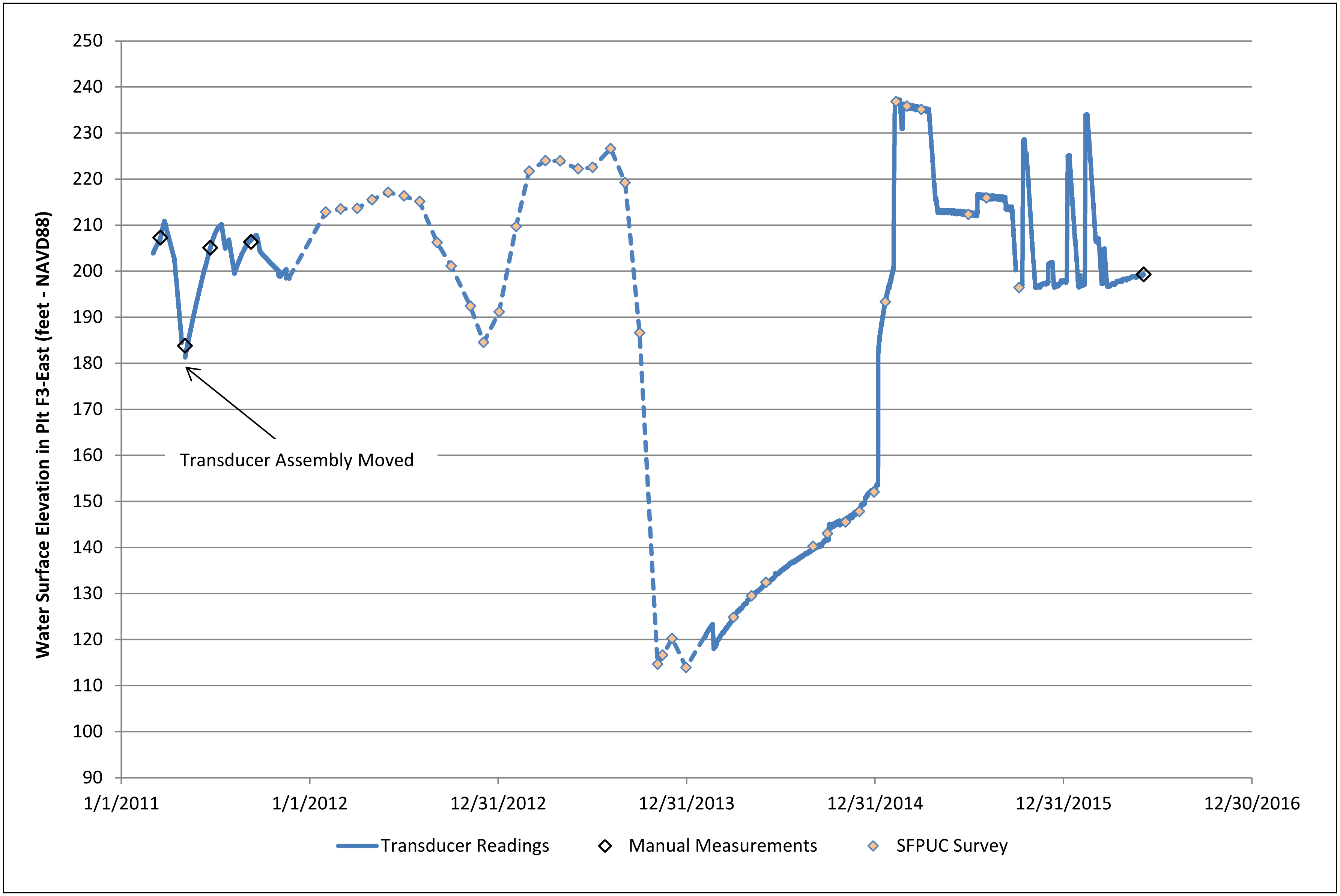
A plot of the water surface elevation in Pit F3-West is shown in **Figure HYD3-4**. It varied between elevation 242 feet and elevation 205 feet during the four-year period from March 2011 to June 2016, with multiple fluctuations, probably in response to pumping by Hanson Aggregates.

The SFPUC has been monitoring water surface elevations in two pits on ODS-leased lands, Pit F4 and Pit F6, since 2011. As shown in **Figure HYD3-5**, the water surface elevation in Pit F4 fell from elevation 247 feet in May 2011 to elevation 223 feet in December 2012, before rising sharply to elevation 233 feet in January 2013. It has remained in the range of elevation 233 feet to elevation 247 feet since then. Pit F4 is equipped with a weir with a crest elevation of 247 feet over which one of ODS' NPDES discharges occurs. Discharges are infrequent and have occurred in May 2011 and March 2016. The water surface elevation in Pit F6, which is actively mined, has fluctuated considerably in the last several years, as shown in **Figure HYD3-6**.

When monitoring began in March 2011, the water surface elevation in Pit F6 was at 146 feet. It rose sharply to elevation 166 feet in May and then fell sharply to elevation 118 feet in June, after which it ranged between elevation 118 feet and elevation 112 feet until March 2012. It then began rising, reaching a maximum elevation of 206 feet in May 2013, although it is not known whether there were water level fluctuations between March 2012 and December 2012 because the measuring equipment failed. Since May 2013, the water surface elevation has remained between elevation 210 feet and elevation 177 feet.

The data on water surface elevations in Pit F3-East, Pit F3-West, Pit F4, and Pit F6, reported above, are based on measurements made with sensors or taken manually. No analysis of aerial photography or satellite imagery was undertaken to extend the record of water levels for these pits.

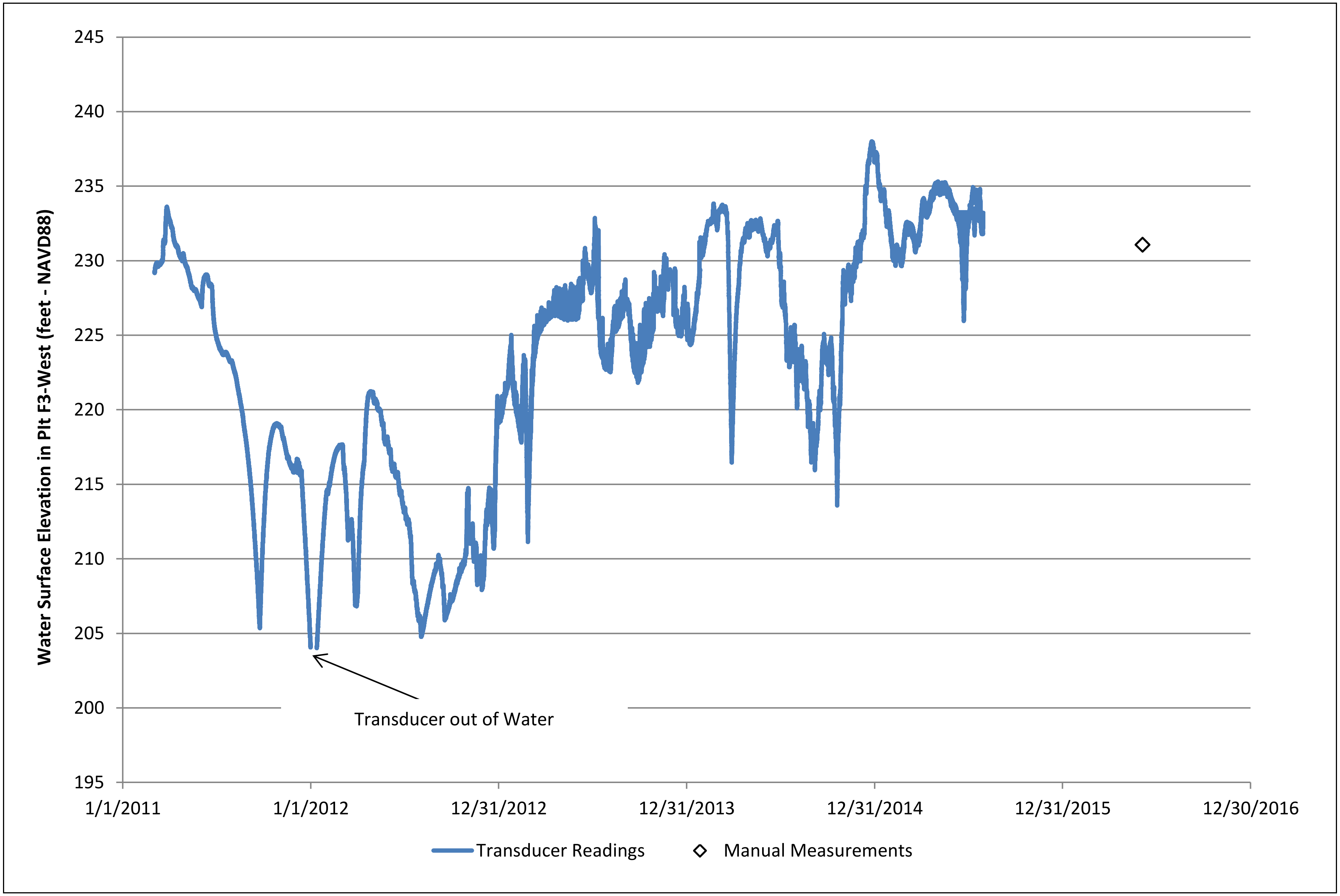
Water enters and leaves the pits by percolation through the stream channel deposits that underlie the Sunol Valley. The direction of water movement depends on the hydraulic gradient between the pits and the surrounding stream channel deposits. Below the stream channel deposits are the Older Alluvium/ Livermore Gravels, which transmit water poorly, and so little water enters or leaves the pits below the base of the stream channel deposits. In the vicinity of Pit F2, the base of the stream channel deposits is estimated to be at about elevation 224 feet (for more information, see Appendix HYD2). The elevation of the bed of Alameda Creek (thalweg) in the same location is at about 242 feet.



SOURCE: Luhdorff and Scalmanini (L&S), 2016. Sunol Pit Monitoring Data Transmittal. Excel spreadsheet files and PDFs of water level figures provided by Tom Elson of L&S on September 16, 2016

Figure HYD 3-3

Historical Water Surface Elevations in Pit F3-East

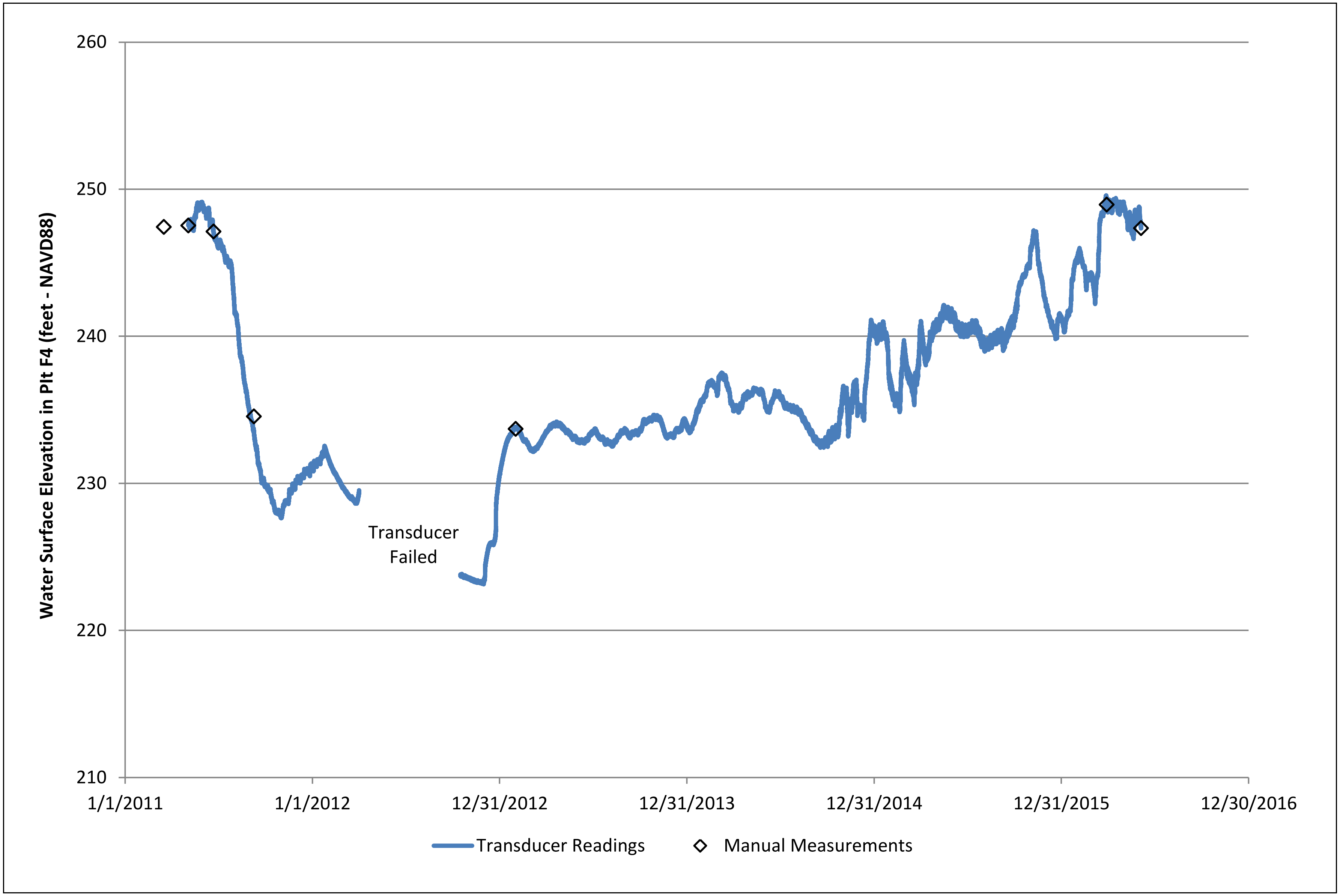


SOURCE: Luhdorff and Scalmanini (L&S), 2016. Sunol Pit Monitoring Data Transmittal. Excel spreadsheet files and PDFs of water level figures provided by Tom Elson of L&S on September 16, 2016

SFPUC Alameda Creek Recapture Project

Figure HYD 3-4

Historical Water Surface Elevations in Pit F3-West

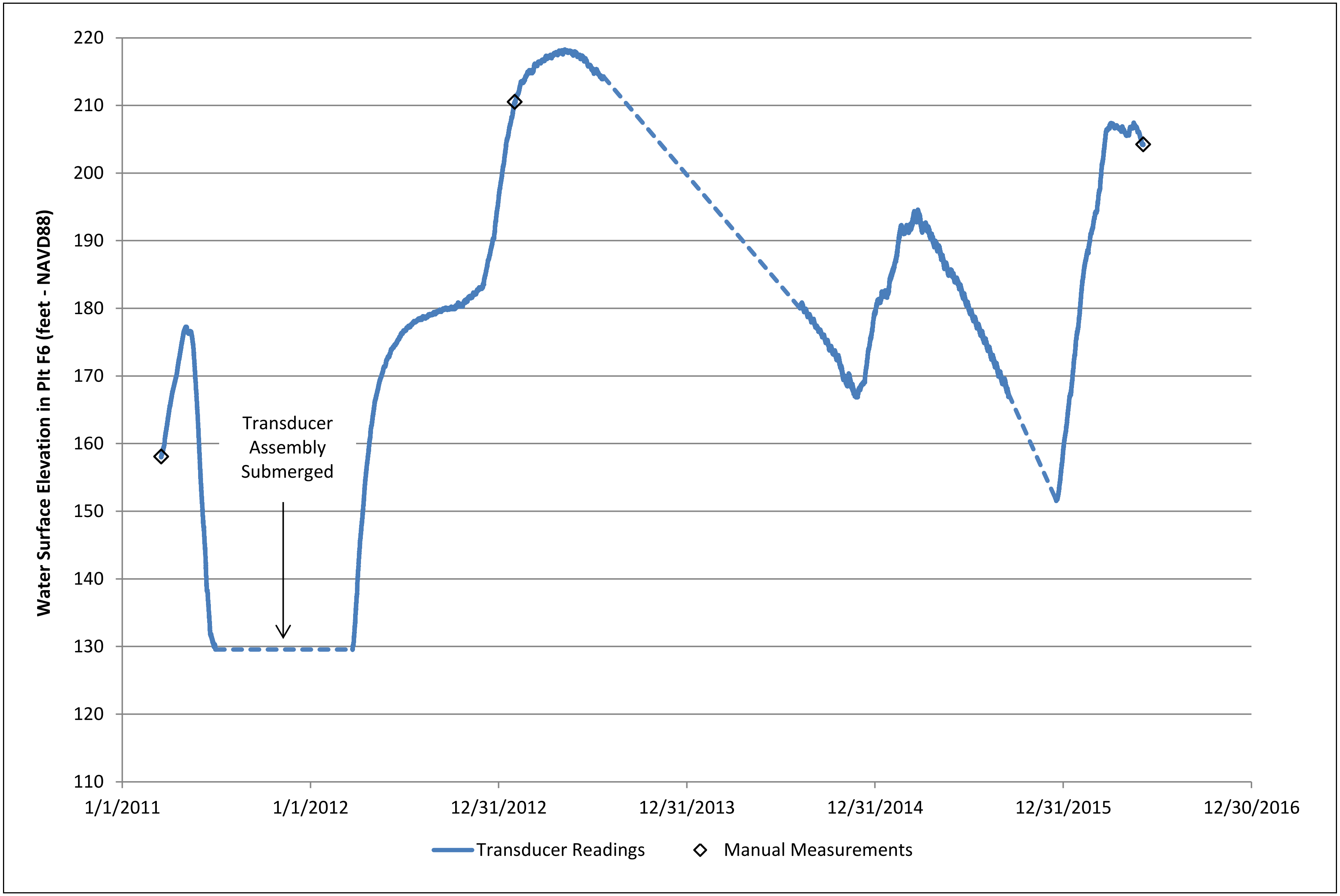


SOURCE: Luhdorff and Scalmanini (L&S), 2016. Sunol Pit Monitoring Data Transmittal. Excel spreadsheet files and PDFs of water level figures provided by Tom Elson of L&S on September 16, 2016

SFPUC Alameda Creek Recapture Project

Figure HYD 3-5

Historical Water Surface Elevations in Pit F4



SOURCE: Luhdorff and Scalmanini (L&S), 2016. Sunol Pit Monitoring Data Transmittal. Excel spreadsheet files and PDFs of water level figures provided by Tom Elson of L&S on September 16, 2016

Figure HYD 3-6
Historical Water Surface Elevations in Pit F6

Water enters Pit F2 from the stream channel deposits when the water level in the deposits is above elevation 224 feet and the water surface elevation in the pit is lower than elevation 224 feet. As shown in Figure HYD3-2, from 2009 until June 2016, the water level in Pit F2 was at or below elevation 224 feet and so water has entered the pit whenever the water level in the stream channel deposits under Alameda Creek was high enough to create a positive hydraulic gradient. Although it has not done so between 2009 and 2016, water could leave Pit F2 and percolate into the stream channel deposits if the water surface elevation in the pit rose higher than the water level in the deposits.

Hanson Aggregates reports that subsurface water migrates from Pit F2 into Pit F1 in the SMP-32 area even when the water level in Pit F2 is below elevation 224 feet. This suggests that there is a discontinuity in the stream channel deposits between Pit F2 on the south side of I-680 and Pit F1 on the north side of I-680, perhaps attributable to removal of Livermore Gravel during the I-680 construction, which may have been replaced with fill that is more permeable than the gravel.

During the five-year period in which water surface elevations in the pits have been monitored, Pit F3-East has probably gained water from the surrounding stream channel deposits almost all the time until October 2013 when cut off walls were placed around it. Pit F3-West has probably gained water from the surrounding ground from early 2011 until the present.

The base of the stream channel deposits is estimated to be at about elevation 228 feet in the vicinity of Pit F4. Except for a short period in 2012, water levels in Pit F4 have been higher than elevation 228 feet. During such times, Pit F4 has lost or gained water from the stream channel deposits under Alameda Creek, with the direction of subsurface flow determined by the subsurface water level in the stream channel deposits. The base of the stream channel deposits is estimated to be at about elevation 245 feet in the vicinity of Pit F6. Pit F6 has probably gained water from the stream channel deposits for the five-year period during which water levels in the pits have been monitored.

3.5 Regulated Discharges from Quarry Pits to Alameda Creek

Hanson and ODS discharge water to Alameda Creek under an NPDES discharge permit issued and managed by the RWQCB, as mentioned above. Their permits do not require a minimum discharge amount but their maximum discharge amounts are restricted. The discharge is permitted for water quality purposes only. The RWQCB can at any time discontinue the discharge permit or update the permit to restrict discharges further (see EIR Chapter 5, Section 5.16.3.1 for more information on the quarry operators discharge permits).

As noted above, Hanson Aggregates pumps excess water in the pits it manages into Alameda Creek under NPDES discharge permits. Excess water is typically discharged to the creek during the night to take advantage of lower rates for electrical power, but some water may be discharged to the creek in the day. Hanson Aggregates discharges relatively small amounts of water to Alameda Creek even when there is no need to discharge excess water from its pits because of the characteristic of its piping at SMP-24. When Hanson Aggregates pumps water from Pits F2, F3-East and F3-West into the 2,000 gallon tank that is used as a source of water for dust control and irrigation, the tank overflows and the overflow is routed to Alameda Creek. These overflows can occur at any time when the quarries run by Hanson Aggregates are operating.

The volume of water discharged to the creek varies considerably from year-to-year and from month-to-month. **Table HYD3-2** shows the amount of water discharged from Hanson Aggregates into Alameda Creek between Water Year 2002 and Water Year 2015 as reported to the Regional Water Quality Control Board (RWQCB). The annual volume of water reported as discharged to the creek under Hanson's NPDES permit during this period varied from a maximum of 5,328 acre-feet in Water Year 2010 to a minimum of 103 acre-feet in Water Year 2012 and averaged 3,245 acre-feet.

TABLE HYD3-2
HANSON AGGREGATES – HISTORICAL NPDES DISCHARGES TO ALAMEDA CREEK

Water Year	Quarter	Mean Quarterly Discharge (cfs)	Total Quarterly Volume (acre-feet)	Total Annual Volume (acre-feet)
2002	1	7.2	1317	4,970
	2	6.7	1193	
	3	6.7	1217	
	4	6.8	1244	
2003	1	6.8	1244	4,578
	2	6.7	1193	
	3	6.2	1116	
	4	5.6	1025	
2004	1	0	0	2,688
	2	4.9	884	
	3	4.9	892	
	4	5.0	912	
2005	1	5.0	912	3,928
	2	4.9	875	
	3	4.9	892	
	4	6.8	1248	
2006	1	6.8	1248	4,953
	2	6.8	1221	
	3	6.8	1235	
	4	6.8	1248	
2007	1	6.8	1248	4,542
	2	6.8	1221	
	3	6.8	1235	
	4	4.6	837	
2008	1	0.03	5	3,718
	2	7.3	1317	
	3	8.4	1518	
	4	4.8	877	
2009	1	3.8	698	2,302
	2	2.6	464	
	3	4.4	795	
	4	1.9	345	
2010	1	4.5	813	5,324
	2	7.3	1299	
	3	9.3	1683	
	4	8.4	1528	

TABLE HYD3-2 (Continued)
HANSON AGGREGATES – HISTORICAL NPDES DISCHARGES TO ALAMEDA CREEK

Water Year	Quarter	Mean Quarterly Discharge (cfs)	Total Quarterly Volume (acre-feet)	Total Annual Volume (acre-feet)
2011	1	6.0	1102	4,480
	2	6.9	1228	
	3	9.0	1619	
	4	2.9	530	
2012	1	0.2	30	103
	2	0.2	33	
	3	0.1	20	
	4	0.1	20	
2013	1	0.04	7	1,069
	2	0.9	169	
	3	2.7	483	
	4	2.3	411	
2014	1	4.0	724	1,012
	2	0.2	43	
	3	0.1	20	
	4	1.2	225	
2015	1	0.1	20	1,206
	2	1.8	327	
	3	2.1	386	
	4	2.6	473	

SOURCE: San Francisco Public Utilities Commission (SFPUC), 2015. SMP-24 discharge to Creek. Excel spreadsheet file provided by Amod Dhakal on April 1, 2015 for data through 2009. Data for 2010-2015 was obtained from reports provided to the RWQCB.

The average annual volume of water discharged under Hanson's NPDES permit between Water Year 1996 and Water Year 2013, the period used in the analysis of the proposed ACRP's hydrologic effects, was 3,436 acre-feet (4). The SFPUC estimates that the minimum annual discharge from Hanson Aggregates is ten percent of the long-term annual average, which for the period of Water Year 1996 to Water Year 2013 calculates to be 344 acre-feet per year. It should be noted that the reported amounts of water discharged by Hanson Aggregates to Alameda Creek under their NPDES permit are estimated based on a pump-rating curve and should not be regarded as precise (5).

Because ODS usually keeps the water level in Pit F4 above the base of the stream channel deposits at about elevation 228 feet, water percolates northward beneath San Antonio Creek towards Pit F3-West. This reduces the need to discharge water from the SMP-30 pits to maintain safe water levels and consequently, regulated discharges by ODS are infrequent. If it is necessary to remove water in the SMP-30 pits, ODS fills Pit F4 to about elevation 247 feet and the water discharges by gravity over a weir to Alameda Creek, just upstream of its confluence with San Antonio Creek. This is one of ODS's NPDES discharge points. ODS has a second regulated discharge point near the south end of Pit F6, but it is rarely used. The amount of water discharged from SMP-30 to Alameda Creek varies considerably from year-to-year and month-to-month. **Table HYD3-3**, shows the annual volumes of water discharged to Alameda Creek by ODS from Water Year 2003 until Water Year 2015. The annual volume of water discharged under ODS's NPDES permit to the creek varied from a maximum of 3,181 acre-feet in the Water Year 2011 to a minimum annual volume of zero, which occurred in several years. The average annual volume of water discharged over the period was 512 acre-feet. It should be noted that some of the reported amounts of water discharged under the NPDES permit by ODS are estimates rather than measured values. Discharges from Pit F4 are measured at the weir, but discharges from Pit F6 are estimated from pump manufacturer rating curves. In addition, the volume of water discharged by ODS in the fourth quarter of 2011 was an anomaly because it resulted from a discharge by the SFPUC into one of the pits managed by ODS.

TABLE HYD3-3
CEMEX (2003-2011)/OLIVER DE SILVA (2012-2015) –
HISTORICAL NPDES DISCHARGES TO ALAMEDA CREEK

Water Year	Quarter	Mean Quarterly Discharge (cfs)	Total Quarterly Volume (acre-feet)	Total Annual Volume (acre-feet)
2003	1	0	0	0
	2	0	0	
	3	0	0	
	4	0	0	
2004	1	0	0	0
	2	0	0	
	3	0	0	
	4	0	0	
2005	1	0	0	236
	2	0	0	
	3	0.4	65	
	4	0.9	171	
2006	1	0.3	62	1,252
	2	0	0	
	3	1.1	198	
	4	5.4	992	
2007	1	3.8	691	740
	2	0.2	31	
	3	0.1	12	
	4	0.03	6	
2008	1	0	0	149
	2	0	0	
	3	0	0	
	4	0.8	149	
2009	1	0.5	90	208
	2	0	0	
	3	0	0	
	4	0.6	118	
2010	1	0	0	893
	2	0	0	
	3	4	713	
	4	1	180	
2011	1	0	0	3,181
	2	0	0	
	3	1.3	239	
	4	16.1	2,942[1]	
2012	1	0	0	0
	2	0	0	
	3	0	0	
	4	0	0	
2013	1	0	0	0
	2	0	0	
	3	0	0	
	4	0	0	

TABLE HYD3-3 (Continued)
CEMEX (2003-2011)/OLIVER DE SILVA (2012-2015) –
HISTORICAL NPDES DISCHARGES TO ALAMEDA CREEK

Water Year	Quarter	Mean Quarterly Discharge (cfs)	Total Quarterly Volume (acre-feet)	Total Annual Volume (acre-feet)
2014	1	0	0	0
	2	0	0	
	3	0	0	
	4	0	0	
2015	1	0	0	0
	2	0	0	
	3	0	0	
	4	0	0	

[1] The high discharge volume in the fourth quarter of 2011 resulted because of a discharge of water by the SFPUC into one of the pits managed by ODS.

SOURCE: San Francisco Public Utilities Commission (SFPUC), 2015. SMP-24 discharge to Creek. Excel spreadsheet file provided by Amod Dhakal on April 1, 2015 for data through 2009. Data for 2010-2015 was obtained from reports provided to the RWQCB.

Historical NPDES discharges from Hanson Aggregates and ODS are summarized in **Table HYD3-4**. Little water has been discharged from the SMP-30 quarry to Alameda Creek since late 2011. This is because ODS has adopted a different approach to water management from the approach used by the former operator, Cemex.

TABLE HYD3-4
SUMMARY OF HISTORICAL NPDES DISCHARGES FROM QUARRIES TO ALAMEDA CREEK

Water Year	Hanson Aggregates Mean Discharge (cfs)	Hanson Aggregates Annual Volume (acre-feet)	Cemex/ODS Mean Discharge (cfs)	Cemex/ODS Annual Volume (acre-feet)	Year Type	SMP 24 Mining Status
2002	6.9	4,970	0	0	Dry	Active
2003	6.3	4,578	0	0	Dry	Active
2004	3.7	2,688	0	0	Dry	Active
2005	5.4	3,928	0.3	236	Normal/Wet	Active
2006	6.8	4,953	1.7	1,252	Normal/Wet	Active
2007	6.3	4,542	0.2	140	Dry	Active
2008	5.1	3,718	0.2	149	Dry	Inactive
2009	3.2	2,302	0.3	208	Normal/Wet	Inactive
2010	7.4	5,324	1.2	893	Normal/Wet	Inactive
2011	6.2	4,480	4.4	3,181 [1]	Normal/Wet	Inactive
2012	0.1	103	0	0	Dry	Inactive
2013	1.5	1,069	0	0	Dry	Inactive
2014	1.4	1,023	0	0	Dry	Inactive
2015	1.7	1,206	0	0	Dry	Inactive

[1] The high discharge volume in 2011 resulted because of a discharge of water by the SFPUC into one of the pits managed by ODS.

SOURCE: San Francisco Public Utilities Commission (SFPUC), 2015. SMP-24 discharge to Creek. Excel spreadsheet file provided by Amod Dhakal on April 1, 2015 for data through 2009. Data for 2010-2015 was obtained from reports provided to the RWQCB.

Notes for Section 3

1. URS, 2009. *Final Updated Alternatives Analysis Report, Alameda Fishery Enhancement Project, SFPUC Project CUW352.01*. January 30, 2009.
2. San Francisco Public Utilities Commission (SFPUC), 2001. *Final Alameda Watershed Management Plan*. April 2001.
3. The monitoring of water levels in the pits is performed by Luhdorff & Scalmanini for the SFPUC. The water level data reported here is from a series of reports and technical memoranda prepared by that company.
4. The record of NPDES discharges of water from the quarries operated by Hanson Aggregates before 2002 is incomplete. Estimates of the missing records were made by the SFPUC to enable daily discharge estimates for the 18-year period from Water Year 1996 to Water Year 2013, the hydrologic period used in the analysis of the proposed ACRP. Data pertaining to Hanson NPDES discharges to Alameda Creek was available as daily flows disaggregated from monthly flows for the period 10/1/1999 to 6/30/2008. Daily discharge values were available from 7/1/2008 and 9/30/2009 and from 3/30/1998 to 9/30/1999. The missing data for calendar days from 10/1/1995 to 3/29/1998 were derived from the same calendar days in Water Year 1999.
5. Although pumps may have a nominal rating, 1,000 gallons per minute for example, their actual performance depends on the circumstances of their application. Pump manufacturers provide rating curves for their pumps. The curves relate flow to the hydraulic head that the pump must overcome. The higher the hydraulic head the lower the flow rate. The quarry operators estimate the hydraulic head that one of their pumps is working against by estimating the vertical height between the pump intake and its outlet, with an adjustment made for friction loss in the pipes. They then use the pump rating curve to estimate flow. If used carefully the procedure provides a reasonable but imprecise estimate of flow.

4. Analytical Methods

4.1 General Approach

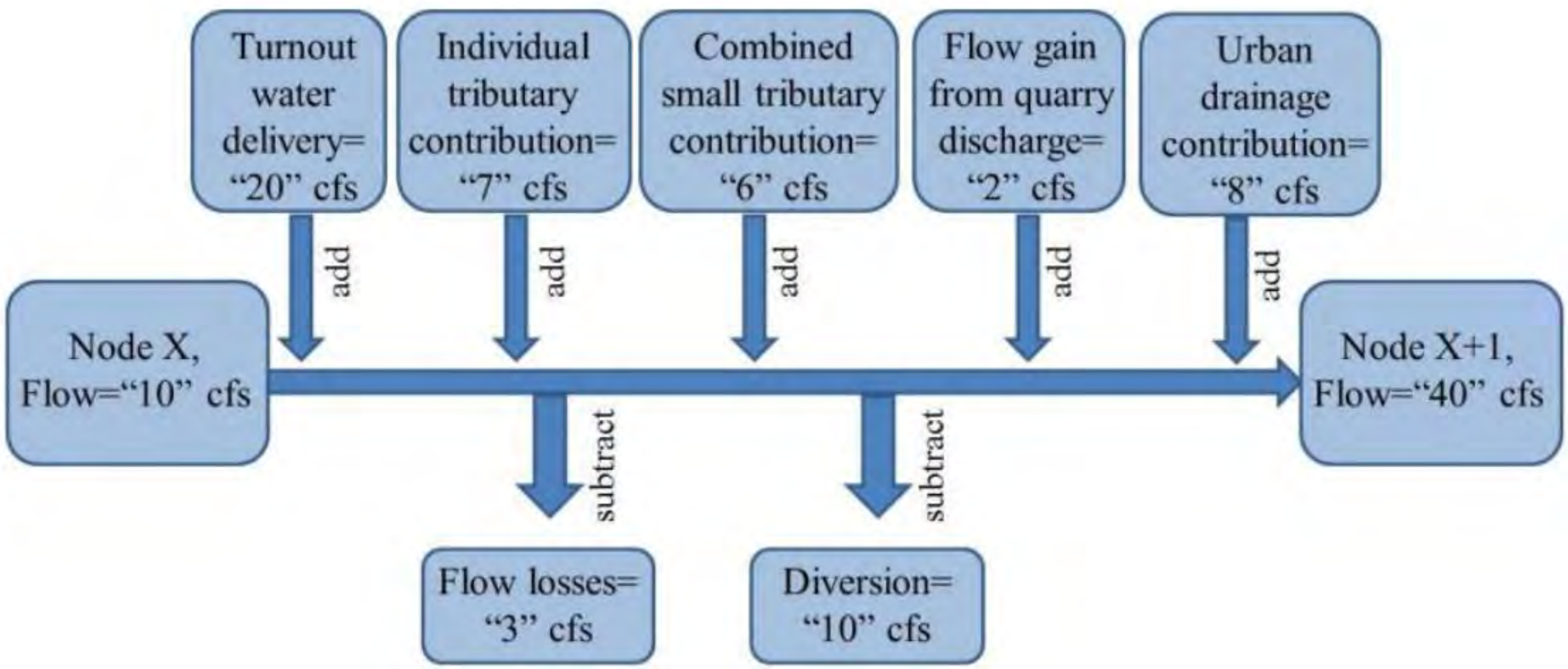
The SFPUC's Alameda System Daily Hydrologic Model (ASDHM) was used to simulate surface water flows in Alameda Creek under the four scenarios analyzed in this report. The ASDHM is a spreadsheet model based on the law of conservation of mass. The ASDHM simulates losses of water to the subsurface but does not simulate subsurface water movements in the ground. Information on subsurface water movements is provided in Appendix HYD2.

4.2 Alameda System Daily Hydrologic Model

The SFPUC uses the Hetch Hetchy/Local Simulation Model to simulate operation of its overall water system operations. The model operates on a monthly time-step and estimates monthly releases from the SFPUC's reservoirs and consequently monthly streamflows. Recognizing that a model that can estimate daily streamflows would be needed to analyze the effects of its water system operations on fisheries in Alameda Creek, the SFPUC developed the ASDHM. The ASDHM enables estimation of daily flows at various locations on Alameda Creek and its tributaries. The model was developed in 2009 by the SFPUC to aid discussion of potential releases and bypasses associated with the CDRP with regulatory agencies. It was expanded in 2012 for use by the Alameda Creek Fisheries Workgroup, and the agencies and stakeholders that comprise the workgroup. The workgroup is attempting to recover steelhead rainbow trout (*Oncorhyncus mykiss*) populations in the Alameda Creek watershed. The workgroup developed a plan that called for several technical analyses, including Ecosystem Diagnosis and Treatment, Numbers of Good Days and Spawning Risk. These analyses require information on hydrology, channel geometry, and water temperature. The ASDHM was developed to provide the hydrology information. Development of the model and its use in support of the Alameda Creek Fisheries Workgroup are described fully in a draft technical memorandum. (1)

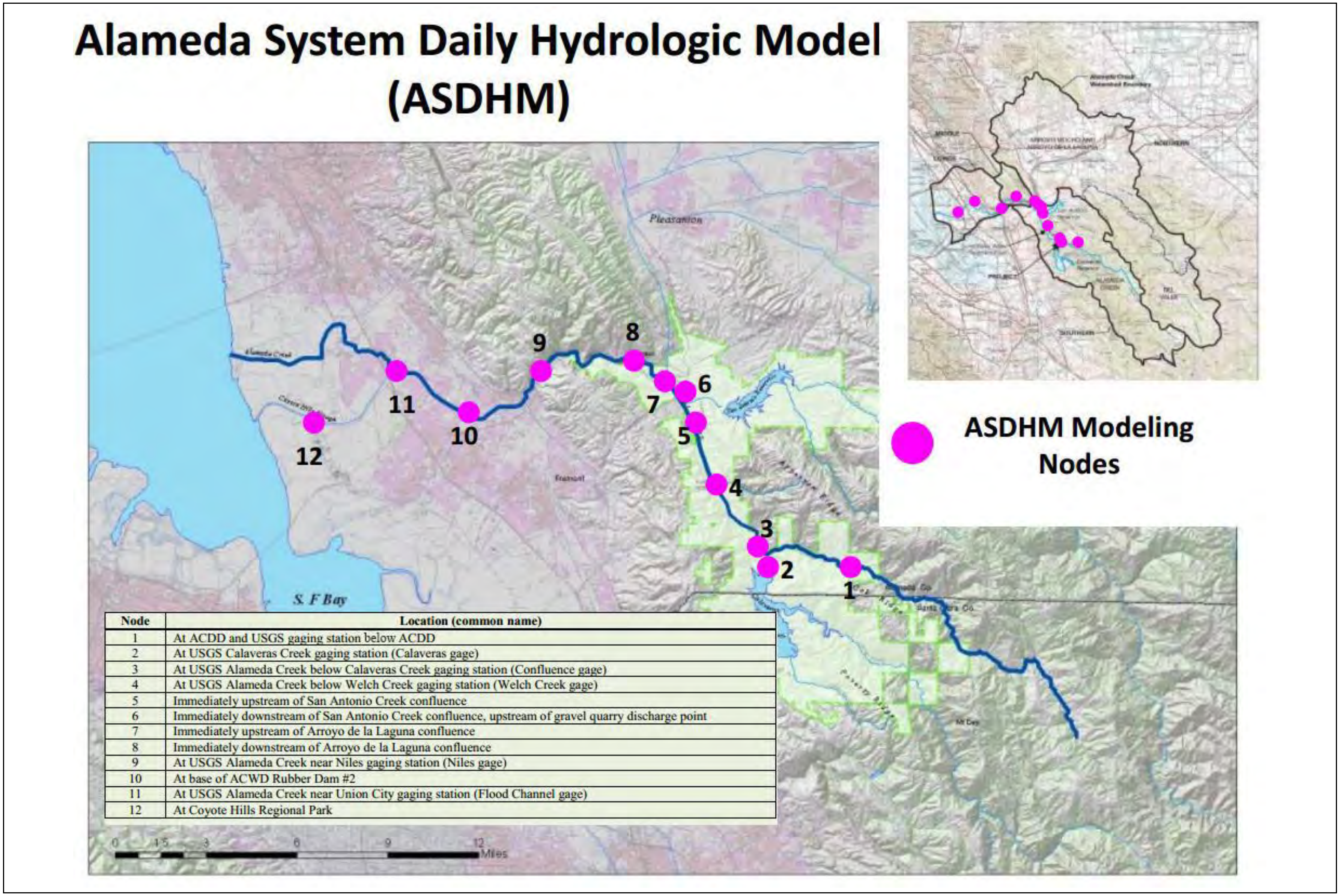
The SFPUC has extended the simulation period of the ASDHM to Water Year 2013 since its use by the Alameda Creek Fisheries Workgroup and has recently updated it to include the ACRP (2). The model's underlying computational concept is shown in **Figure HYD4-1**. The current version of the model enables estimation of daily flow values at 12 locations (or nodes) on Alameda Creek and its tributaries. The locations of the nodes, together with a description, are shown in **Figure HYD4-2**. The most upstream node is on Alameda Creek below the Alameda Creek Diversion Dam. The most downstream node is close to the point at which the creek discharges into San Francisco Bay.

ASDHM: Computational Concept



SOURCE: SFPUC, 2015. Alameda Creek Recapture Project (ACRP) CEQA Baseline/Hydro Approach Meeting. PowerPoint presentation file provided by Amod Dhakal on February 4, 2015.

SFPUC Alameda Creek Recapture Project
Figure HYD 4-1
ASDHM Computational Concept



Node	Location (common name)
1	At ACDD and USGS gaging station below ACDD
2	At USGS Calaveras Creek gaging station (Calaveras gage)
3	At USGS Alameda Creek below Calaveras Creek gaging station (Confluence gage)
4	At USGS Alameda Creek below Welch Creek gaging station (Welch Creek gage)
5	Immediately upstream of San Antonio Creek confluence
6	Immediately downstream of San Antonio Creek confluence, upstream of gravel quarry discharge point
7	Immediately upstream of Arroyo de la Laguna confluence
8	Immediately downstream of Arroyo de la Laguna confluence
9	At USGS Alameda Creek near Niles gaging station (Niles gage)
10	At base of ACWD Rubber Dam #2
11	At USGS Alameda Creek near Union City gaging station (Flood Channel gage)
12	At Coyote Hills Regional Park

SOURCE: SFPUC, 2015. Alameda Creek Recapture Project (ACRP) CEQA Baseline/Hydro Approach Meeting. PowerPoint presentation file provided by Amod Dhakal on February 4, 2015

SFPUC Alameda Creek Recapture Project

Figure HYD 4-2

ASDHM Modeling Node Locations

4.2.1 Use of the ASDHM for the Alameda Creek Fisheries Workgroup

Scenarios

The ASDHM was run to simulate streamflow under various different scenarios for the Alameda Creek Fisheries Workgroup. Development of the model and its use in support of the Alameda Creek Fisheries Workgroup are described fully in a draft technical memorandum.

Losses to the subsurface and streamflow gain from quarry NPDES discharges

Alameda Creek loses water to the subsurface as it flows through the section of the Sunol Valley between the Welch Creek confluence and the Arroyo de la Laguna confluence. Water is lost to the stream channel gravels that lie under the creek. It is likely that losses to the subsurface have always occurred in this reach of Alameda Creek, but they have probably been increased by the excavation of deep gravel mining pits within a few hundred feet of the creek channel.

Several efforts have been made to quantify the losses to the subsurface. In each study, water was released from Calaveras Reservoir and flow measurements were made at several locations along the creek (3, 4). In one study, conducted by Trihey, 24.5 cfs was lost to the subsurface zone between the Welch Creek gage (Node 4) and the Alameda Creek/Arroyo de la Laguna confluence (Node 7), of which 17 cfs was lost between the Welch Creek gage and the San Antonio Creek confluence. Another study made by the SFPUC confirmed that loss of Alameda Creek surface water to the subsurface between the Welch Creek gage (Node 4) and the San Antonio Creek confluence (Node 5) was 17 cfs (5). The total of streamflow in Alameda Creek at the Welch Creek gage and any additional flow contributed by runoff between the Welch Creek and San Antonio Creek confluences had to be greater than 17 cfs for flowing water to be observed just upstream of the confluence with San Antonio Creek.

Based on the results of the studies, the ASDHM assumed that up to 17 cfs percolates into the ground between the Welch Creek confluence and the San Antonio Creek confluence. The ASDHM, as used for the Alameda Creek Fisheries Work Group, did not include any further loss of Alameda Creek surface water to the subsurface downstream of the San Antonio Creek confluence. (6)

Much of the time, Alameda Creek gains water downstream of its confluence with San Antonio Creek (Node 6) as a result of NPDES discharges from the quarries. As described above in Section 3, Quarry Operations, Hanson Aggregates maintain safe water levels in their pits and ponds by discharging excess water to Alameda Creek in accordance with its NPDES permit. The annual average volume of water discharged under its NPDES permit for the period Water Year 1999 to Water Year 2009 (model period used in earlier analysis) was 3,799 acre-feet. The average annual volume of water discharged under its NPDES permit for the period Water Year 1996 to Water Year 2013 was 3,436 acre-feet, or an average rate of 4.7 cfs.

The SFPUC's model runs for pre-2001, existing, with-CDRP, and with-project conditions do not include NPDES discharges from the quarries at Node 6 or losses between San Antonio Creek and Arroyo del la Laguna (Nodes 6 and 7). Although it was assumed that NPDES discharges from the quarries might continue in the future, the amount and timing of the discharge was unknown and so the SFPUC excluded NPDES discharges as well as losses in this reach in its model runs. The purpose of the model runs completed for the Alameda Creek Fisheries Workgroup was the maintenance of adequate flow for over-summering steelhead in the reach of the creek above the Welch Creek confluence and migration flows during the winter. Including the NPDES discharges was determined to be unnecessary and of little value to that analyses. The SFPUC's model run for with-CDRP conditions was used by the National Marine Fisheries Service to support their analysis when they issued their Biological Opinion for the CDRP pursuant to the federal Endangered Species Act. This run did not include NPDES quarry discharges.

4.2.2 Use of the ASDHM to Analyze the Effects of the ACRP

Scenarios

ESA/Orion analyzed four scenarios for the ACRP EIR. They were:

- Pre-2001 Conditions: Conditions that existed before 2001, when the DSOD imposed storage restrictions on Calaveras Reservoir.
- Existing Conditions: Conditions that generally exist in 2015 (date of publication of the ACRP Notice of Preparation) with restricted storage in Calaveras Reservoir by order of the DSOD.
- With-CDRP Conditions: Conditions that will exist when the CDRP has been completed and is in operation, including implementation of the instream flow schedules and restoration of the historical capacity of Calaveras Reservoir.
- With-Project Conditions: Conditions that would exist when both the CDRP and the ACRP are completed and are in operation.

For the purposes of the ACRP EIR, ESA/Orion requested Alameda Creek streamflow data from four scenarios modeled by the SFPUC using the ASDHM. The SFPUC provided data from four modeled scenarios labeled: CDRP with ACRP, CDRP with no ACRP, measured impaired, and computed impaired, as modified to account for the current ACRP project assumptions. The simulation period and the hydrologic calculations for these scenarios are described in a memorandum (7). The CDRP with ACRP scenario is equivalent to with-project conditions; the CDRP with no ACRP scenario is equivalent to with-CDRP conditions; and the measured impaired scenario is equivalent to existing conditions. The computed impaired scenario represents conditions that existed before the DSOD imposed storage restrictions on Calaveras Reservoir (pre-2001 conditions).

Period of Analysis

ESA/Orion compared the streamflows that would occur under each of the four scenarios analyzed in this report using the ASDHM output provided by the SFPUC. Streamflows were estimated for each scenario for a period of time that includes a broad range of hydrologic circumstances for which site-specific data are available. The hydrology used in the analysis was for the 18-year period from Water Year 1996 to Water Year 2013.

The SFPUC classifies water years based on flow measured at a stream gage on Arroyo Hondo, a tributary of Calaveras Creek. Eight of the 18 water years in the period Water Year 1996 to Water Year 2013 were classified as dry and ten years were classified as wet/normal.

Losses to Subsurface and Gains from NPDES Discharges from Quarries

As described earlier, the ASDHM assumes a loss of up to 17 cfs of Alameda Creek surface water to the subsurface between the Welch Creek confluence and the San Antonio Creek confluence. This assumption was retained for ESA/Orion's analysis of the four scenarios. As noted earlier, the studies of losses to the groundwater from Alameda Creek showed that up to an additional 7.5 cfs of surface water is lost to the subsurface between the San Antonio Creek (Node 6) and Arroyo de la Laguna confluences (Node 7). In addition, water is added to surface flow in this reach of Alameda Creek by NPDES discharges from the quarries. Because the reach between the San Antonio Creek (Node 6) and Arroyo de la Laguna confluences (Node 7) is downstream of ACRP and is important for impact analysis, a close representation of physical processes occurring in the reach was necessary for the EIR impact analysis. The loss to the subsurface and the gain from the quarry discharges are not represented in the ASDHM, as used for the Alameda Creek Fisheries Workgroup. To better simulate physical processes in the reach, ESA/Orion adjusted the ASDHM outputs downstream of Node 6 to represent both the gains (Hanson's quarry NPDES discharge) and the losses that occur between San Antonio Creek (Node 6) and Arroyo de la Laguna (Node 7).

It is expected that a portion of the up to 7.5 cfs loss to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences may end up in SFPUC's existing infiltration gallery and a portion may emerge as a return flow around Niles. No information is available on the amount of water that may emerge from the subsurface and supplement surface water flows so no corresponding adjustment was made to ASDHM output. It was assumed that this water is lost from the Alameda Creek system. The method used to estimate the amounts of water added to Alameda Creek by the NPDES discharges from the quarries under pre-2001, with-CDRP and with-project scenarios is described in the following section.

Table HYD4-1 shows the average annual and range of modeled losses to the subsurface for the four scenarios. The upper part of the table shows losses between the Welch Creek and San Antonio Creek confluences. The lower part of the table shows losses between the San Antonio Creek and Arroyo de la Laguna confluences.

TABLE HYD4-1
LOSS OF ALAMEDA CREEK SURFACE WATER TO THE SUBSURFACE AND GAIN FROM QUARRY NPDES DISCHARGES (ACRE-FEET PER YEAR)

	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Loss between Welch Creek and San Antonio Creek				
Average Annual	3,610	4,526	9,033	9,033
Maximum (water year)	6,460 (1998)	6,765 (2006)	10,747 (1998)	10,747 (1998)
Minimum (water year)	1,462 (2012, 2013)	2,249 (2001)	7,164 (2012)	7,164 (2012)
Gain in Flow at San Antonio Creek Confluence from quarry NPDES discharge				
Average Annual	3,612	3,436	6,620	2,532
Maximum (water year)	4,460 (2010)	5,328 (2010)	12,480 (2001)	6,411 (1998)
Minimum (water year)	68 (2012)	103 (2012)	310 (2012)	632 (2013)
Loss between San Antonio Creek and Arroyo de la Laguna				
Average Annual	3,078	3,693	4,641	2,267
Maximum (water year)	4,511 (2006)	5,217 (2006)	5,433 (several)	3,418 (1998)
Minimum (water year)	215 (2012)	430 (2012)	916 (2012)	1,106 (2012)

The reason that losses of Alameda Creek surface water to the subsurface between Welch and San Antonio Creeks are different for the four scenarios is because the volume and seasonal pattern of flow differ among the scenarios. Under pre-2001 and existing conditions, for most of the summer and fall, Alameda Creek is dry or close to dry downstream of the Welch Creek confluence. Under with-CDRP and with-project conditions, there is always a small flow at the Welch Creek confluence because of the CDRP required releases at Calaveras Dam and bypasses at the Alameda Creek Diversion Dam. This small flow percolates into the streambed between the Welch Creek and San Antonio Creek confluences for many months, substantially increasing the amount of water that enters the subsurface under with-CDRP and with-project conditions. The losses between San Antonio Creek and the Arroyo de la Laguna during the non-rainy season primarily depend on quarry NPDES discharges.

NPDES Discharges from Quarries to Alameda Creek

As described in Section 3 above, Quarry Operations, the quarry operators have NPDES permits to discharge water to Alameda Creek. They discharge water fairly continuously in order to conduct aggregate mining in dry conditions and to maintain safe water levels in the pits they manage. The amount of water that the quarry operators discharge to the creek affects flow in Alameda Creek from the NPDES discharge point to the mouth of the creek. Thus, to make estimates of flow in the creek downstream of the quarries (the location of the proposed ACRP), estimates of the quarry NPDES discharges under the four scenarios must be made.

The amount of water that the operators discharge to Alameda Creek depends on a number of factors, including what they are permitted to discharge under their NPDES permits, but one of the most important factors is the rate at which water percolates into the bed of Alameda Creek in the reach of the creek adjacent to the quarry pits. As noted in an earlier section, the rate at which losses to the subsurface occur varies from scenario to scenario, with larger losses occurring under with-CDRP and with-project scenarios than under pre-2001 and existing conditions. The method used to estimate the volume of the quarry NPDES discharges under the four scenarios depends on the relationship between the volume of water entering the pits from subsurface sources (water lost to the subsurface in the creek reach adjacent to the quarries and other subsurface water entering from the east) and the volume of water leaving the quarries in the form of NPDES discharges to Alameda Creek. For with-project conditions, it also depends on the volume of water recaptured by the ACRP.

Quarry NPDES Discharge Estimation Method

Several assumptions were made in order to estimate the volume of the quarry NPDES discharges under pre-2001, with-CDRP, and with-project conditions, given the known volume of quarry discharges under the existing conditions. First, it was assumed that all of the Alameda Creek surface water that percolates into the subsurface between the Welch Creek and San Antonio Creek confluences finds its way into Pit F2. Of the pits adjacent to Alameda Creek — Pits F2, F3-East, F3 West, F4 and F6 — Pit F2 is the farthest downstream. The SFPUC made this same assumption in its estimate of the amount of water it proposes to recapture from Pit F2. Second, it was assumed that the proportional relationship between the volume of water entering Pit F2 and the volume of water leaving the pits under existing conditions remains the same for the other three scenarios.

Third, it was assumed that only NPDES discharges by Hanson Aggregates enter into the calculations. Historically, Hanson Aggregates has discharged much more water from its pits to Alameda Creek than the other operator, ODS. As a result of recent changes in its water management practices, ODS has almost eliminated NPDES discharges to the creek, so it was reasonable to conclude that in the future any quarry discharges from ODS would be negligible. Fourth, it was assumed that the quarry operators continue to discharge excess water to Alameda Creek under their NPDES permits as at present. While this assumption is reasonable in the short-term, in the next decade or two, continued aggregate mining is expected to increase the total water storage capacity of the pits. The increase in total water storage capacity will be partially offset by Hanson's loss of Pit F2 storage capacity if the ACRP is approved and becomes operational. The effects of continued mining on the water storage capacity of the pits are described in a subsequent section. Fifth, it was assumed that the Regional Water Quality Control Board will not change the conditions of the NPDES permits or put new restrictions in place regarding discharges. Currently, permit conditions limit the maximum amounts of water that the quarry operators may discharge but they do not specify minimum discharge amounts.

Figure HYD4-3 is a schematic diagram showing the various pathways for water entering and leaving Pit F2, which are labeled A through G, and L. Water enters Pit F2 as a result of percolation from Alameda Creek between the Welch Creek and San Antonio Creek confluences (L). Water also enters Pit F2 by percolation from a watershed to the east (A) and as rainfall (B). Water leaves Pit F2 by seepage into the ground (C), by evaporation (D), and by pumping to Alameda Creek by Hanson Aggregates (E) under their NPDES discharge permit. Hanson Aggregates also pumps water out of the pit and uses it consumptively for aggregate and asphalt production (F). If the ACRP is approved and implemented the SFPUC would also pump water from the pit (G). The SFPUC would use the water for municipal water supply.

The values of A, B, C, D and F are assumed to be fairly constant over time and are the same for all four scenarios. The values of A, B, C and F are assumed to vary from year-to-year around a constant mean. The volumes of water stored in Pit F2 and in other pits available to Hanson Aggregates for water storage are also assumed to vary from year-to-year around a constant mean.

For the existing condition, the daily values of E, NPDES discharge to the creek by Hanson Aggregates, are known and are based on the historical record between Water Year 1996 and Water Year 2013, as described in the previous section. For pre-2001, with-CDRP, and with-project conditions, the daily values of E were calculated based on the proportional relationships described above, as represented by the following equations:

For pre-2001 conditions, $E_{Pre2001} = E_{Exist}$ multiplied by $[(L_{Pre2001} + A_{Pre2001})$ divided by $(L_{Exist} + A_{Exist})]$

For with-CDRP conditions, $E_{CDRP} = E_{Exist}$ multiplied by $[(L_{CDRP} + A_{CDRP})$ divided by $(L_{Exist} + A_{Exist})]$

For with-project conditions, $E_{proj} = E_{Exist}$ multiplied by $[(L_{Proj} + A_{Proj} - G_{Proj})$ divided by $(L_{Existing} + A_{Exist})]$

All calculations were made as daily values for the 18-year period between Water Year 1996 and Water Year 2013.(8) Daily values of L were calculated using the ASDHM streamflow data provided by the SFPUC. Daily values of A and G were obtained from the SFPUC's daily recapture calculations. Average annual and average monthly values were calculated from the daily values.

The calculation method described above assumes that the daily pattern of discharges under with-CDRP and with-project conditions will mirror the historical pattern of NPDES discharges. The quarry NPDES discharges under existing conditions are represented by historical daily discharges between Water Year 1996 and Water Year 2013. Under with-CDRP, and with-project conditions, they are represented by the historical daily discharges between Water Year 1996 and Water Year 2013 multiplied by a factor. It is unlikely that future daily NPDES discharge patterns will precisely mirror past patterns but it was the most reasonable assumption to make considering how unpredictable the past quarry NPDES discharges have been.

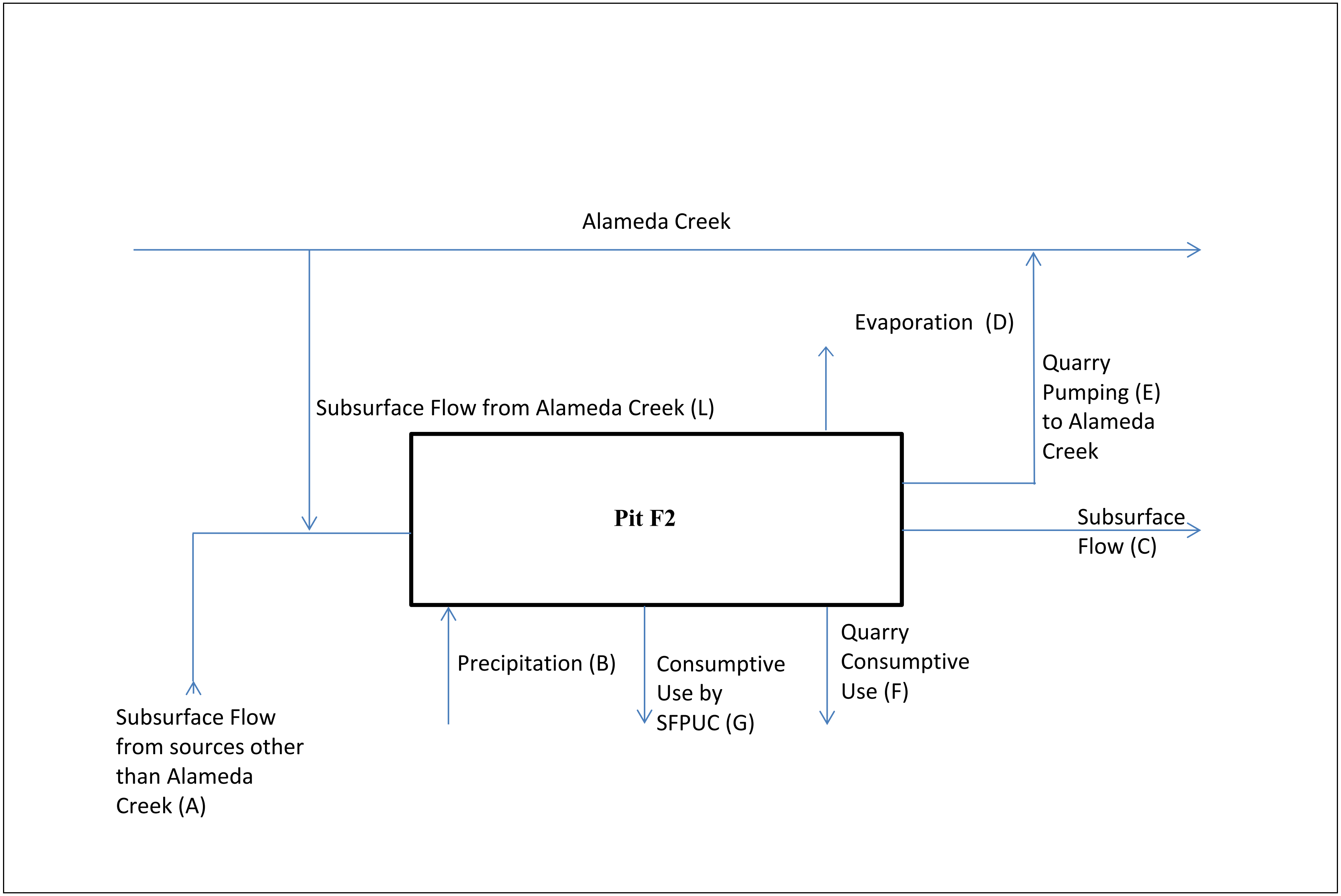


Figure HYD 4-3
Schematic of Water Entering and Leaving Pit F2

Quarry NPDES Discharge Estimates

The estimated average annual quarry NPDES discharges for the pre-2001, existing, with-CDRP, and with-projects conditions are shown in **Table HYD4-2**. The estimates were made as described above.

TABLE HYD4-2
ESTIMATED ANNUAL VOLUME OF QUARRY NPDES DISCHARGES TO ALAMEDA CREEK
(acre-feet per year)

	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Average Annual	2,796	3,436	6,620	2,532
Maximum (water year)	4,460 (2010)	5,328 (2010)	12,480 (2001)	6,411 (1998)
Minimum (water year)	68 (2012)	103 (2010)	310 (2012)	632 (2013)

Uncertainty and Quarry NPDES Discharge Estimates

As noted above, several assumptions were made to estimate the volume of quarry NPDES discharges under pre-2001, with-CDRP, and with-project conditions. While ESA/Orion believe that the assumptions are reasonable, several factors make it difficult to estimate precisely the amount of water that the quarry operators might have to pump out of the pits to Alameda Creek in the future under their NPDES discharge permits. The factors are:

- accuracy of loss estimates
- changes in storage in the pits
- changes in consumptive use by quarry operators
- changes in NPDES discharge permits
- changes in water management practices by quarry operators

Each of these factors is discussed in the following paragraphs:

As noted earlier, previous studies indicate that up to 17 cfs of surface water flow in Alameda Creek is lost to the subsurface between the Welch Creek confluence and the San Antonio Creek confluence. Information on subsurface water levels shows that the 17 cfs loss to the subsurface is probably a simplification of a complex phenomenon. The estimated loss of 17 cfs of Alameda Creek surface water to the subsurface between the Welch Creek and San Antonio Creek confluences is based on measurements made during an experimental release of water from Calaveras Reservoir. The measurements were made over a few days and may not represent typical conditions over a longer period of time. At the beginning of the rainy season, subsurface water levels under Alameda Creek are at their seasonal minimum. When the first storms of the season occur, and the stream channel gravels under Alameda Creek are unsaturated, the losses to the subsurface may be greater than 17 cfs. Late in the rainy season, when the stream channel gravels are saturated, losses to the subsurface may be less than 17 cfs. While the use of 17 cfs as an average value for losses to the subsurface during the rainy season is reasonable, any inaccuracy in the loss estimates could affect the quarry discharge estimates.

One of the assumptions made in the quarry NPDES discharge estimates is that the water storage capacity available to Hanson Aggregates in the quarry pits that it manages stays fairly constant between 2015 and the time that the CDRP and ACRP become operational. In fact, mining of aggregate increases the volume of the quarry pits and thus potentially increases the amount of water storage capacity available to the quarry operators, depending on where the quarry operators dispose of their spoils. The SFPUC provided ESA/Orion with information on the amount of material removed from the quarries in 2012, 2013, and 2014. Hanson Aggregates removed 1,039,650, 1,101,200 and 1,170,230 short tons in 2012, 2013, and 2014, respectively, or an average of 1,103,693 short tons per year. Short tons are equal to 2,000 pounds. ODS removed 900,312 and 1,409,254 short tons in 2013 and 2014, respectively, or an average of 1,154,783 short tons per year. Converting the average amounts removed to volumes using an aggregate-in-place density of 156 pounds per cubic foot indicates that the volumes removed by Hanson Aggregates and ODS are 14.15 million cubic feet and 14.8 million cubic feet per year, respectively. Hanson Aggregates does not dispose of its spoils within its pits so most of the space created by excavation becomes available for water storage. It is assumed that 80 percent of the excavated space at SMP-32 is available for water storage. ODS disposes spoil within its pits and so only some of the space created is available for water storage. It is assumed here that 50 percent of the excavated space in the SMP-30 area is available for water storage. Using these assumptions, 260 and 170 acre-feet of extra water storage capacity is created each year by Hanson Aggregates and ODS, respectively.

If it is assumed that the source of the discharges, Hanson Aggregates, only has access to water storage within the properties that it manages and that the ACRP becomes operational at about the same time as the CDRP, 2018 to 2019, the water storage capacity available to Hanson Aggregates would be 780 acre-feet greater in 2018 than it is in 2015. If all of the extra water that enters the subsurface under with-CDRP and with-project conditions seeps into the quarry ponds (9,033 acre-feet per year), then by 2018 about 9 percent of it could be accommodated in the pits without the need for discharging to the Creek under its NPDES permit. If water storage capacity on property managed by ODS was also available to Hanson Aggregates then a higher percentage of the water entering the pits could be accommodated without the need for discharging to the creek. Under these circumstances, the volume of the future quarry NPDES discharges would be lower than estimated above.

On the other hand, if the ACRP is built and were to become operational, Hanson Aggregates would no longer be able to store water in Pit F2, which could increase the company's need to discharge water to Alameda Creek. Pit F2 currently provides a large proportion of Hanson Aggregates' water storage capacity. The loss of Pit F2 storage makes water management more challenging for Hanson

Aggregates and increases the likelihood that all its storage capacity could become full in most years, making discharge of water to Alameda Creek unavoidable.

The rate at which the quarry operators mine aggregate depends on economic conditions and is difficult to predict. However, it is likely that as the population of the Bay Area increases, demand for building materials including aggregate, concrete and asphalt will also increase. ODS has recently increased its ability to produce asphalt and has obtained permits for a new concrete facility. If the market for aggregate increases it is likely that quarry operators will increase their consumptive use of water for aggregate washing and concrete and asphalt production. Because the quarry operators obtain their water from the pits, higher consumptive use could reduce their need to discharge water from the pits to Alameda Creek, and the volume of the future quarry NPDES discharges would be lower than estimated above.

It appears certain that the quarry operators would need to discharge more water to Alameda Creek under with-CDRP conditions than they do under existing conditions, but by an amount subject to uncertainty. It appears likely that the quarry operators would need to discharge less water to Alameda Creek under their NPDES permits under with-project conditions than they do under existing conditions, but again, by an amount subject to uncertainty. There is also uncertainty as to whether their discharge permits would continue as is in the future or if changes would be applied to the permits over time. It is also uncertain whether they could continue with the same water management practices.

Use of Quarry NPDES Discharge and Downstream Flow Estimates for Environmental Impact Analysis

An estimate of the volume of water that the quarry operators would discharge to Alameda Creek under their NPDES discharge permits in the future was made as described above. The estimated quarry NPDES discharges were then used to estimate surface water flow in Alameda Creek downstream of the quarry NPDES discharge point. Despite the limiting factors with respect to the quarry discharge estimates described above, surface water flows estimated based on past NPDES discharges, and a formula derived from this information, provide the best, and most reasonable basis for environmental impact assessment as they are based on the only relevant information available. Although the flow estimates described in the following sections and used in the environmental assessment are expressed in a numerically exact form they should be regarded as estimates only and not as precise amounts. The USGS reports that the accuracy of measured daily flows in Alameda Creek are in the range of 5 to 8 percent. Because the ASDHM uses USGS gage data as an input and estimates watershed contributions based on measured flows, the SFPUC expects that daily flows estimated with the ASDHM upstream of the San Antonio Creek confluence (Node 6) would be no higher than 15 percent above actual flows or 15 percent below them.

The accuracy of streamflow estimates downstream of the San Antonio Creek confluence is less than that of the upstream estimates because of the additional uncertainty associated with the quarry operators' NPDES discharges which affect streamflow estimates downstream of the confluence. Due to the extent of these uncertainties, it is reasonable to assume that the margin of error associated with streamflow estimates in this reach of the creek would be substantially greater than plus or minus 15 percent. The accuracy of the streamflow estimates downstream of the San Antonio Creek confluence is least when the NPDES discharges make up a high proportion of streamflow.

Streamflow-related environmental impacts of the project are in the reach of Alameda Creek between the San Antonio Creek and Arroyo de la Laguna confluences, downstream of ACRP project area and downstream of the quarry NPDES discharge points. During the summer and fall, the dry season, the only flow in this reach of the creek under all four scenarios is that contributed by the quarry NPDES discharges. As indicated above, the streamflow estimates are at their least accurate under these circumstances.

All or most of the flow contributed by the quarries' NPDES discharges percolates into the bed of Alameda Creek between the San Antonio and Arroyo de la Laguna confluences and so the quarry discharges have little effect on streamflow downstream of the Arroyo de la Laguna confluence. The accuracy of daily flow estimates downstream of the Arroyo de la Laguna confluence are probably about the same as the streamflow estimates above the San Antonio Creek confluence.

It should also be borne in mind that the proposed ACRP may operate for several decades and during that time, quite apart from any effect caused by the ACRP, the need for quarry NPDES discharges may cease because of much increased water storage in Hanson Aggregates' pits. Ultimately, the aggregate mines will become exhausted and retired from production at which time the quarry NPDES discharges will cease. This would be the case whether or not the ACRP is built.

Finally, as noted above, the daily and seasonal pattern of estimated future quarry NPDES discharges was assumed to mirror the historical pattern of discharges. This is an artifact of the calculation method rather than an actuality. The future pattern of daily and seasonal NPDES discharges likely will not mirror the historical pattern, so there may or may not be longer periods when discharges are minimal compared to the historical pattern.

Notes for Section 4

1. Dhakal A.S., Buckland E., and McBain S, 2012. *Overview of Methods, Models and Results to Develop Unimpaired, Impaired and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrologic Years 1996-2009*. Draft Technical Memorandum for the Alameda Creek Fisheries Workgroup. April 24, 2012.
2. *Dhakal, A. S. (memo to Steven Smith), 2016,* Simulation Period, Scenarios, and Hydrologic Calculations incorporated in Alameda System Daily Hydrologic Model (ASDHM) for Alameda Creek Recapture Project (ACRP) Hydrologic Requirements

3. Trihey and Associates, Inc., 2003. *Sunol Valley Surface Flow Study, Fall 2001*. Prepared for the Office of the City Attorney, City and County of San Francisco.
4. Entrix, Inc., 2004. *Alameda Creek Juvenile Steelhead Downstream Migration Flow Requirements. Phase 1: Field Survey Results.*
5. There is no formal report of the experimental releases made by the SFPUC to measure losses of surface water to the subsurface in Alameda Creek. An Excel file with analysis and information was provided by Amod Dhakal to ESA/Orion on July 14, 2016.
6. The workgroup decided not to include additional losses below the confluence with San Antonio Creek because, as the next few paragraphs describe, the workgroup chose to exclude the NPDES discharges from the modeling. It was generally assumed that these accretions and depletions cancelled each other out.
7. Same as (2)
8. Because critical gage data were not available between Water Year 1995 and Water Year 1999 the missing flow data for the existing condition for that period were developed by using simulated pre-2001 scenario flow data. Because the DSOD had not been implemented between Water Year 1995 and Water Year 1999, this was considered reasonable; however, it is noted that pre-2001 flows represent a typical operation of Calaveras Reservoir and not the actual operation during these years.

5. Alameda Creek Surface Water Hydrology

Two types of streamflow data are referred to in this section, measured data and estimated data. Measured streamflow data is information from U.S. Geological Survey (USGS) stream gages on Alameda Creek. Estimated streamflow data is information obtained from simulations made with the ASDHM. The comparisons of streamflow under the four scenarios rely on estimated data. The ASDHM was calibrated using measured streamflow data.

5.1 Measured Streamflow

5.1.1 Water Years and Water Year Types

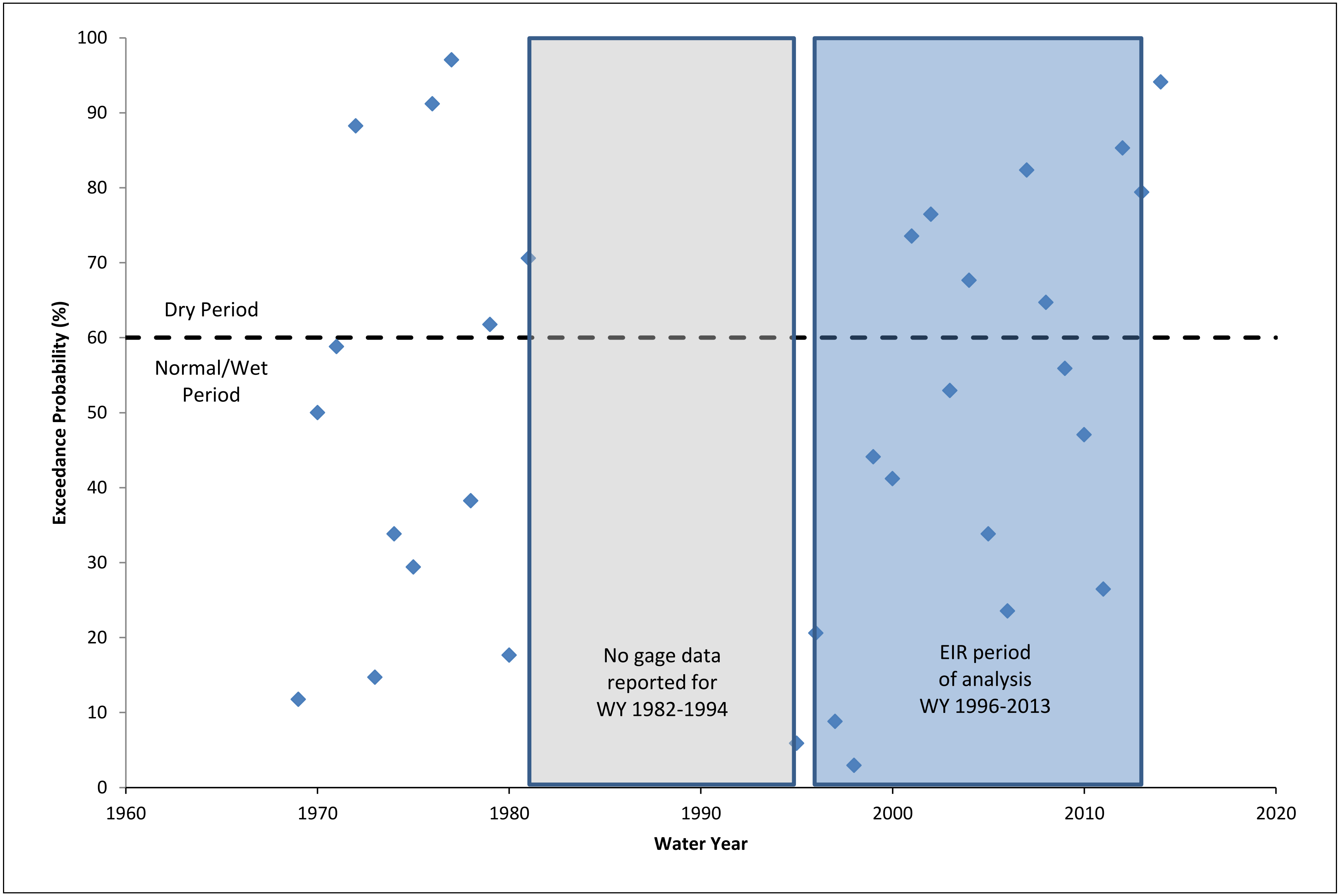
Statistical data on precipitation and streamflow are organized by water year; that is, the period from October 1st of one year to September 30th of the next year. For example, Water Year 2002 is the period from October 1, 2001 until September 30, 2002. The SFPUC classifies water year types based on flow measured at a stream gage on Arroyo Hondo, which is a major tributary of Calaveras Creek. Arroyo Hondo flows into Calaveras Reservoir. Years in which the exceedance probability is greater than 60 percent are classified as dry years. All other years are classified as normal/wet years. The classification of the water year types since 1969, when the Arroyo Hondo gage was installed, is shown in **Figure HYD5-1**.

5.1.2 Gaging Stations

The USGS measures streamflow at five stream gages located along the mainstem of Alameda Creek: upstream of the Alameda Creek Diversion Dam; below the Calaveras Creek confluence; below the Welch Creek confluence; at the downstream end of Niles Canyon; and in the section of the creek confined between levees near the Interstate 880 bridge. Gage numbers, catchment areas and periods of record are shown in **Table HYD5-1**. The locations of the gages are shown in Figure HYD4-2. In March 2010, the SFPUC installed two additional gages on the mainstem of Alameda Creek. They are located between the San Antonio Creek and Arroyo de la Laguna confluences.

TABLE HYD5-1
USGS GAGES ON MAINSTEM OF ALAMEDA CREEK

Gage No.	Gage Location	Catchment Area (square miles)	Period of record
11-172945	Upstream of Alameda Creek Diversion Dam	33.3	1995-present
11-173510	Downstream of Calaveras Creek confluence	135	1996-present
11-173575	Downstream of Welch Creek confluence	145	2000-present
11-179000	Near Niles	633	1891-present
11-180700	Flood Control Channel at Union City	639	1959-present



SOURCE: USGS, 2015. Annual mean discharge values for USGS Gage 11173200, Arroyo Hondo Near San Jose, CA. Text file retrieved from USGS website on August 21, 2015. Normal/wet and dry periods are based on the exceedance probabilities used in Dhakal et. al. 2012.

SFPUC Alameda Creek Recapture Project

Figure HYD 5-1
Classification of water year types based on the USGS Gauge on Arroyo Hondo

5.1.3 Historical Flow Data

The USGS stream gage just upstream of the Alameda Creek Diversion Dam has been in place since Water Year 1995. The stream gage records unimpaired flow from the upper Alameda Creek watershed. **Figure HYD5-2** is a plot of gaging data from Water Year 1994 until Water Year 2015. It shows that Alameda Creek is a naturally flashy stream. A flashy stream is one where flow can vary greatly from day-to-day and even hour-to-hour in response to rainfall over the stream's watershed. The highest daily flow during the entire period of record was just over 1,200 cfs in Water Year 1995; the highest daily flow in the hydrologic period used in the analysis of the proposed ACRP, Water Year 1996 to Water Year 2013, was about 1,150 cfs in December 1997.

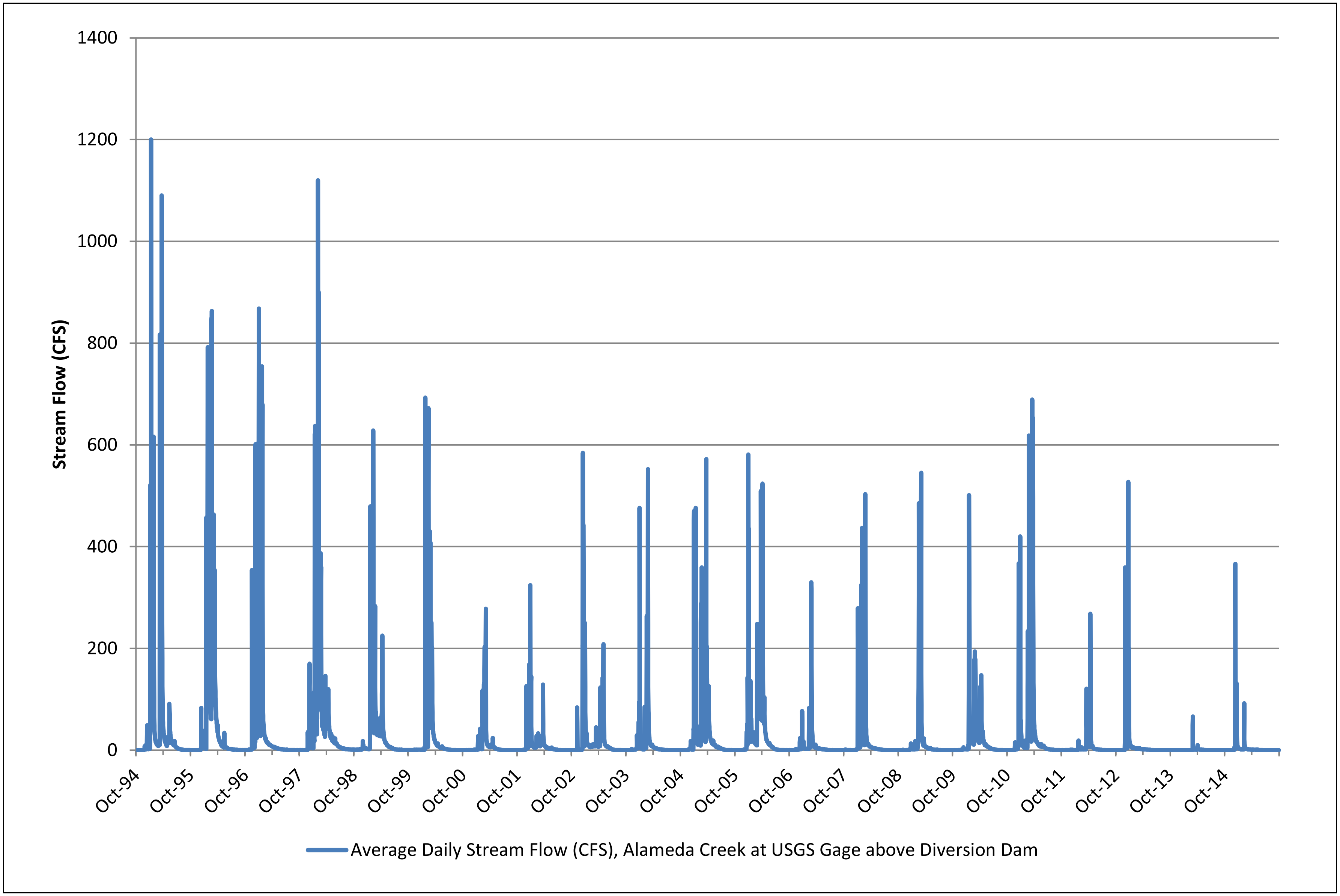
Flow volume in Alameda Creek varies widely from year-to-year. As measured above the Alameda Creek Diversion Dam, the highest annual flow volume within the period of record was 36,054 acre-feet and occurred in Water Year 1998; the lowest annual flow volume was 522 acre-feet and occurred in 2014. **Figure HYD5-3** compares the hydrographs as measured above the Alameda Creek Diversion Dam for a representative wet and dry year: 2006 with an exceedance probability of 24 percent, which was accordingly classified as normal/wet; and 2007 with an exceedance probability of 86 percent, which was classified as dry. Annual flow volumes in 2006 and 2007 were 21,502 acre-feet and 4,771 acre-feet, respectively. In 2006, daily flows exceeded 500 cfs three times; in 2007 daily flows exceeded 200 cfs only once. In 2006, daily flow exceeded 50 cfs for most of March and much of April. In 2007, there was little flow in the creek after mid-March.

Table HYD5-2 shows average daily flows by month as measured at the USGS gage above the Alameda Creek Diversion Dam from Water Year 1996 through Water Year 2013. The highest average daily flow by month typically occurs in February (1).

TABLE HYD5-2
ALAMEDA CREEK ABOVE ALAMEDA CREEK DIVERSION DAM –
USGS AVERAGE DAILY FLOW BY MONTH FOR WATER YEARS 1996-2013 (cfs)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	0.2	2.3	26.4	60.1	82.1	50.4	25.2	7.4	2.6	0.8	0.3	0.2
Max Daily Average	1.5	354	602	868	1,120	689	524	208	14.0	5.8	2.6	1.5
Min Daily Average	0.0	0.0	0.0	0.4	1.2	1.5	2.4	0.5	00	0.0	0.0	0.0
% of Av. Annual Flow	0.1	0.9	10.2	23.3	31.8	19.5	9.8	2.9	1.0	0.3	0.1	0.1

SOURCE: USGS, 2016. Mean daily discharge values for USGS Gage 11172945, Alameda Creek Above Diversion Dam Near Sunol, CA. Accessed on July 7, 2016.

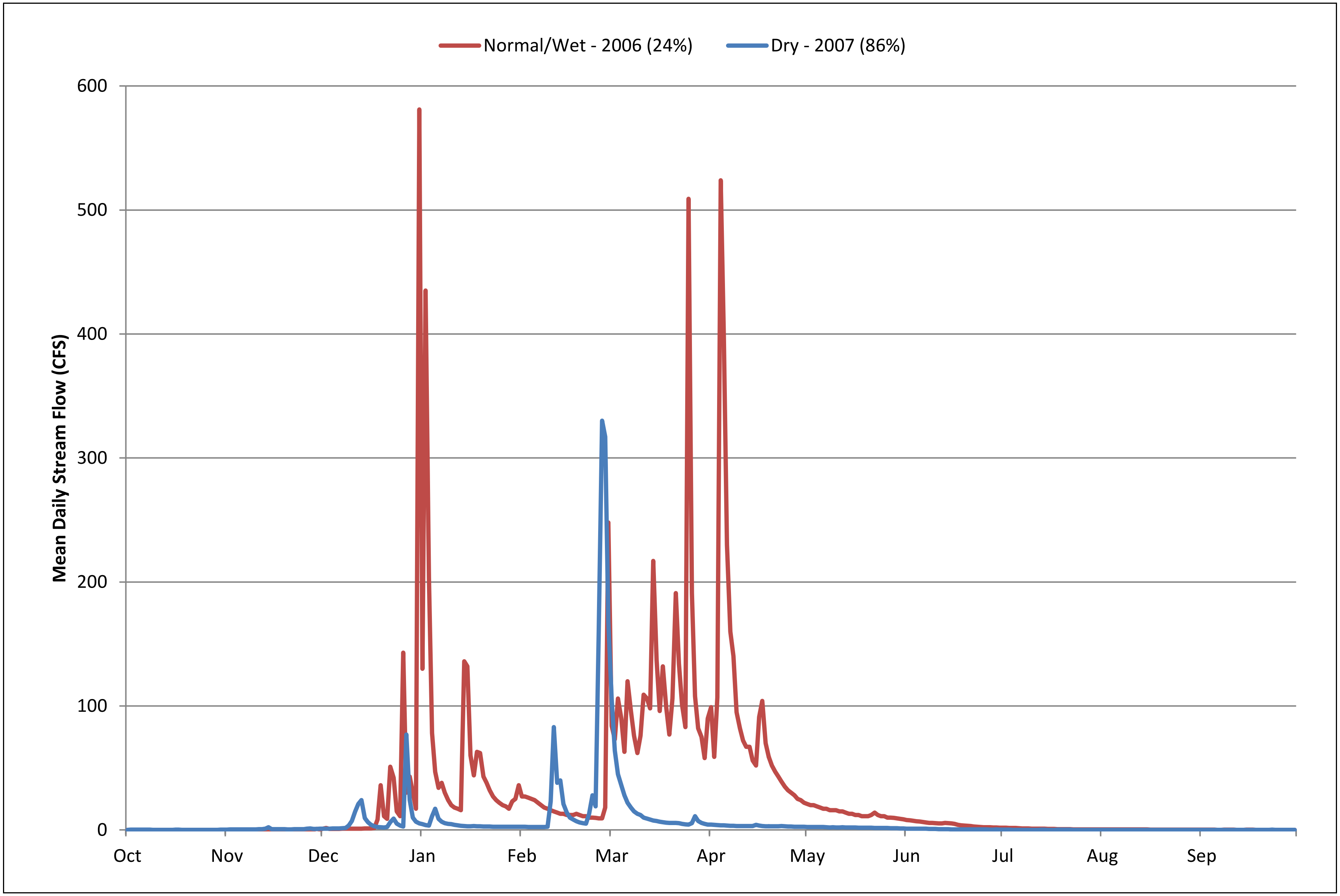


SOURCE: USGS, 2015. Mean daily discharge values for USGS Gage 11172945, Alameda Creek Above Diversion Dam Near Sunol, CA. Text file retrieved from USGS website October 08, 2015.

SFPUC Alameda Creek Recapture Project

Figure HYD 5-2

Historical Alameda Creek flow measured at the USGS Gage above the Alameda Creek Diversion Dam



SOURCE: 7. USGS, 2015a. Mean daily discharge values for USGS Gage 11172945, Alameda Creek Above Diversion Dam Near Sunol, CA. Text file retrieved from USGS website October 08, 2015; USGS, 2015b. Annual mean discharge values for USGS Gage 11173200, Arroyo Hondo Near San Jose, CA. Text file retrieved from USGS website on August 21, 2015.

NOTE: Exceedance probabilities (in parentheses) were calculated using data from the Arroyo Hondo gauge for Water Years 1969-2015 (longest gage record for upper watershed).

Figure HYD 5-3

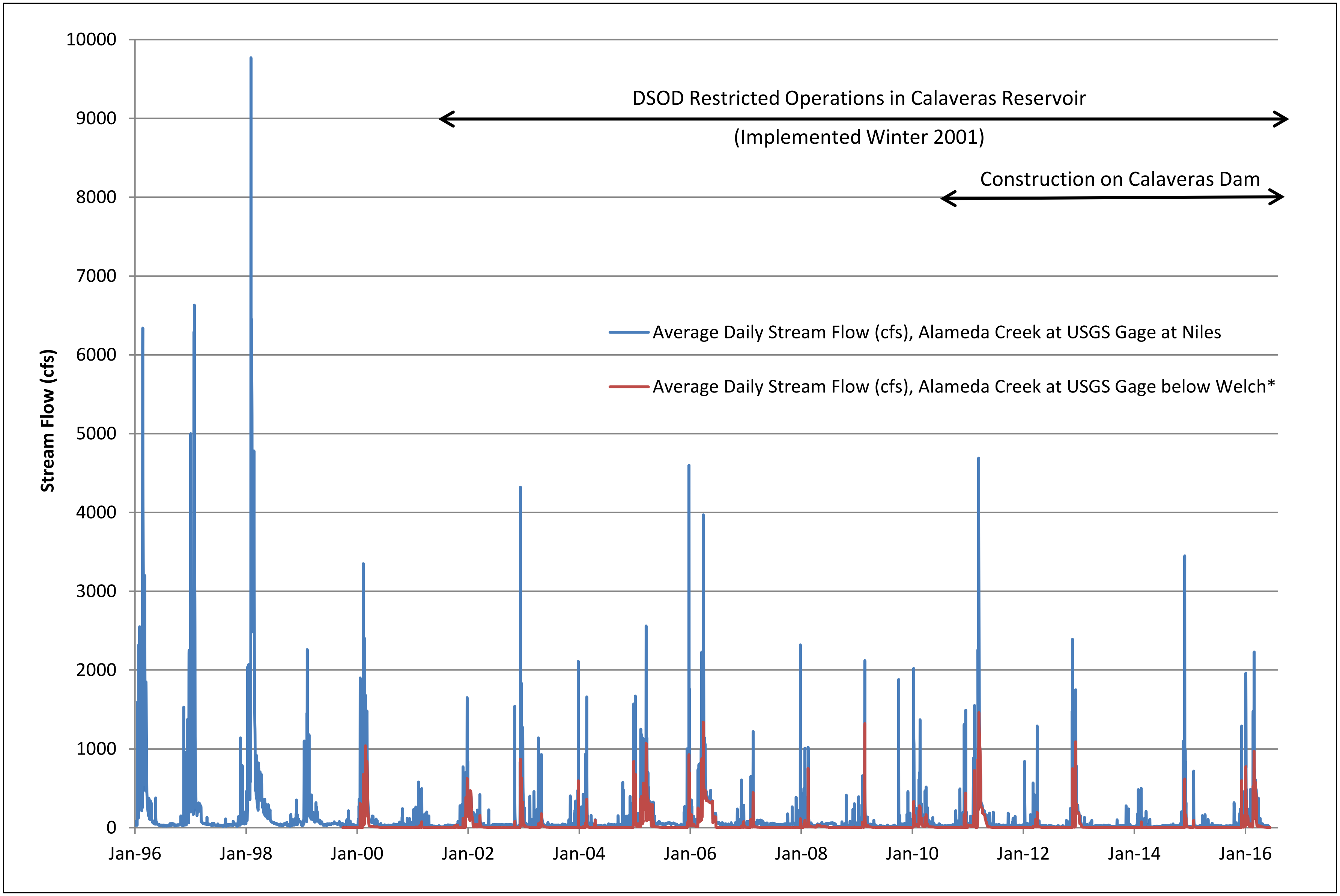
Flow in Alameda Creek measured at the USGS gage above the Alameda Creek Diversion Dam in example wet (2006) and dry years (2007)

Measured streamflow at the other four USGS gages on Alameda Creek is influenced by the SFPUC's municipal water system operations. The effects of the SFPUC's water system operations on flow in Alameda Creek are different for the periods before and after the DSOD-imposed restrictions on storage in Calaveras Reservoir, and for the period after construction of the CDRP began. Before 2001, the SFPUC operated Calaveras Reservoir in a manner that took advantage of its full storage, except for a limitation that the reservoir could not normally be drawn down below elevation 690 feet to prevent entrainment of fish in the outlet works. Since 2001, when the DSOD restrictions were imposed, the SFPUC has captured less water from the watershed upstream of Calaveras Reservoir and has diverted less water from Alameda Creek to the reservoir than it would have in the absence of the restrictions. Consequently, more water has passed over the Alameda Creek Diversion Dam than before 2001, and releases at Calaveras Dam were more frequent than they were before 2001. In 2010, construction of the CDRP began, which further limited storage in the reservoir. Beginning in Water Year 2011, releases were made from the reservoir to accommodate construction activities.

The ACRP project area lies between the USGS gage just downstream of the Welch Creek confluence and the USGS gage at Niles. The Welch Creek gage is located about three miles upstream of the ACRP project area and the Niles gage is located about four miles downstream of it. **Figure HYD5-4** shows flow in Alameda Creek at the Welch Creek gage for the period from Water Year 2000 to Water Year 2016 and flow in Alameda Creek at the USGS gage at Niles for the period from Water Year 1996 until 2016. The flow rate at the Niles gage is strongly influenced by flows from the large Arroyo de la Laguna watershed, including water released from the State Water Project into the Arroyo de la Laguna watershed, above its confluence with Alameda Creek.

Tables HYD5-3 and **HYD5-4** show, respectively, average daily flows by month as measured at the Welch Creek gage for the period Water Year 2000 through Water Year 2013 and at the Niles gage from Water Year 1996 through Water Year 2013. The highest average daily flow at the Welch Creek gage typically occurs in March; at the Niles gage it occurs in February.

Table HYD5-5 shows the average annual flow and the average annual flow volume at four locations. Three of the four gages are for the period Water Year 1996 to Water Year 2013. Data for the Welch Creek gage is for Water Year 2000 to Water Year 2013 because the gage was only installed in 1999. Flow generally increases in a downstream direction, but the total volume of flow in Alameda Creek below the Calaveras Creek confluence is lower than it is above the Alameda Creek Diversion Dam because the SFPUC diverts some of the water in the creek at the diversion dam to Calaveras Reservoir for municipal use.



SOURCE: USGS, 2016. Mean daily discharge values for USGS Gage 11173575, Alameda Creek Below Welch Creek Near Sunol, CA. Text file retrieved from USGS website on June 26, 2016.

USGS, 2016. Mean daily discharge values for USGS Gage 11179000, Alameda Creek Near Niles, CA. Text file retrieved from USGS website on June 26, 2016.

*Records only available for WY 2000 - 2016

SFPUC Alameda Creek Recapture Project

Figure HYD 5-4

Historical Alameda Creek flow measured at the USGS Gage below Welch Creek and at Niles

TABLE HYD5-3
ALAMEDA CREEK BELOW WELCH CREEK –
USGS AVERAGE DAILY FLOW BY MONTH FOR WATER YEARS 2000-2013 (cfs)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	1.7	1.3	37.8	53.3	45.2	103.2	85.4	38.3	12.7	1.1	0.5	0.3
Max Daily Average	34.0	83.0	1,090	699	1,040	1,460	1340	345	335	7.3	2.3	1.9
Min Daily Average	0.0	0.0	0.1	0.7	0.8	2.0	1.4	0.6	0.2	0.1	0.0	0.0
% of Av. Annual Flow	0.5	03	9.9	14.0	11.9	27.1	22.4	10.1	3.3	0.3	0.1	0.1

SOURCE: United States Geologic Survey (USGS), 2016. Mean daily discharge values for USGS Gage 11173575, Alameda Creek Below Welch Creek Near Sunol, CA. Accessed on July 7, 2016.

TABLE HYD5-4
ALAMEDA CREEK AT NILES –
USGS AVERAGE DAILY FLOW BY MONTH FOR WATER YEARS 1996-2013 (cfs)

Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average Daily	42.5	56.6	166.8	307.7	491.7	287.8	172.8	74.2	42.7	33.0	32.0	31.1
Max Daily Average	1,880	1,540	4,600	6,630	9,770	4,690	3,970	928	340	68.0	112	152
Min Daily Average	7.1	7.6	12.0	12.0	14.0	18.0	12.0	10.0	8.0	7.7	5.9	3.8
% of Av. Annual Flow	2.4	3.3	9.7	17.7	28.3	16.5	9.9	4.3	2.5	1.9	1.8	1.8

SOURCE: USGS, 2016. Mean daily discharge values for USGS Gage 11179000, Alameda Creek Near Niles, CA. Accessed on July 7, 2016.

TABLE HYD5-5
USGS AVERAGE ANNUAL FLOW AT FOUR LOCATIONS ON MAINSTEM OF ALAMEDA CREEK
FOR WATER YEARS 1996-2013

Gauge Location	Average Annual Flow (cfs)	Average Annual Volume (acre-feet)
Alameda Creek above ACDD	21	15,027
Alameda Creek below Calaveras Creek	15	10,494
Alameda Creek below Welch Creek*	32	22,972
Alameda Creek near Niles Canyon	143	103,661

SOURCE: USGS, 2016. *Data for Welch Creek gage is for Water Year 2000 to Water Year 2013.

5.2 SFPUC's Alameda System Operations

The SFPUC has operated and will operate its Alameda System differently under the scenarios analyzed in this report. The following section describes operations under pre-2001, existing, and with-CDRP conditions.

5.2.1 Pre-2001 Conditions

Calaveras Reservoir has a nominal capacity of 96,850 acre-feet. Prior to the imposition of storage restrictions on Calaveras Reservoir by the DSOD in 2001, the SFPUC filled the reservoir close to its spillway crest elevation whenever runoff from the watershed was sufficient. Almost all the water withdrawn from the reservoir was conveyed to San Antonio Reservoir or the Sunol Valley Water Treatment Plant via the Calaveras Pipeline. Although the SFPUC sought to avoid any loss of stored water, unseasonable storms over the watershed would occasionally cause water to spill over Calaveras Dam's spillway crest or necessitate a release of water from the reservoir to Calaveras Creek through the large cone valve at the dam.

5.2.2 Existing Conditions

Under existing conditions, with DSOD-imposed restrictions in place, storage in Calaveras Reservoir is limited to approximately one third of its nominal capacity and with minimum and maximum water elevations of 690 feet and 705 feet respectively, only 13 percent of its capacity is usable. Thus, the water level in the reservoir is maintained far below the spillway crest elevation. As a result, no uncontrolled spills have occurred since 2001. Controlled releases through the cone valve at the base of the dam are occasionally made to manage water levels in the reservoir. Releases are also made occasionally through a temporary low-flow valve installed in 2006. The releases through the low-flow valve were made for experimental purposes, including the experiments designed to measure losses of Alameda Creek surface water to the subsurface in the Sunol Valley north of the Welch Creek gage. The measured losses are described in Chapter 4, above, of this report.

5.2.3 With-CDRP Conditions

Calaveras Reservoir

Construction of the CDRP is expected to be completed in 2018 and Calaveras Reservoir's nominal capacity of 96,850 acre-feet will be restored. If there is a wet period immediately following project completion, the reservoir could fill in two years; if drier conditions prevail, it will take longer to fill the reservoir. Once the reservoir is full, the SFPUC will operate it much as it did before the DSOD restrictions were imposed, except that releases will be made from the reservoir to improve habitat for fish and other aquatic life in Calaveras and Alameda Creeks. The releases will be made in accordance with the instream flow schedule for Calaveras Reservoir shown in **Table HYD5-6**. The releases will be made to Calaveras Creek below Calaveras Dam using permanent low-flow valves that will be installed at the new dam.

The release schedule is different for dry and normal/wet years, with the classification of the year based on cumulative inflow from Arroyo Hondo into Calaveras Reservoir. Years are expected to be classified as dry 40 percent of the time. The releases will be made year-round and will be in the range of 5 to 12 cfs, depending on the time of the year and whether the year is classified as dry or normal/wet. The total annual release volume in dry years would be approximately 5,540 acre-feet; in normal or wet years it would be approximately 7,545 acre-feet.

TABLE HYD5-6
CDRP INSTREAM FLOW SCHEDULE FOR RELEASES FROM CALAVERAS DAM

Flow Schedule Decision Date	Flow Schedule Application Period	Dry (Schedule B)		Normal/Wet (Schedule A)	
		Cumulative Arroyo Hondo flows for water year classification (MG)	Flow Release (cfs)	Cumulative Arroyo Hondo flows for water year classification (MG)	Flow Release (cfs)
N/A	October	N/A	7	N/A	7[a]
N/A	Nov 1 thru Dec 31	N/A	5	N/A	5
Dec 29	Jan 1 thru Apr 30	≤ 360	10[a]	> 360	12[a]
Apr 30	May 1 thru Sept 30	≤ 7,246	7	> 7,246	12

SOURCE: National Marine Fisheries Service (NMFS), 2011. Southwest Region. Biological Opinion for Calaveras Dam Replacement Project in Alameda and Santa Clara Counties. Tracking No. 2005/07436. March 5, 2011.

When the CDRP is completed and the reservoir's capacity is restored, the SFPUC will fill and draw down the reservoir much as it did before the imposition of storage restrictions in 2001, except that the magnitude of the dry season drawdown will be greater than formerly. Under existing conditions, the SFPUC transfers water from Calaveras Reservoir to San Antonio Reservoir for storage and supplies water to the Sunol Valley Water Treatment Plant to meet water demand in the service area. Both of these activities draw down storage and water surface elevations in Calaveras Reservoir. Under with-CDRP conditions, these activities will continue but water will also be released to Calaveras Creek to benefit aquatic life. As a result of the releases, water surface elevations in Calaveras Reservoir will be lower than they were prior to 2001 (although they will be much higher than they have been since the DSOD imposed storage restrictions in 2001).

San Antonio Reservoir

When the DSOD imposed restrictions on storage in Calaveras Reservoir in 2001, the SFPUC adjusted the operation of its other facilities to allow for the reduction in overall water system storage. After the CDRP is completed, the SFPUC will operate San Antonio Reservoir much as it did before 2001.

Alameda Creek Diversion Dam

Physical modifications at the Alameda Creek Diversion Dam (ACDD) that are a part of the CDRP will enable the SFPUC to bypass water at the diversion dam to benefit aquatic life. The physical and operational changes made to the diversion dam as part of CDRP will alter flow in Alameda Creek.

Before the DSOD imposed restrictions on Calaveras Reservoir storage, the gates on the tunnel that conveys water from the Alameda Creek Diversion Dam to Calaveras Reservoir were typically open for most of the winter high flow season. During such times, there was no flow other than seepage in the reach of Alameda Creek below the diversion dam, except for brief periods when streamflow in the upper creek exceeded 650 cfs (the capacity of the Alameda Creek Diversion Tunnel). When the gates on the diversion tunnel were closed, typically in the dry season but also during the wet season when

Calaveras reservoir levels were high, whatever flow reached the diversion dam from the upper watershed passed over the dam crest to the creek below. However, in the dry season, little water arrived at the diversion dam from the upper watershed and so little continued down the creek.

Under existing conditions, with storage in Calaveras Reservoir limited by DSOD restrictions, the SFPUC does not divert as much water from Alameda Creek at the Alameda Creek Diversion Dam as it did formerly. Consequently, the gates on the tunnel are open for a briefer period and more water spills over the diversion dam and continues down Alameda Creek than it did before the storage restrictions were imposed. The gates to the tunnel have been closed since May 2012 due to permit restrictions. However, flow in the reach of Alameda Creek between the diversion dam and the Calaveras Creek confluence is still limited to dam seepage whenever the gates on the tunnel are open and stream discharge from the upper creek is less than 650 cfs.

As part of the CDRP, a fish screen will be installed at the Alameda Creek Diversion Dam. The fish screen will prevent fish from entering the tunnel that conveys diverted water to Calaveras Reservoir, but it will also reduce the capacity of the tunnel from 650 cfs to 370 cfs. In addition, a bypass system and a fish ladder will be installed at the diversion dam that will enable fish passage and bypass of water to benefit aquatic life in Alameda Creek below the diversion dam. Operation of the Alameda Creek Diversion Dam under with-CDRP conditions will be in accordance with the following schedule:

- Diversion shall be restricted to the period between December 1 and March 31
- No diversion from April 1 to November 30
- Diversion rates shall not exceed 370 cfs
- Minimum bypass flow of 30 cfs will be provided immediately below the ACDD when water is present in upper Alameda Creek above the Alameda Creek Diversion Dam. Water will be bypassed using the bypass tunnel, fish ladder, and/or across the dam crest (2).

In accordance with this schedule, a minimum of 30 cfs will be bypassed at the Alameda Creek Diversion Dam whenever there is 30 cfs or more arriving at the diversion dam from the upper watershed. When there is less than 30 cfs arriving from the upper watershed, the entire flow will be bypassed at the diversion dam and will continue downstream in the creek. Average daily flow at the USGS gage on Alameda Creek above the diversion dam typically exceeds or is close to 30 cfs from December through April, so it can be expected that, after completion of the CDRP, there will be substantial flow in the reach of Alameda Creek between the diversion dam and the Calaveras Creek confluence for much of the winter.

To summarize, after completion of the modifications at the Alameda Creek Diversion Dam, the SFPUC will be able to divert no more than 370 cfs from Alameda Creek to Calaveras Reservoir and diversion will only be permitted in the months of December, January, February, and March. In addition, during the diversion period, the SFPUC will bypass a minimum of 30 cfs at the Alameda Creek Diversion Dam whenever there is 30 cfs or more of natural flow in the creek upstream of the dam. For example, if there is a flow of 500 cfs in the upper creek in January, the SFPUC could choose to divert 370 cfs through the tunnel. The remaining 130 cfs would flow through the bypass or the fish ladder, or pass over the crest of the diversion dam to the creek below. If there is a flow of 300 cfs in the upper creek in January, the SFPUC must divert no more than 270 cfs into the tunnel in order to maintain the minimum 30 cfs bypass flow. If there is a flow of 100 cfs in April, no diversion could be made and the entire 100 cfs would flow through the bypass or the fish ladder or pass over the crest of the dam to the stream below. If there is a flow of 15 cfs in the upper creek in June, no diversion can be made and the entire 15 cfs would flow through the bypass or the fish ladder to the creek below. If there is no flow in the upper creek in September, no water would bypass the Alameda Creek Diversion Dam.

Effects on Streamflow

Under with-CDRP conditions, flow in Alameda Creek downstream of the Alameda Creek Diversion Dam will be affected by physical and operational changes at the diversion dam. Flow in the creek downstream of the Calaveras Creek confluence will be affected by physical and operational changes at Calaveras Reservoir and at the Alameda Creek Diversion Dam. Restoration of full capacity in the reservoir will tend to reduce total annual flow in Alameda Creek downstream of the Calaveras Creek confluence compared to existing conditions because the SFPUC will be able to store and use more water for municipal water supply than it can today. On the other hand, the release of water from Calaveras Reservoir and the bypass of water at the Alameda Creek Diversion Dam to benefit aquatic life will tend to increase total annual flow in Alameda Creek downstream of the Calaveras Creek confluence compared to existing conditions.

As noted previously, the SFPUC calculates that releases from Calaveras Reservoir will total 5,540 acre-feet per year in dry years and 7,533 acre-feet per year in normal and wet years. The releases from Calaveras Reservoir together with the bypasses at the Alameda Creek Diversion Dam are estimated to average 14,695 acre-feet per year. In dry years, the releases and bypasses are estimated to average 10,133 acre-feet per year. In wet years, the releases and bypasses are estimated to average 18,345 acre-feet per year.

5.3 Comparison of Pre-2001, Existing and With-CDRP Conditions

The following comparison of pre-2001, existing and with-CDRP conditions was made using hydrology for the 18-year period from Water Year 1996 to Water Year 2013.

The ASDHM was used to estimate flow in Alameda Creek, under pre-2001, existing and with-CDRP conditions, at several locations, referred to as nodes, along the creek. The locations of the nodes are shown in Figures HYD2-2 and HYD4-2. The losses of Alameda Creek surface water to the subsurface, described above in Section 4, Analytical Methods, occur between the Welch Creek confluence (Node 4) and just upstream of the San Antonio Creek confluence (Node 5) and between just downstream of the San Antonio Creek confluence (Node 6) and the Arroyo de la Laguna confluence (Node 7).

The NPDES discharge of water from the quarries is assumed to occur at Node 6, just downstream of the San Antonio Creek confluence. Consequently, flow estimates at Node 6, and all locations on Alameda Creek downstream of the Node 6, are influenced by the NPDES discharges from the quarries. In the existing conditions scenario, the NPDES discharges from the quarries are represented by Hanson Aggregates' reported historical daily discharges between 1996 and 2013. The historical daily NPDES discharges averaged 3,436 acre-feet per year. Daily discharges from Hanson Aggregates under pre-2001 and with-CDRP conditions were estimated as described in Section 4, Analytical Methods. The average annual NPDES discharges from the quarries under pre-2001 and with-CDRP conditions were estimated to be 2,796 and 6,620 acre-feet, respectively.

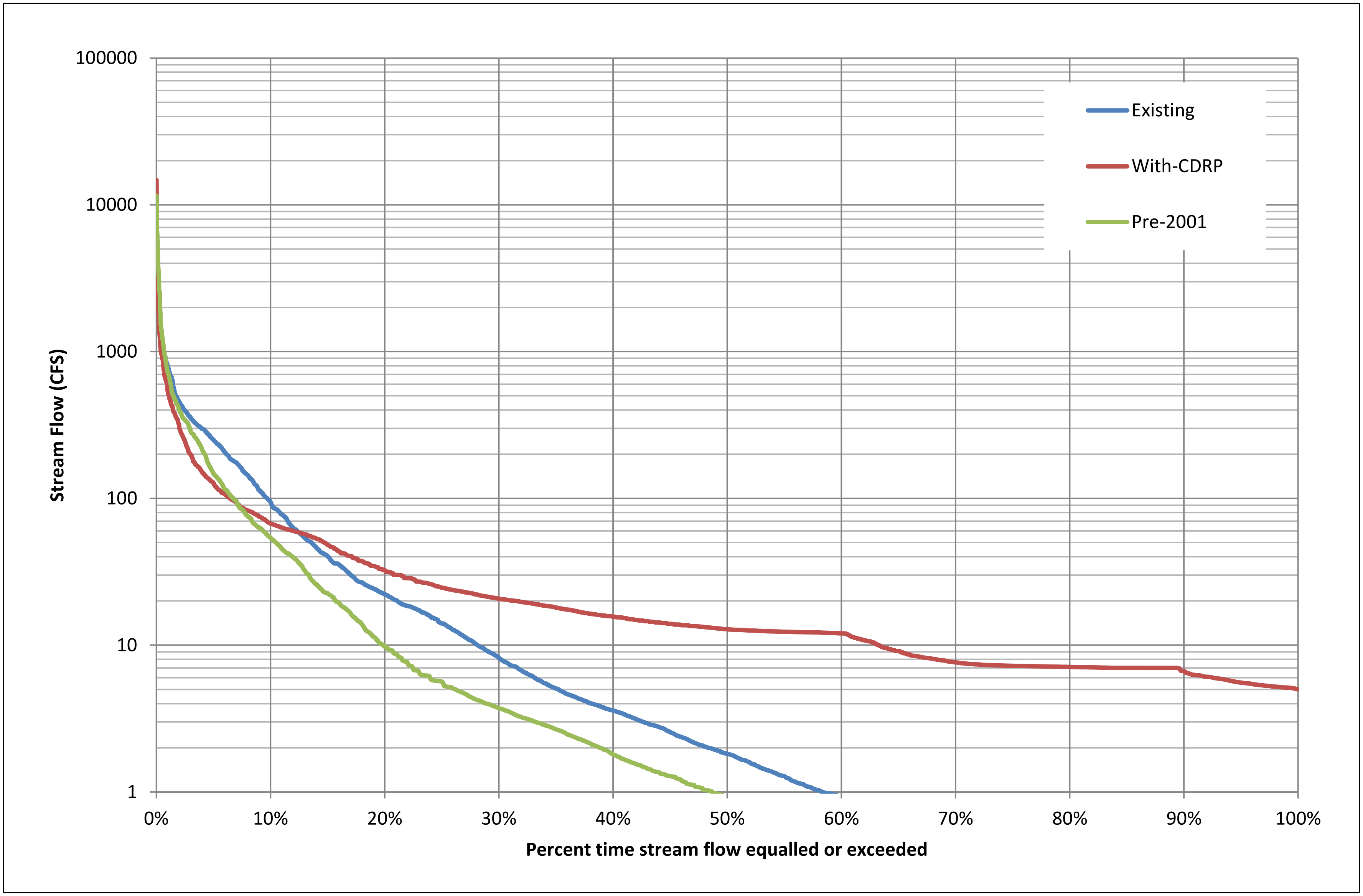
Information on daily, monthly, and annual flows was compiled and is described below. Daily flow information is needed for the comparison of conditions for fish and downstream water users under the different scenarios. Information on monthly and annual flows is needed to compare conditions for vegetation, wildlife, and downstream water users under the different scenarios.

5.3.1 Estimated Daily Flows

Figures HYD5-5, **HYD5-6** and **HYD5-7** compare flow duration curves for pre-2001, existing, and with-CDRP conditions at three locations on Alameda Creek. The three locations are just downstream of the Welch Creek confluence (Node 4), just upstream of the San Antonio Creek confluence (Node 5), and just upstream of the Arroyo de la Laguna confluence (Node 7).

Figure HYD5-5 shows flow duration curves based on daily data for pre-2001, existing, and with-CDRP conditions just downstream of the Welch Creek confluence (Node 4). Under pre-2001 conditions, flow exceeds one cfs on about 48 percent of the days. Under existing conditions, flow exceeds one cfs on about 58 percent of the days. Under with-CDRP conditions, flow is never less than 5 cfs on any day because of the releases from Calaveras Reservoir and bypasses at the ACDD that are part of the CDRP.

Figure HYD5-6 compares flow duration curves for pre-2001, existing, and with-CDRP conditions just upstream of San Antonio Creek confluence (Node 5). Node 5 is about 200 feet upstream of the proposed ACRP. Under pre-2001 conditions, flow exceeds one cfs on about 18 percent of the days. Under existing conditions, flow exceeds one cfs on about 24 percent of the days; under with-CDRP conditions, flow exceeds one cfs on about 37 percent of the days. The reduced frequency of days when flows exceed one cfs under all three conditions at this location is attributable to the losses to the subsurface that occur between the Welch Creek and San Antonio Creek confluences. The increased frequency of days when flows exceed one cfs under with-CDRP conditions is attributable to the releases of water from Calaveras Reservoir and bypasses of water at the Alameda Creek Diversion Dam.

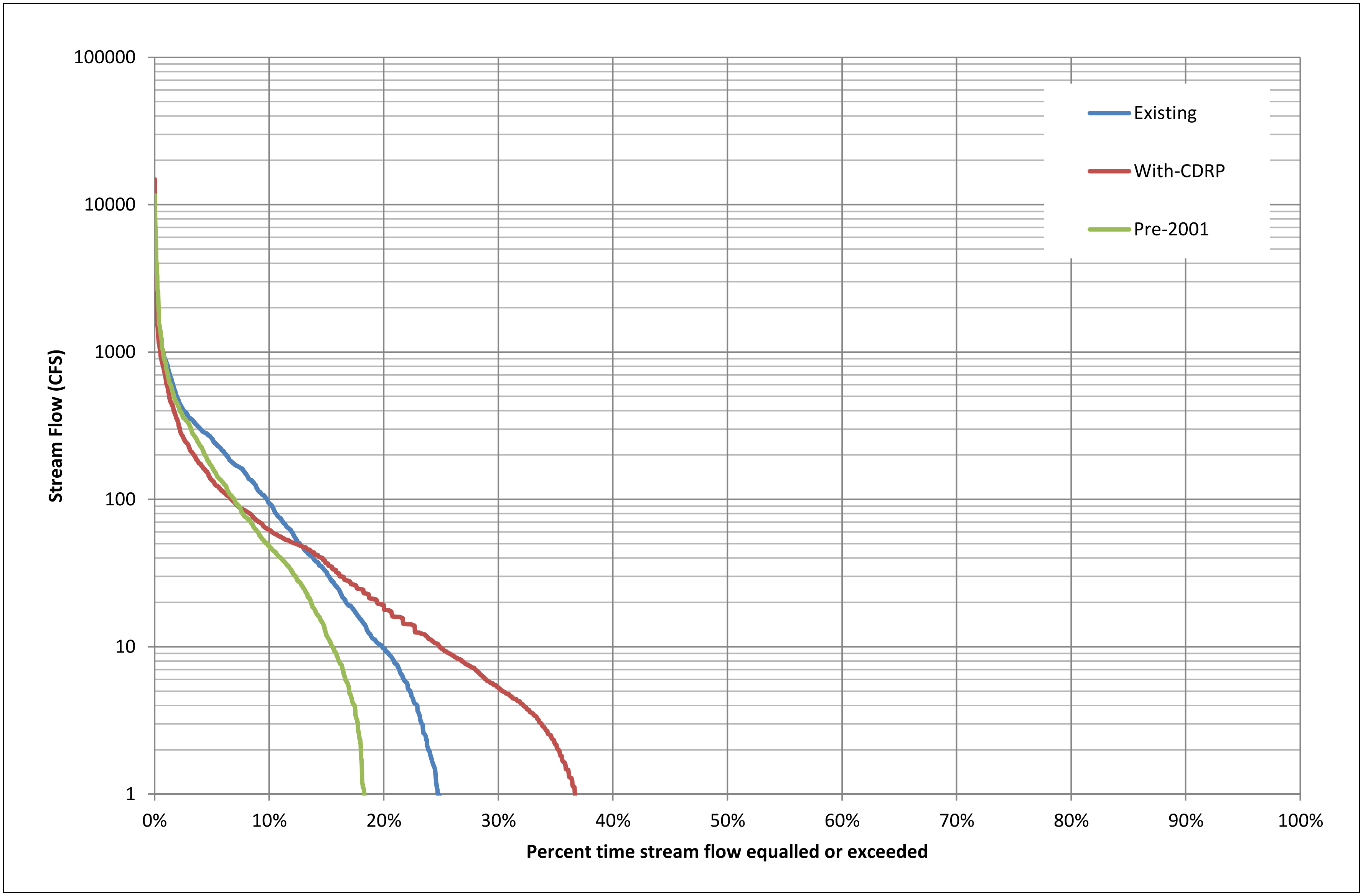


SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure HYD 5-5

Flow Duration Curves for Node 4 (Alameda Creek below Welch Creek) for Existing, Pre-2001, and with-CDRP Conditions



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure HYD 5-6

Flow Duration Curves for Node 5 (Alameda Creek above San Antonio Creek) for Existing, Pre-2001, and with-CDRP Conditions

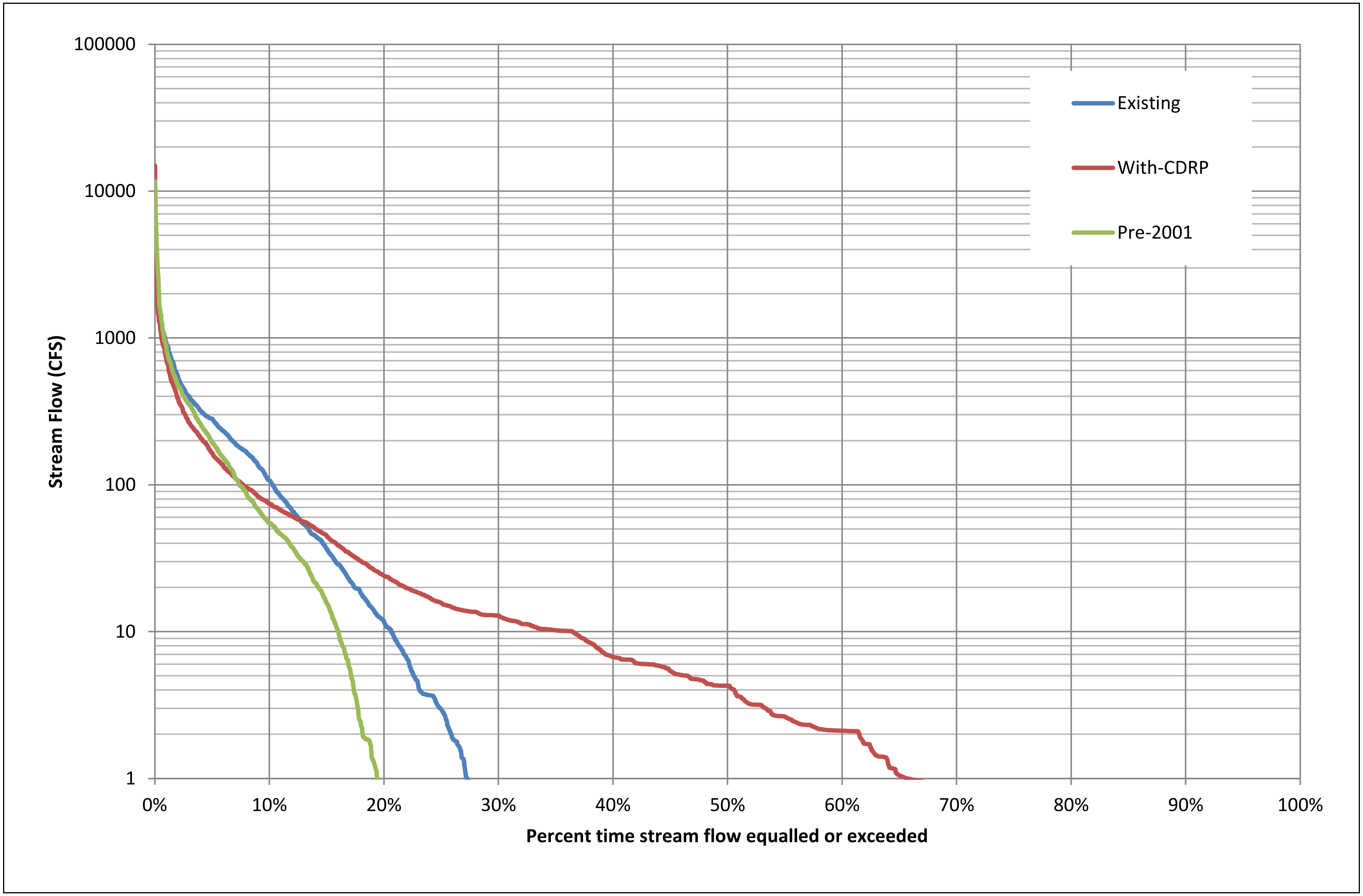
Figure HYD5-7 compares flow duration curves for pre-2001, existing and with-CDRP conditions downstream of the proposed project area and just upstream of the Arroyo de la Laguna confluence (Node 7). Under pre-2001 conditions, flow exceeds one cfs on 19 percent of the days. Under existing conditions, flow exceeds one cfs on 27 percent of the days. Under with-CDRP conditions, flow exceeds one cfs on 65 percent of the days. Under all three conditions, surface water is added between the San Antonio Creek and Arroyo de la Laguna confluences as a result of the quarry NPDES discharges but also lost to the subsurface by percolation.

Daily hydrographs from three selected water years (Water Years 2012, 2008, and 2011) representing ranges of exceedance probabilities from 28 percent to 94 percent (wet to dry water year types) are provided to illustrate daily flows at three different nodes. For each of these water years, daily hydrographs are provided that include quarry NPDES discharges and additional losses between the confluences of Alameda Creek with San Antonio Creek and the Arroyo de la Laguna, as well as without these accretions and depletions. These hydrographs are provided to illustrate the specific effects of the accretions and depletions.

Daily hydrographs are presented at Nodes 4, 5, and 7 for three scenarios: (1) Pre-2001 Conditions, (2) Existing Conditions, and (3) With-CDRP Conditions. Node 4 is downstream of SFPUC's compliance location and is the most upstream node of Sunol Valley. The SFPUC's compliance location is the location in the watershed specified in the CDRP regulatory permit where streamflows are measured to ensure compliance with the instream flow schedule shown in Table HYD5-6. The change between Node 4 and Node 5 depicts the influence of loss in Sunol Valley. Node 7 represents flow downstream of the project before Alameda Creek meets Arroyo de la Laguna Creek (**Figures HYD 5-8A, HYD5-8B,** and **HYD5-8C**).

Due to continuous release of instream and bypass flows, in general, at Node 4, with-CDRP flows are always higher than pre-2001 flows (Figures HYD 5-8A, HYD5-8B and HYD5-8C). In drier years, during which Calaveras Reservoir does not spill, with-CDRP flows at Node 4 are always higher than pre-2001 flows. For example, in HY 2012, with-CDRP flows at Node 4 are always higher than pre-2001 flows, with the difference as high as 270 cfs. Although HY 2012 was very dry, with-CDRP peak flows exceed 100 cfs in March 2012 on two occasions due to reduced diversion capacity of ACDD. During the ACDD non-diversion period, the with-CDRP conditions peak flow at Node 4 exceeds 400 cfs in April.

However, in some years there are instances during which Calaveras Reservoir was full in pre-2001 conditions, resulting in spill, whereas the reservoir does not spill under with-CDRP conditions. Since there are no instream and bypass flow requirements in pre-2001 conditions, Calaveras Reservoir is generally at higher elevations than under with-CDRP conditions. For example, pre-2001 flows are greater than with-CDRP flows at Node 4 for five days in Water Year 2008 as Calaveras Reservoir spills for five days in pre-2001 conditions but it does not spill under with-CDRP conditions (see February 2008 storm in Figure HYD5-8B). In Water Year 2011 under the exceedance probability of 28 percent



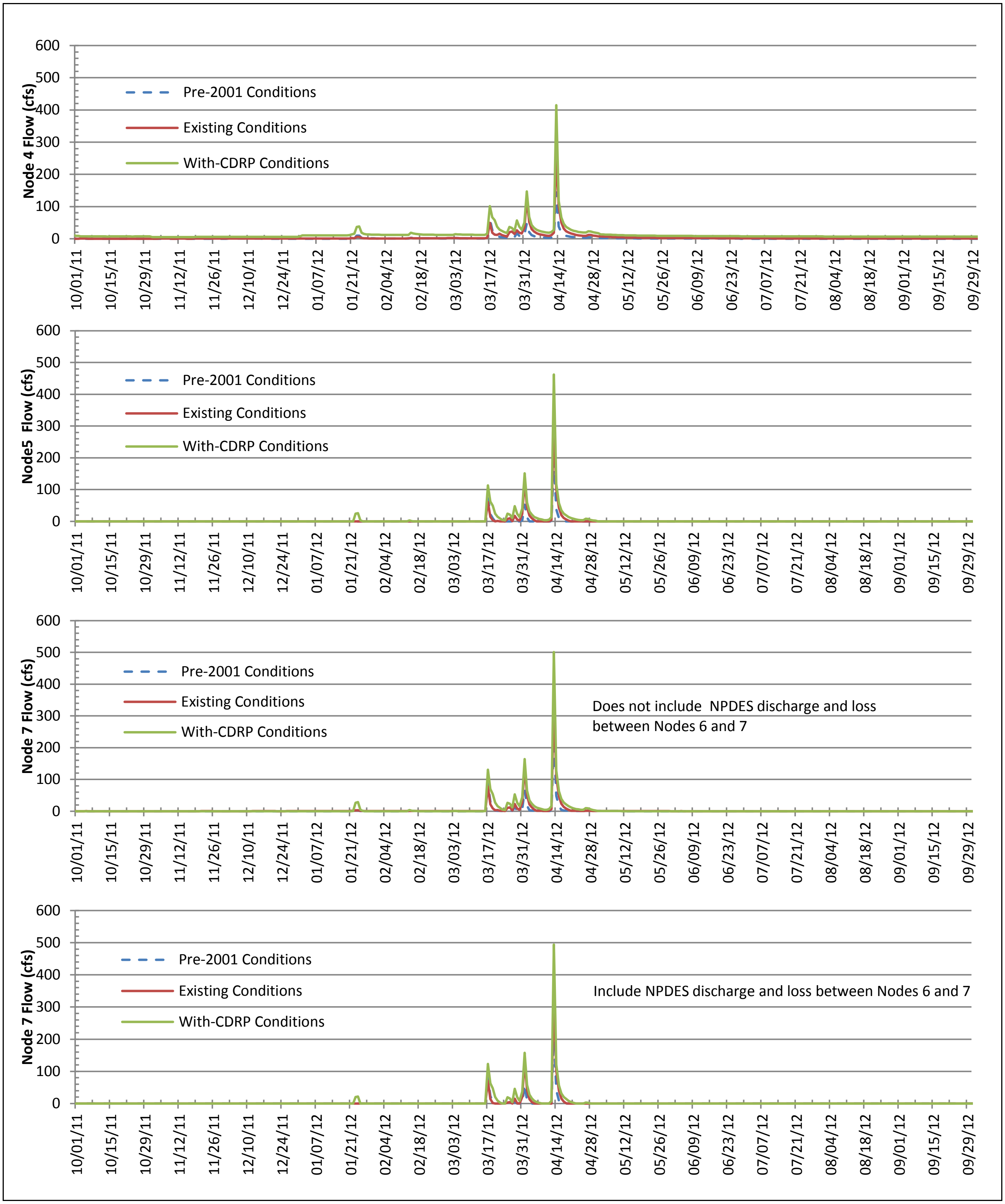
SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

SFPUC Alameda Creek Recapture Project

Figure HYD 5-7

Flow Duration Curves for Node 7 (Alameda Creek above Arroyo de la Laguna) for Existing, Pre-2001, and with-CDRP Conditions

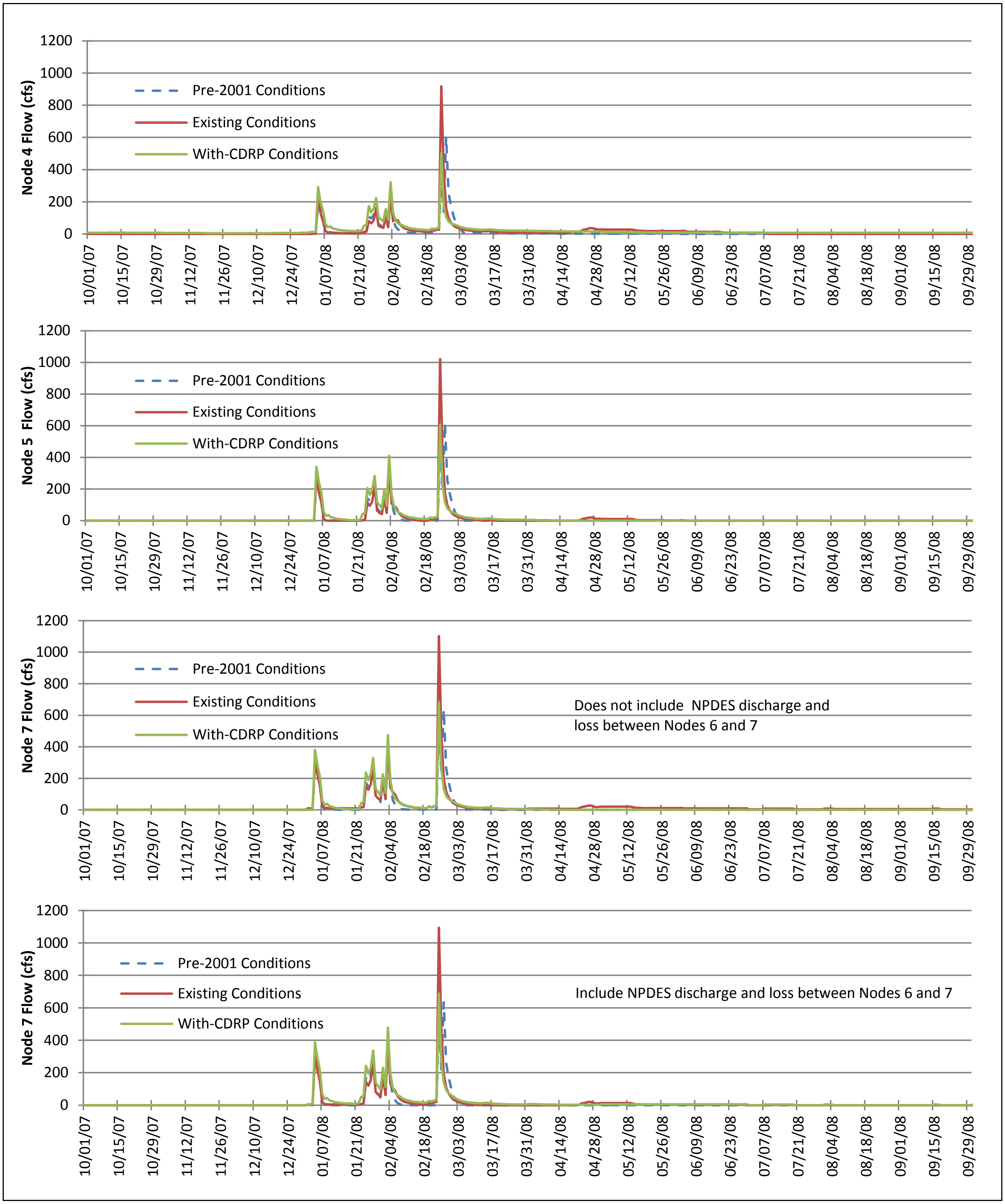


SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted by ESA/Orion.

NOTE: The adjusted ASDHM Node 7 which included NPDES discharge and loss is depicted on bottommost graph.

Figure HYD 5-8A

Daily Hydrographs for WY 2012 (Ex. Prob. 91%) at Nodes 4, 5, and 7 for Pre-2001, Existing, and with-CDRP Conditions



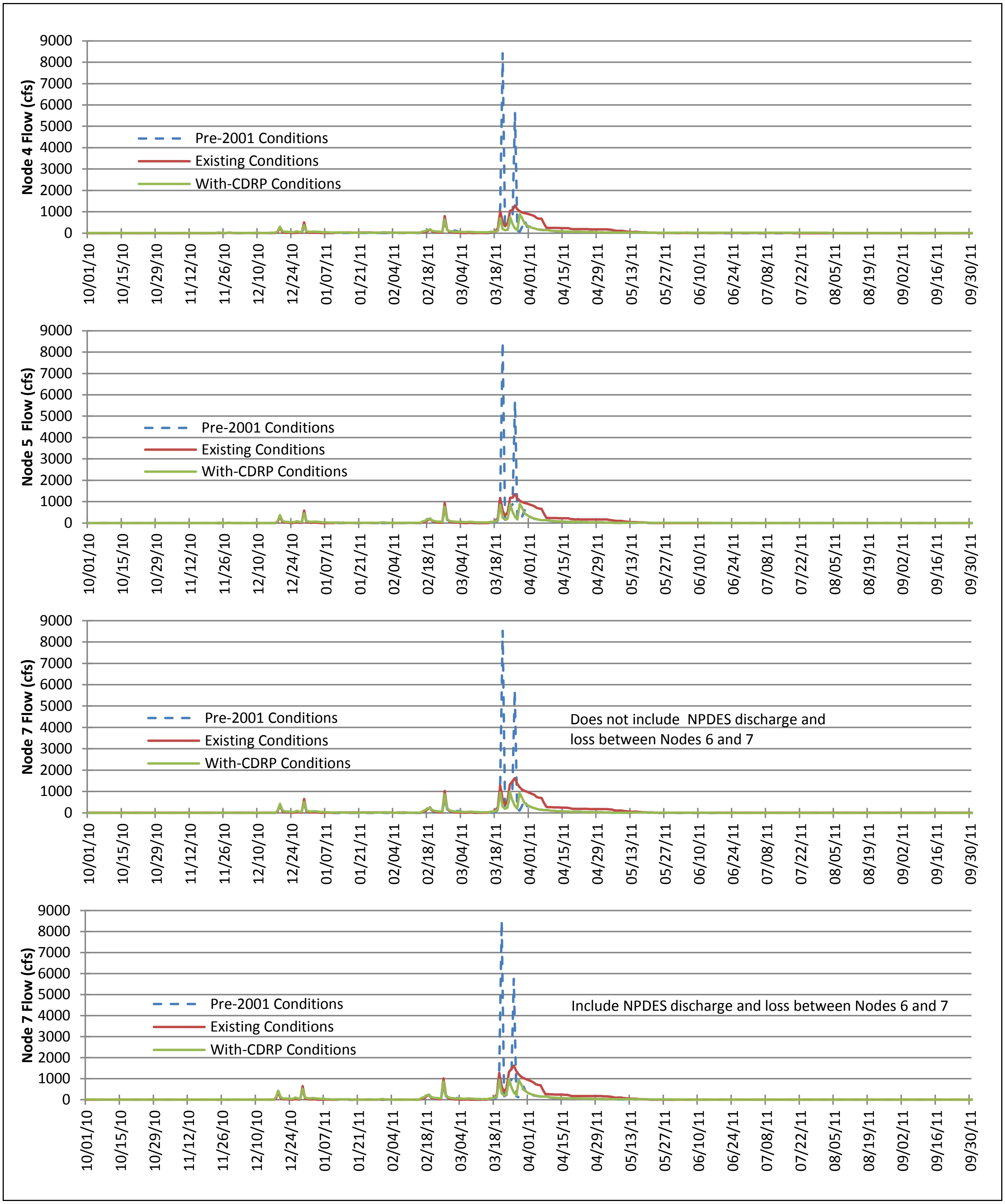
SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted by ESA/Orion.

NOTE: The adjusted ASDHM Node 7 which included NPDES discharge and loss is depicted on bottommost graph.

SFPUC Alameda Creek Recapture Project

Figure HYD 5-8B

Daily Hydrographs for WY 2008 (Ex. Prob. 64%) at Nodes 4, 5, and 7 for Pre-2001, Existing, and with-CDRP Conditions



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted by ESA/Orion.

NOTE: The adjusted ASDHM Node 7 which included NPDES discharge and loss is depicted on bottommost graph.

SFPUC Alameda Creek Recapture Project

Figure HYD 5-8C

Daily Hydrographs for WY 2011 (Ex. Prob. 28%) at Nodes 4, 5, and 7 for Pre-2001, Existing, and with-CDRP Conditions

(wet year), Calaveras Reservoir spills in both with-CDRP and pre-2001 conditions. Since Calaveras is at much higher elevation in pre-2001 conditions compared to with-CDRP conditions the spill rate is higher under the pre-2001 conditions. However, even in Water Year 2011 (wet year), flows at Node 4 are higher under the pre-2001 conditions for only 16 days compared to with-CDRP conditions. Water Years 2011 and 2012 represent the construction period of Calaveras Reservoir under the existing conditions and Water Year 2008 represents the DSOD period. During these periods, Calaveras Reservoir and ACDD are operated as demanded by such limitations and does not represent a typical operation as represented in with-CDRP conditions. Flows are either lower or higher in existing conditions compared to with-CDRP conditions depending on how ACDD and Calaveras Reservoir are operated to accommodate the limited operational capacity of Calaveras Reservoir. Nevertheless, pattern of larger flows including peaks at Node 4 are in general similar between existing and with-CDRP conditions.

The pattern of flows at Node 5 is similar to Node 4 for larger flows. Node 5 receives additional contributions from the watershed between Node 4 and Node 5 during rainy periods. Therefore, flow peaks are slightly higher at Node 5 compared to Node 4 despite losses in Sunol Valley. Due to the Sunol Valley loss of 17 cfs, in general, Node 5 does not have flows from June to November in all conditions. Although ACDD is not operated between April and November during with-CDRP conditions, Alameda Creek around ACDD does not have significant flows during June to November. The maximum instream flow from Calaveras Reservoir during June to November is 12 cfs.

The pattern of flows at Node 7 is similar to Node 5 for all flow ranges. Node 7 receives additional contributions from the watershed between Node 5 and Node 7 during rainy periods. Therefore, in all conditions, flow peaks are higher at Node 7 compared to Node 5. In earlier applications of the model both gain from NPDES quarry discharges and losses in this reach were not included. Therefore, same as Node 5, in general, Node 7 does not have flows from June to November. In the analytical results presented in this report both the NPDES quarry discharges and losses between Node 6 and Node 7 have been incorporated. Losses of 7.5 cfs have been assumed between Node 6 and Node 7. When the NPDES quarry discharges at Node 6 are less than 7.5 cfs, Node 7 flows are the same in both methods of calculations. Therefore, the addition of the NPDES quarry discharge gain and loss incorporated between Node 6 and Node 7 does not pose hydrologic significance to affect hydrographs during rainy periods. However, Node 7 under this new calculation may receive small flows in all conditions during the period when the estimated NPDES quarry discharge at Node 6 is greater than 7.5 cfs. Therefore, at times, Node 7 has flows in this new calculation between June and November. During such hydrologic situation there are no flows between Nodes 4 and 5 and there are flows between Nodes 6 and Node 7 albeit very small. For three examples presented here, the average gain from the NPDES quarry discharge in Water Years 2012, 2008, and 2011 in pre-2001 conditions are 1.2 cfs, 2.2 cfs, and 5.2 cfs, respectively. Similarly, under the existing conditions flows are 0.1 cfs, 5.9 cfs, and 5.2 cfs, respectively, and under with-CDRP conditions, in Water Years

2012, 2008, and 2011, they are 0.4 cfs, 7.4 cfs, and 9.1 cfs, respectively. Because 7.5 cfs is lost between Nodes 6 and 7, the new calculation at Node 7 has an insignificant effect on flow rate at Node 7.

5.3.2 Annual Flow Volumes Calculated from Estimated Daily Flows

Tables HYD5-7, HYD5-8 and **HYD5-9** show estimated annual flow volumes under pre-2001, existing, with-CDRP, and with-project conditions for the 18-year period from Water Year 1996 to Water Year 2013 at three locations along Alameda Creek. Table HYD5-7 shows estimated Alameda Creek flows below the Welch Creek confluence (Node 4); Table HYD5-8 shows creek flows above the San Antonio Creek confluence (Node 5); and Table HYD5-9 shows creek flows above the Arroyo de la Laguna confluence (Node 7). Between the Welch Creek confluence and the Arroyo de la Laguna confluence, water is added to Alameda Creek by accretion; that is, water from storm runoff and tributaries. It is also added by NPDES discharges from the quarries and lost to the subsurface by percolation into the streambed.

TABLE HYD5-7
ESTIMATED ANNUAL FLOW VOLUME IN ALAMEDA CREEK
BELOW WELCH CREEK CONFLUENCE (NODE 4) FOR WY1996-WY2013 (acre-feet)

Water Year	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions	Year type
1996	85,478	85,478	90,569	91,640	Wet
1997	76,127	76,127	76,023	85,079	Wet
1998	126,329	126,329	124,809	131,491	Wet
1999	21,141	21,141	25,966	27,319	Wet
2000	28,238	32,765	25,524	34,780	Wet
2001	3,282	2,803	12,009	12,009	Dry
2002	3,343	30,187	13,415	13,415	Dry
2003	7,157	15,535	20,822	20,822	Dry
2004	4,719	6,019	14,622	14,622	Dry
2005	49,587	56,581	27,755	47,585	Wet
2006	67,856	78,200	48,590	73,844	Wet
2007	2,564	6,763	11,200	11,200	Dry
2008	7,944	11,737	15,351	15,351	Dry
2009	16,332	9,789	14,963	20,569	Wet
2010	17,924	14,870	20,013	25,419	Wet
2011	50,817	54,095	34,025	56,269	Wet
2012	1,605	3,271	9,710	9,710	Dry
2013	3,446	16,555	11,481	11,481	Dry
Average	31,878	36,007	33,157	39,029	
Maximum	126,329	126,329	124,809	131,491	
Minimum	1,605	2,803	9,710	9,710	

SOURCE:SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

TABLE HYD5-8
ESTIMATED ANNUAL FLOW VOLUME IN ALAMEDA CREEK ABOVE SAN ANTONIO CREEK CONFLUENCE (NODE 5) FOR WY1996-WY2013 (acre-feet)

Water Year	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions	Year Type
1996	89,075	89,075	88,777	89,848	Wet
1997	77,523	77,523	71,921	80,977	Wet
1998	128,445	128,445	122,634	129,315	Wet
1999	19,347	19,347	19,696	21,048	Wet
2000	28,945	32,298	19,856	29,111	Wet
2001	2,588	2,036	5,994	5,994	Dry
2002	1,961	26,067	6,489	6,489	Dry
2003	6,491	13,981	14,990	14,990	Dry
2004	4,138	5,327	8,620	8,620	Dry
2005	49,841	55,551	22,839	42,668	Wet
2006	67,647	76,527	43,787	69,041	Wet
2007	1,847	4,918	4,335	4,335	Dry
2008	8,036	9,037	10,238	10,238	Dry
2009	15,695	8,788	7,901	13,506	Wet
2010	16,558	12,599	13,143	18,549	Wet
2011	50,112	52,199	28,147	50,391	Wet
2012	837	1,673	3,250	3,250	Dry
2013	3,155	14,688	4,877	4,877	Dry
Average	31,787	34,999	27,637	33,510	--
Maximum	128,445	128,445	122,634	129,315	--
Minimum	837	1,673	3,250	3,250	--

SOURCE: SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

TABLE HYD5-9
ESTIMATED ANNUAL FLOW VOLUME IN ALAMEDA CREEK ABOVE ARROYO DE LA LAGUNA CONFLUENCE (NODE 7) FOR WY1996-WY2013 (acre-feet)

Water Year	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions	Year Type
1996	97,845	97,845	98,944	97,882	Wet
1997	84,586	84,586	80,591	87,297	Wet
1998	142,718	142,718	137,869	146,031	Wet
1999	21,024	21,024	22,407	24,767	Wet
2000	30,616	34,078	23,403	30,934	Wet
2001	3,219	2,801	13,929	6,302	Dry
2002	2,307	26,789	9,292	5,654	Dry
2003	7,818	15,651	19,747	14,767	Dry
2004	4,831	6,726	12,963	8,586	Dry
2005	51,941	57,738	26,550	43,533	Wet
2006	70,068	84,627	48,399	71,020	Wet
2007	2,199	5,413	11,255	4,433	Dry
2008	9,122	10,737	13,229	10,646	Dry

TABLE HYD5-9 (Continued)
ESTIMATED ANNUAL FLOW VOLUME IN ALAMEDA CREEK ABOVE ARROYO DE LA LAGUNA CONFLUENCE (NODE 7) FOR WY1996-WY2013 (acre-feet)

Water Year	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions	Year Type
2009	16,346	9,410	10,931	13,691	Wet
2010	18,445	14,999	19,104	19,314	Wet
2011	52,698	57,661	33,009	54,056	Wet
2012	909	1,634	2,961	3,167	Dry
2013	3,525	14,598	4,991	4,818	Dry
Average	34,452	38,274	32,752	35,934	--
Maximum	142,718	142,718	137,869	146,031	--
Minimum	909	1,634	2,961	3,167	--

SOURCE: SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted to include NPDES quarry discharges at Node 6 and losses between Node 6 and 7 by ESA/Orion.

Tables HYD5-7, HYD5-8 and HYD5-9 show that annual flow volumes in Alameda Creek at all three locations vary greatly from year-to-year. For example, under existing conditions, the highest annual flow volume at Node 4 in the 18-year period was about 45 times greater than the lowest flow volume; the highest annual flow volume at Node 7 in the 18-year period was about 87 times greater than the lowest flow volume.

As shown in Table HYD5-7, average annual flow volume in Alameda Creek below the Welch Creek confluence (Node 4) under pre-2001 conditions between Water Year 1996 and Water Year 2013 is estimated to be 31,878 acre-feet. Estimated annual flow volume in the 18-year period ranged from 126,329 acre-feet in 1998 to 1,605 acre-feet in 2012. Average annual flow volume in Alameda Creek below the Welch Creek confluence under existing conditions between Water Year 1996 and Water Year 2013 is estimated to be 36,007 acre-feet. Estimated annual flow volume ranged from 126,329 acre-feet in 1998 to 2,803 acre-feet in 2001. Estimated average annual flow volume under existing conditions is greater than under pre-2001 conditions because, under the former, DSOD restrictions on storage in Calaveras Reservoir limited the amount of water the SFPUC could divert from Alameda Creek.

Average annual flow volume in Alameda Creek below the Welch Creek confluence under with-CDRP conditions between Water Year 1996 and Water Year 2013 is estimated to be 33,157 acre-feet. Estimated annual flow volume in the 18-year period ranged from 124,809 acre-feet in 1998 to 9,710 acre-feet in 2012. The estimated average annual flow volume at Node 4 is lower under with-CDRP conditions than under existing conditions by about 3,000 AF because the flow-reducing effects of restoration of full capacity to Calaveras Reservoir are greater than the flow-increasing effects of releases at Calaveras Reservoir and the bypasses at the Alameda Creek Diversion Dam.

As shown in Table HYD5-8, average annual flow volume in Alameda Creek above the San Antonio Creek confluence under pre-2001 conditions is estimated to be 31,787 acre-feet. Estimated annual flow volume in the 18-year period ranged from 128,445 acre-feet in 1998 to 837 acre-feet in 2012. Average annual flow volume in Alameda Creek at the same location under existing conditions, is estimated to be 34,999 acre-feet. Estimated annual flow volume in the 18-year period ranged from 128,445 acre-feet in 1998 to 1,673 acre-feet in 2012.

Average annual flow volume in Alameda Creek above the San Antonio Creek confluence under with-CDRP conditions is estimated to be 27,637 acre-feet. Estimated annual flow volume in the 18-year period ranged from 122,634 acre-feet in 1998 to 3,250 acre-feet in 2012. Between the Welch Creek confluence and the San Antonio Creek confluence, Alameda Creek gains water from accretion and loses it to the subsurface. Accretion is the same for existing and with-CDRP conditions, but losses to the subsurface are different. The average annual loss to the subsurface under existing conditions is estimated to be 4,526 acre-feet. The average annual loss to the subsurface under with-CDRP conditions is estimated to be 9,033 acre feet, or 4,507 acre-feet greater than under existing conditions (see Table HYD4-1). The reason for this is the different seasonal flow pattern of the two conditions. Implementation of the CDRP instream flow schedules under with-CDRP conditions will result in a small flow in Alameda Creek between its confluences with Calaveras Creek and Welch Creek during the summer and fall, when the creek is usually dry under the existing conditions. Consequently, there is a much greater opportunity for water to percolate into the subsurface under with-CDRP conditions than under existing conditions.

Below the San Antonio Creek confluence, Alameda Creek gains water from accretion and from NPDES discharges from the quarries and loses it to the subsurface. As shown in Table HYD5-9 average annual flow volume just upstream of the Arroyo de la Laguna confluence is estimated to be 34,452 acre-feet under pre-2001 conditions. Estimated annual flow volume in the 18-year period ranged from 142,718 acre-feet in 1998 to 909 acre-feet in 2012. Annual average flow volume at the same location under existing conditions is estimated to be 38,274 acre-feet. Estimated annual flow volume in the 18-year period ranged from 142,718 acre-feet in 1998 to 1,634 acre-feet in 2012. Annual average flow volume just upstream of the Arroyo de la Laguna under with-CDRP conditions is estimated to be 32,752 acre-feet. Estimated annual flow volume ranged from 137,869 acre-feet in 1998 to 2,961 acre-feet in 2012.

5.3.3 Monthly Flows Calculated from Simulated Daily Flows

Monthly flows in Alameda Creek are highly variable as shown above in Figure HYD5-3. The figure shows hydrographs for an exemplary wet/normal year (Water Year 2006) and an exemplary dry year (Water Year 2007) for the USGS gage on Alameda Creek just upstream of the Alameda Creek Diversion Dam under existing conditions. In the wet/normal year, flow exceeded 100 cfs for most of April and May. In the dry year, there was very little flow in the creek for most of these two months.

Similar variability in monthly flow patterns occurred under pre-2001 conditions and can be expected under with-CDRP conditions.

Table HYD5-10 compares estimated monthly average flows in Alameda Creek at three locations for the period Water Year 1996 to Water Year 2013 for pre-2001, existing, and with-CDRP conditions. The locations are just downstream of Welch Creek (Node 4), just upstream of San Antonio Creek (Node 5), and just upstream of the Arroyo de la Laguna (Node 7). Values at Node 7 reflect NPDES discharges from the quarries and losses between Alameda Creek's confluence with San Antonio Creek and its confluence with the Arroyo de La Laguna. Just downstream of the Welch Creek confluence, average monthly flow in Alameda Creek under with-CDRP conditions is less than under existing conditions in December, January, March, April, and May. Average monthly flow under with-CDRP conditions is considerably greater in the summer and fall because of the releases from Calaveras Reservoir and the bypasses at the Alameda Creek Diversion Dam.

TABLE HYD5-10
ESTIMATED AVERAGE MONTHLY FLOW AT THREE LOCATIONS ON ALAMEDA CREEK FOR EXISTING AND WITH-CDRP CONDITIONS FOR WY 1996 TO WY 2013 (CFS)

Node	Scenario	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
4	Pre-2001 Conditions	0.2	1.5	20.5	103.3	180.2	147.5	71.8	8.5	2.4	0.5	0.3	0.2
4	Existing Conditions	1.4	1.8	40.3	125.4	182.0	120.5	86.8	33.5	11.3	1.2	0.4	0.3
	With-CDRP Conditions	7.3	8.4	33.0	99.9	184.4	87.1	71.9	21.8	13.7	11.0	10.2	10.0
	Difference in flow between with-CDRP and existing conditions (With- CDRP Conditions minus Existing Conditions)	5.9	6.6	-7.3	-25.5	2.4	-33.4	-14.9	-11.7	2.4	9.8	9.8	9.7
5	Pre-2001Conditions	0	0.9	21.6	107.9	187.0	146.0	67.6	4.2	0.4	0	0	0
5	Existing Conditions	0.5	1.1	40.5	127.9	186.8	117.9	80.6	26.1	7.1	0	0	0
	With-CDRP Conditions	0	2.6	28.6	97.5	186.3	81.6	60.8	9.1	1.4	0.1	0	0
	Difference in flow between with-CDRP and existing conditions (With-CDRP Conditions minus Existing Conditions)	-0.5	1.5	-11.9	-30.4	-0.5	-36.3	- 19.8	-17.0	-5.7	0.1	0	0
7	Pre-2001 Conditions	0	1.1	24.5	117.7	201.9	156.4	73.7	4.8	0.4	0	0	0.1
7	Existing Conditions	0.6	1.2	43.6	138.4	202.1	130.8	92.2	27	7.3	0.1	0	0.1
	With-CDRP Conditions	1.7	4.2	33.9	111.2	206.0	97.5	72	14.2	5.1	2.9	2.3	2.7
	Difference in flow between with-CDRP and existing conditions (With-CDRP Conditions minus Existing Conditions)	1.1	3.0	-9.7	-27.2	3.9	-33.3	-20.2	-12.8	-2.2	2.8	2.3	2.6

SOURCE SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted to include NPDES quarry discharges at Node 6 and losses between Node 6 and 7 by ESA/Orion.

Just upstream of the San Antonio Creek confluence, average monthly flow under with-CDRP conditions is less than under existing conditions in December, January, March, April, May, and June. There is no flow in Alameda Creek under either with-CDRP or existing conditions in July, August, September, and October. Much of the water that arrives at the Welch Creek confluence under with-CDRP conditions as a result of releases and bypasses at Calaveras Reservoir and the Alameda Creek Diversion Dam is lost to the subsurface between the Welch Creek confluence and the San Antonio Creek confluence.

Just upstream of the Arroyo de la Laguna confluence, average monthly flow in Alameda Creek under with-CDRP conditions is less than under existing conditions in December, January, March, April, May, and June. Average monthly flow is greater under with-CDRP conditions than under existing conditions in the summer and fall. Under both conditions, Alameda Creek flow in July, August, September, and October at this location is attributable almost entirely to NPDES discharges from the quarries.

Notes for Section 5

1. Average daily flows by month are calculated by averaging all the daily flow records for a particular month over the period Water Year 2002 to Water Year 2010.
2. National Marine Fisheries Service (NMFS), 2011. *Biological Opinion for Calaveras Dam Replacement Project in Alameda and Santa Clara Counties*. Tracking No. 2005/07436. March 5, 2011.

6. Effects of ACRP Operations on Surface Water Hydrology

Operation of the proposed ACRP would affect surface water levels in Pit F2 and the SFPUC's operation of its Alameda System, particularly Calaveras Reservoir, which could affect surface water flow in Alameda Creek. The effects of the ACRP are determined by comparing surface water hydrology with the ACRP in operation to surface water hydrology under existing and with-CDRP conditions.

6.1 Effects of ACRP on Water Levels in Pit F2

The top of the berms that separate Pit F2 from the Alameda Creek channel are at about elevation 260 feet and the bottom of the pit is at about elevation 10 feet. The thalweg, or lowest point in the Alameda Creek channel, is at about elevation 242 feet in the vicinity of the proposed project.

Operation of the ACRP would alter water levels in Pit F2 directly by pumping water from the pit, and it could also affect water levels in the pit indirectly by altering the rate at which water seeps into the pit. The rate at which water seeps into Pit F2 depends on the relative elevations of the subsurface water level in surrounding stream channel deposits and the water level in Pit F2. Because operation of the ACRP would change the water level in Pit F2, it has the potential to alter the rate of seepage of subsurface water into the pit.

6.1.1 Water Level Changes in Pit F2 Caused by ACRP Pumping

When the ACRP is in operation, the SFPUC intends to maintain the water surface elevation in Pit F2 between 150 feet and 240 feet under normal hydrologic conditions, but may occasionally lower it to elevation 100 feet under very dry conditions. **Figure HYD6-1** shows the expected annual pattern of water surface elevations in Pit F2 with the ACRP in operation. During normal operations of the ACRP, the SFPUC would maintain water levels in Pit F2 between elevations 150 and 180 feet from mid-May to mid-December. Between mid-January and mid-April, the SFPUC would maintain water levels in Pit F2 between elevations 200 feet and 240 feet.

Comparison to Existing Conditions

The water surface elevation in Pit F2 was below the operating range of the proposed ACRP from mid-2009 to the spring of 2013. Since then, it has risen gradually, reaching an elevation of 223 feet in the winter of Water Year 2016 before falling back to elevation 210 feet by June of that year, as shown in Figure HYD3-2. With the proposed ACRP in operation, water surface elevations in Pit F2 would fluctuate between elevations 150 feet and 240 feet. Under existing conditions, they have been in that range since the spring of 2013. So water levels in Pit F2 with the ACRP in operation would be the same or similar to those under existing conditions.

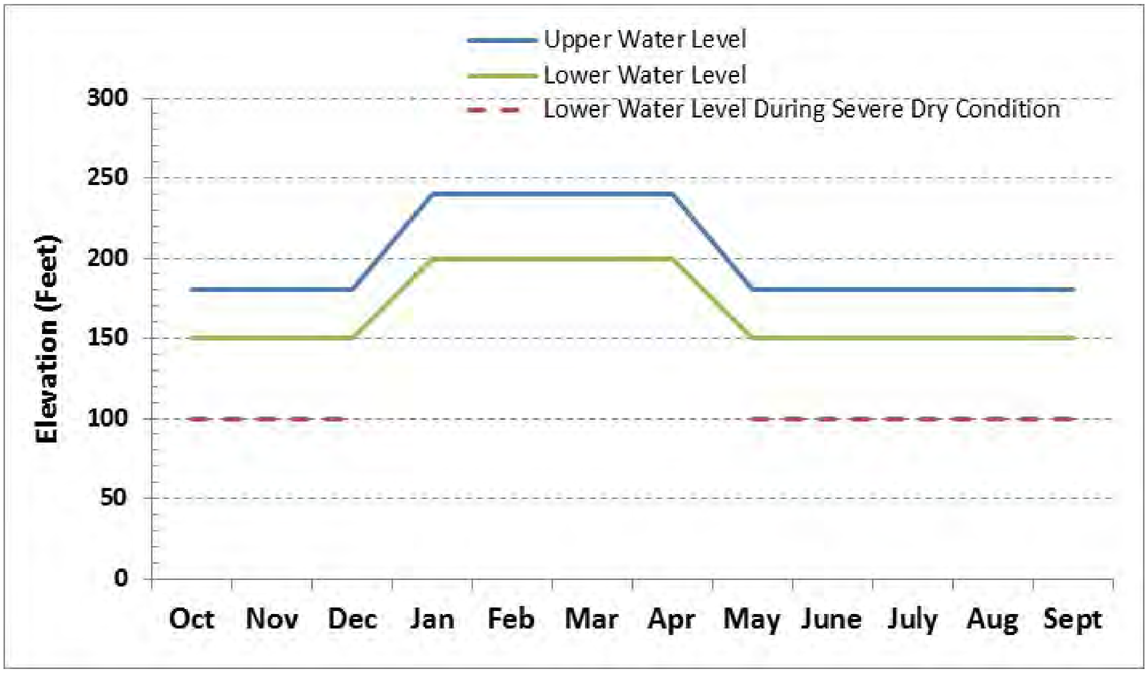


Figure HYD6-1
Proposed ACRP Operating Scenario

Comparison to With-CDRP Conditions

As noted above, by the winter of Water Year 2016, the water surface elevation in Pit F2 had reached elevation 223 feet before dropping to elevation 210 feet a few months later. Hanson Aggregates has been pumping water out of Pit F2, as needed, to maintain a safe water level and for aggregate and asphalt production purposes. The SFPUC expects that Hanson Aggregates will maintain the water surface elevation in the pit between elevation 150 feet and 240 feet for the next several years and will continue to do so once the CDRP is commissioned. When the ACRP is commissioned, the SFPUC expects that the water level in Pit F2 would be maintained between elevation 150 feet and 240 feet most of the time. So water levels in Pit F2 with the ACRP in operation would be the same or similar to those under with-CDRP conditions.

6.1.2 Water Level Changes In Pit F2 Caused Indirectly by ACRP-induced Changes in Seepage Rates

Water enters and leaves Pit F2 in several ways as shown diagrammatically in Figure HYD4-3. Rain falls directly into the pit and water evaporates from its surface. Most of the water that enters the pit does so by seeping or percolating from the subsurface through the layer of permeable stream channel deposits that, in the vicinity of Pit F2, extend from about elevation 250 feet to their base at about elevation 224 feet (1). The primary source of water percolating into Pit F2 from the stream channel deposits is Alameda Creek, although much of it probably arrives after passing through one or more of the pits to the south. The pits to the south have historically had higher water levels than Pit F2. Some of the water percolating into the pit may originate in water that makes its way into the stream channel deposits from San Antonio Creek and from runoff from hills to the east. The SFPUC estimates that the quantity of water originating from the east averages 1,033 acre-feet per year.

Differences in hydraulic head, a form of potential energy, cause water to make its way through the stream channel deposits. For example, if the subsurface water level in the stream channel deposits is at elevation 245 feet and the water surface elevation in Pit F2 is at elevation 230 feet, 15 feet of hydraulic head is available to overcome friction in the stream channel deposits and push subsurface water toward, and into the pit. As the subsurface water level in the stream channel deposits under the creek falls, the amount of available hydraulic head decreases and the rate at which water moves toward the pit slows down and eventually stops when the water levels in the stream channel deposits and the pit equalize.

When the water level in the Pit F2 is above elevation 224 feet, the base of the stream channel deposits, it may cause water to move from the pit into the stream channel deposits depending on the water level in the deposits. For example, if the subsurface water level in the stream channel deposits is at elevation 225 feet and the water surface elevation in the pit is at elevation 240 feet, 15 feet of hydraulic head is available to drive water from the pit into the stream channel deposits.

If the water level in Pit F2 is below elevation 224 feet, the base of the stream channel deposits, it has no influence on the rate at which water percolates into the pit from the deposits. The rate at which water seeps into the pit from the stream channel deposits depends entirely on the water level in the deposits.

Comparison to Existing Conditions

From October 2009 to October 2015, the water surface elevation in Pit F2 was below elevation 224 feet and so water has been seeping into the pit for the entire six-year period. As noted above, the SFPUC plans to keep water levels in Pit F2 in the range of elevation 150 feet to 240 feet with the proposed ACRP in operation. From mid-January to mid-April, the SFPUC expects the water level in the pit to be between 200 feet and 240 feet. During such times, if the water level is above elevation 224 feet, some water would seep out of the pit into the stream channel deposits under Alameda Creek. Under existing conditions, the water level has always been below elevation 224 feet and so water has never moved from the pit to the stream channel deposits under Alameda Creek.

From mid-April to mid-December, the SFPUC expects the water level in Pit F2 with the proposed ACRP in operation to be between elevations 150 feet and 180 feet. During that period, the rate of water movement to and from the pit to the stream channel deposits under Alameda Creek would be the same for with-project conditions as it is for existing conditions. Under both conditions, water would move from the stream channel deposits under Alameda Creek into the pit during this period. The rate of movement would depend entirely on subsurface water levels in the stream channel deposits under Alameda Creek and would be the same for existing and with-project conditions.

Comparison to With-CDRP Conditions

The SFPUC expects that Hanson Aggregates will maintain water levels in Pit F2 between elevation 150 feet and 240 feet until the CDRP is commissioned and will continue to do so when the CDRP is in operation. The SFPUC would keep the water level in Pit F2 within the same range after the ACRP is commissioned. Consequently, the rates of seepage from Pit F2 to the surrounding ground and from the surrounding ground to Pit F2 would be the same for with-CDRP and with-project conditions.

6.2 Effects of ACRP on Streamflow in Alameda Creek

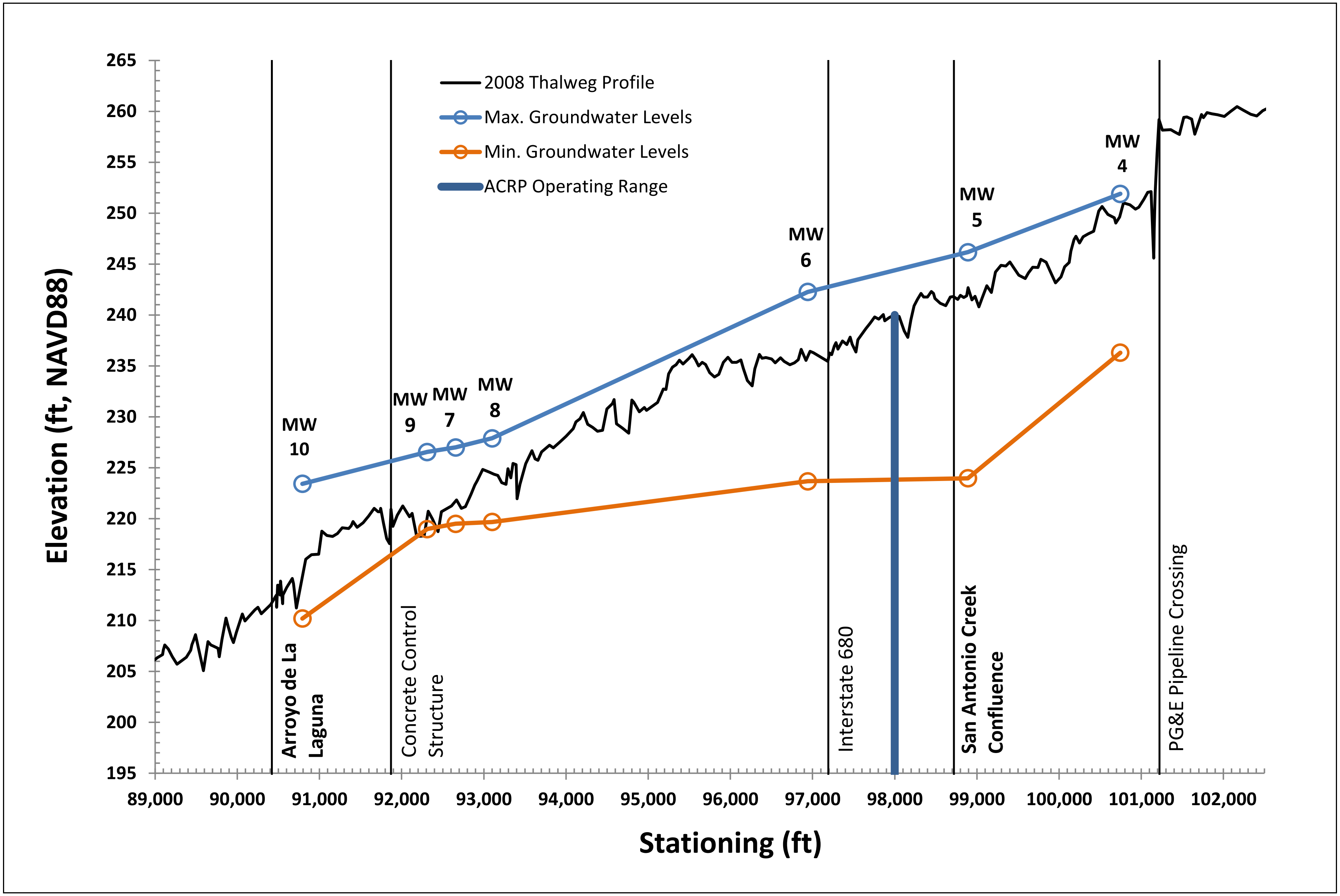
Operation of the ACRP could affect surface water flow in Alameda Creek in two ways: ACRP-caused changes in water levels in Pit F2 could accelerate the seepage of water from the creek to the pit with a consequent effect on surface water flow; and ACRP pumping of water from Pit F2 could cause changes in water management by the quarry operators that could reduce their need to discharge water into Alameda Creek under their NPDES discharge permits, thereby affecting flow in Alameda Creek downstream of the quarries.

6.2.1 ACRP-caused changes in water levels in Pit F2 and their relationship to flows in Alameda Creek

The proposed ACRP would change water levels in Pit F2 directly as a result of project operations and could change them indirectly as a result of ACRP-caused changes in seepage rates into the pit, as discussed in Section 6.1 above. If flow in Alameda Creek adjacent to Pit F2 was affected by the water level in the pit then ACRP-caused changes in Pit F2 water levels could affect surface water flow in the creek.

There is a relationship between the water level in Pit F2 and surface water flow in Alameda Creek, but it is not a direct one. Surface water from Alameda Creek percolates into the stream channel deposits that underlie the creek downstream of the Welch Creek confluence. During high flow periods, typically in the winter and spring, considerable volumes of water enter the stream channel deposits raising the water level in the deposits until it is close to and may even exceed the elevation of Alameda Creek's thalweg as shown in **Figure HYD6-2**. The thalweg elevation adjacent to Pit F2 is at about elevation 242 feet. Figure HYD6-2 shows the maximum and minimum water levels in a series of monitoring wells along the alignment of Alameda Creek and the elevation of the creek's thalweg (for more information on the monitoring wells, see Appendix HYD2).

High water levels in the stream channel deposits are sustained until the rains cease and surface water flow in Alameda Creek diminishes and eventually disappears. Subsurface water in the stream channel deposits continues to move downstream but much of it seeps into the gravel pits. With no surface water to replenish them, subsurface water levels decline to an elevation of about 224 feet in the vicinity of Pit F2 and only rise again when the next year's storms and high stream discharges occur. The geologic units below elevation 224 feet, Older Alluvium and the Livermore Gravels, transmit water very poorly, so very little or no water enters the pits from the ground below elevation 224 feet.



SOURCE: SFPUC, 2015. Alameda Creek Recapture Project (ACRP) CEQA Baseline/Hydro Approach Meeting. PowerPoint presentation file provided by Amod Dhakal on February 4, 2015; ESA, 2008 – thalweg profile.

NOTES: The expected operating range of water surface elevations in Pit F2 is 151 to 243 ft under the with-project condition (ACRP). The historic operating range by Hanson Aggregate was 90 to 160 ft.

SFPUC Alameda Creek Recapture Project

Figure HYD 6-2

Maximum and Minimum Water Levels in Monitoring Wells

The relationship between water levels in Pit F2 and flow in Alameda Creek is not simple and can best be understood by consideration of a hypothetical scenario. If a large pipe connected Pit F2 to Alameda Creek then there would be a simple relationship between the water level in the pit and flow in the creek. Whenever there was sufficient flow in the creek, water would travel rapidly through the pipe and the water level in the pit would begin to rise almost immediately. At the same time, flow in the creek would be reduced by the volume of water that moved through the pipeline to the pit. But there is no such pipe connecting Pit F2 to Alameda Creek and surface water from the creek must first percolate into the subsurface and then seep through several hundred feet of gravel, sand, and clay before reaching the pit. Whereas it would take less than a minute for creek water to make its way to the pit in a pipe, it probably takes several days, perhaps weeks, for water to make its way from the creek through the stream channel deposits to the pit. Under the conditions that actually exist, the water level in the pit responds only sluggishly to transitory high flows in the creek. Furthermore, water does not move through the stream channel deposits fast enough to have a substantial reductive effect on streamflow in the creek.

The nature of the relationship between flow in Alameda Creek and water levels in Pit F2 is illustrated by data obtained during a strong storm in early December 2012. The storm occurred after a long period of dry weather. Storms that produce as much or more runoff than the December 2012 storm are fairly infrequent. Between Water Year 1999 and Water Year 2014, about 12 storms produced more runoff than the December 2012 storm, as measured at the Welch Creek gage.

Estimated flow in Alameda Creek close to Pit F2 and water surface elevations in Pit F2 before, during and after the storm are shown in **Table HYD6-1**. The estimated streamflow values were obtained by deducting 17 cfs from measured flow values at the Welch Creek gage. As discussed previously, experiments have shown that about 17 cfs is lost to the subsurface between the Welch Creek and San Antonio Creek confluences.

Water surface elevations in Pit F2 were increasing gradually through the month of November from elevation 149.2 feet on November 1 to elevation 150 feet on November 28, 2012, or a rate of 0.03 feet per day. No streamflow occurred during the period. The rise in water surface elevation accelerated in the few days before the storm, the days of the storm (December 2 and 3), and in the days after the storm. Between November 28 and December 11, the water surface elevation in Pit F2 rose from elevation 150 feet to elevation 151.5 feet, a rate of 0.1 feet per day. In the two days of the storm itself, when average daily flow in the creek peaked at 733 cfs, the water surface elevation in Pit F2 rose no faster than it did over the 14-day period from November 28 and December 11. While the two-day period of high flow in the creek influenced water surface elevations in the pit, accelerating the rate of rise over the 14-day period, there was no sharp rise during the storm itself. Clearly, substantial flow in the creek after a period of little or no flow does not result in an immediate rise in the water level in the pit.

TABLE HYD6-1
ALAMEDA CREEK FLOW AND WATER LEVELS IN PIT F2, DECEMBER 2012

Month	Day	Streamflow (cfs)	Pit F2 Water level (feet)
Nov	1	0	149.1
Nov	26	0	150.0
	27	0	150.0
	28	0	150.0
	29	0	150.1
	30	0	150.3
Dec	1	0	150.4
	2	733	150.6
	3	125	150.6
	4	8	150.7
	5	2	150.9
	6	16	151.0
	7	1	151.1
	8	0	151.2
	9	0	151.3
	10	0	151.4
	11	0	151.5

SOURCE: Streamflow data for Welch Creek gage was obtained from the USGS and adjusted by ESA/Orion to account for losses to the subsurface upstream of Pit F2. Water levels in Pit F2 were obtained from Luhdorff & Scalmanini Consulting Engineers.

During the two days of high creek flow (December 2 and 3), 1,769 acre-feet of water flowed past Pit F2 in the Alameda Creek channel. During the four-day period December 1 to December 4, the water surface elevation in Pit F2 rose by 0.3 feet. This represents an increase in volume of water in the pit of about 17 acre-feet and some of this was likely attributable to direct rainfall into the pit. Very little of the water passing by Pit F2 in the Alameda Creek channel in the December storm found its way into the pit during the storm. It is clear that the existence of Pit F2 adjacent to Alameda Creek, with a water surface elevation about 100 feet below the thalweg of the creek, had very little immediate effect on the volume of flow in the adjacent creek channel during the large December storm.

As shown in Table HYD6-1, water levels in Pit F2 have no immediate effect on surface water flow in Alameda Creek and so any water level changes in the pit caused by the proposed ACRP would have no effect on surface water flow compared to either existing or with-CDRP conditions.

6.2.2 ACRP-induced changes in estimated NPDES discharges by the quarry operators and their effects on flow in Alameda Creek

The ACRP would remove an annual average of 7,178 acre-feet of water from Pit F2 and transfer it to San Antonio Reservoir or the SVWTP for use as municipal water supplies. The removal of water from Pit F2 by the SFPUC would likely affect how Hanson Aggregates manages water in its other pits. If changes in the way that Hanson Aggregates manages water results in changes in the volume of water that it discharges to Alameda Creek under its NPDES permit, then flow in Alameda Creek downstream of the quarries would be affected (2).

The amount of water that the operators discharge to Alameda Creek under their NPDES permits depends on a number of factors but, as described above in Section 4.2.2 one of the most important factors is the rate at which water percolates into the bed of Alameda Creek in the reach of the creek adjacent to the quarry pits. The method used to estimate the volume of the quarry NPDES discharges under the four scenarios depends on the relationship between the volume of water entering the pits from subsurface sources (water lost to the subsurface in the creek reach adjacent to the quarries and other subsurface water entering from the east) and the volume of water leaving the quarries in the form of NPDES discharges to Alameda Creek. The method is described above in Section 4, Analytical Methods.

The reported NPDES discharges from Hanson Aggregates for the period Water Year 1996 to Water Year 2013 have averaged 3,436 acre-feet per year and varied between a maximum of 5,328 acre-feet per year to a minimum of 103 acre-feet per year. Reported daily NPDES discharge volumes from Hanson Aggregates were input to the ASDHM just downstream of the San Antonio Creek confluence to calculate flow in Alameda Creek downstream of the NPDES discharge point under existing conditions.

For with-CDRP conditions, quarry NPDES discharges were estimated to average 6,620 acre-feet per year and range from a maximum of 12,480 acre-feet in 2001 to a minimum of 310 acre-feet in 2012. For with-project conditions, NPDES discharges were estimated to average 2,532 acre-feet per year and range from a maximum of 6,411 acre-feet in 1998 to a minimum of 632 acre-feet in 2013. Estimated daily NPDES discharge volumes from Hanson Aggregates were input to the ASDHM just downstream of the San Antonio Creek confluence to calculate flow in Alameda Creek downstream of the NPDES discharge point under with-CDRP and with-project conditions.

The Hanson Aggregates NPDES discharges, which occur primarily during the night, have had an erratic effect on flow in Alameda Creek between the quarries and the confluence with the Arroyo de la Laguna, sometimes adding considerable volumes of water and sometimes not. Although the volume of Hanson Aggregates' NPDES discharges is expected to change under with-CDRP and with-project conditions compared to existing conditions, the NPDES discharges would continue to occur erratically and to have an erratic effect on streamflow between the NPDES discharge point and Alameda Creek's confluence with the Arroyo de la Laguna.

The effect of the NPDES discharges from the quarries on flow in Alameda Creek downstream of the confluence with Arroyo de la Laguna is much less than it is upstream of the confluence for two reasons. The first reason is that much of the water contributed by the NPDES discharges from the quarries percolates into the ground between the quarry discharge point and the confluence with the arroyo. The second reason is that the flow of water entering Alameda Creek from the arroyo is considerably greater than the flow of water in Alameda Creek upstream of the confluence with the arroyo and so any effects of the NPDES discharges on streamflow are proportionally less than they are upstream of the arroyo.

Estimated daily flows

Comparison to Existing Conditions

Figures HYD6-3, **HYD6-4** and **HYD6-5** compare flow duration curves for with-project and existing conditions at three locations on Alameda Creek. The three locations are just downstream of the Welch Creek confluence (Node 4), just upstream of the San Antonio Creek confluence (Node 5), and just upstream of the Arroyo de la Laguna confluence (Node 7).

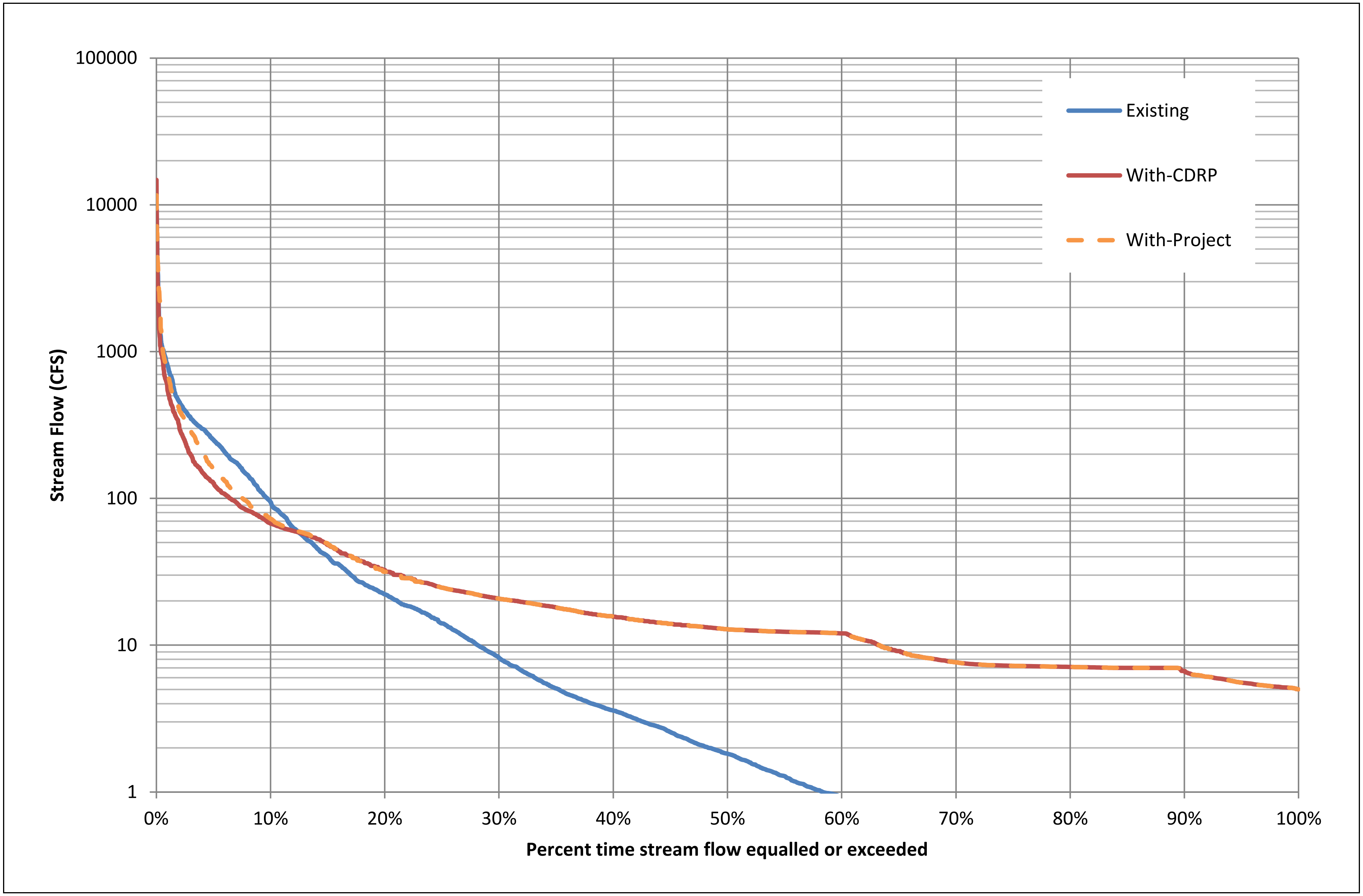
Figure HYD6-3 shows flow duration curves based on daily data for existing and with-project conditions just downstream of the Welch Creek confluence (Node 4). Under existing conditions, flow exceeds one cfs on about 58 percent of the days. Under with-project conditions, flow is never less than 5 cfs on any day because of the releases from Calaveras Reservoir and bypasses at the ACDD that are part of the CDRP.

Figure HYD6-4 compares flow duration curves for existing and with-project conditions just upstream of San Antonio Creek confluence (Node 5). Node 5 is about 200 feet upstream of the proposed ACRP. Under existing conditions, flow exceeds one cfs on about 24 percent of the days, compared to about 37 percent of the days under with-project conditions. The reduced frequency of days when flows exceed one cfs under both conditions at this location compared to Node 4 is attributable to the losses to the subsurface that occur between the Welch Creek and San Antonio Creek confluences. The increased frequency of days when flows exceed one cfs under with- project conditions is attributable to the releases of water from Calaveras Reservoir and bypasses of water at the Alameda Creek Diversion Dam.

Figure HYD6-5 compares flow duration curves for existing and with-project conditions downstream of the proposed project area and just upstream of the Arroyo de la Laguna confluence (Node 7). Under existing conditions, flow exceeds one cfs on 28 percent of the days. Under with-project conditions, flow exceeds one cfs on 34 percent of the days. Under both conditions, surface water is added between the San Antonio Creek and Arroyo de la Laguna confluences as a result of the quarry NPDES discharges but also lost to the subsurface by percolation.

Comparison to With-CDRP Conditions

Figures HYD6-3, HYD6-4 and HYD6-5 also compare flow duration curves for with-project and with-CDRP conditions at three locations on Alameda Creek: just downstream of the Welch Creek confluence (Node 4); just upstream of the San Antonio Creek confluence (Node 5); and just upstream of the Arroyo de la Laguna confluence (Node 7).

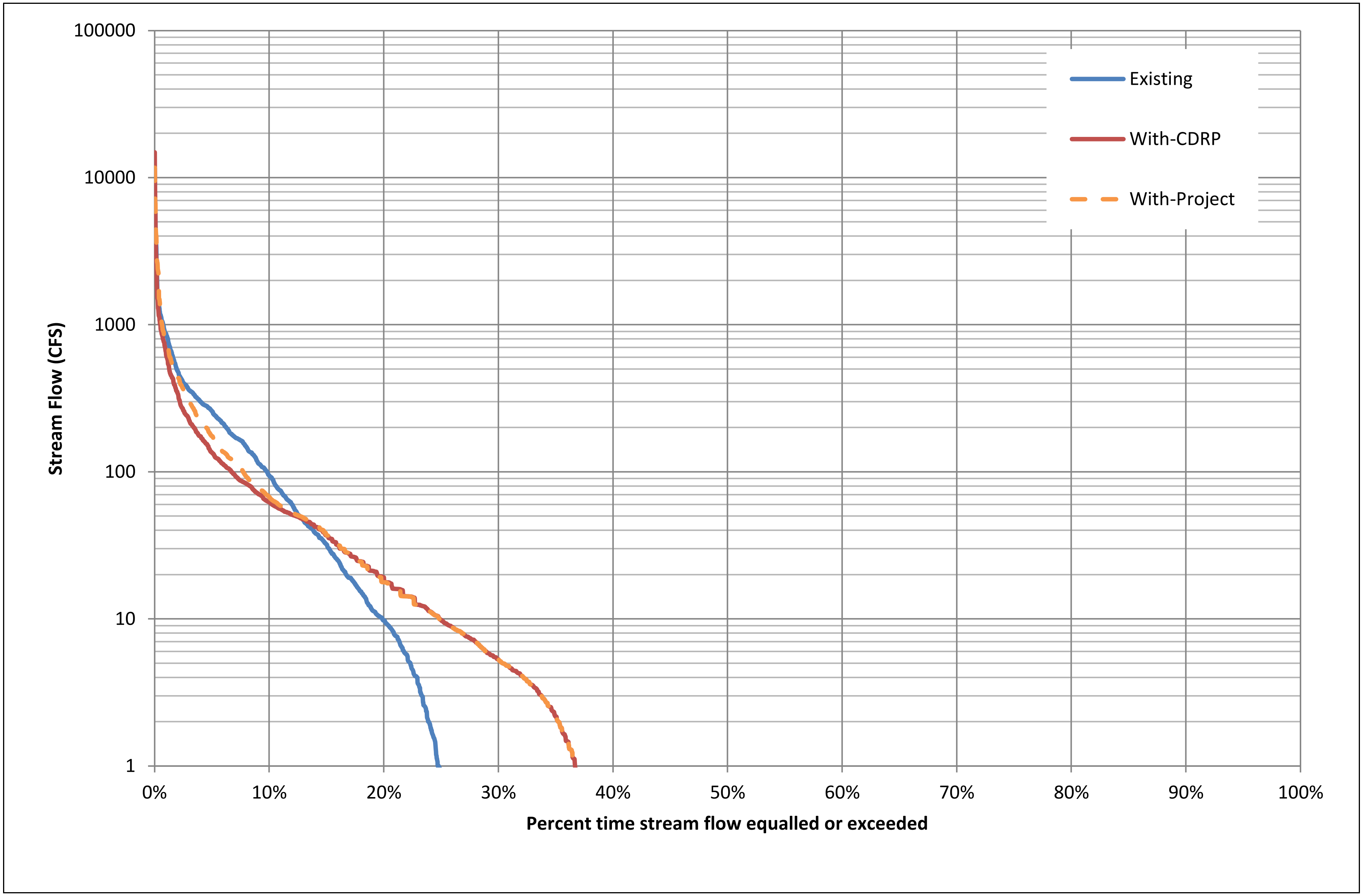


SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure HYD 6-3

Flow Duration Curves for Node 4 (Alameda Creek below Welch Creek) for Existing, with-CDRP, and with-Project Conditions

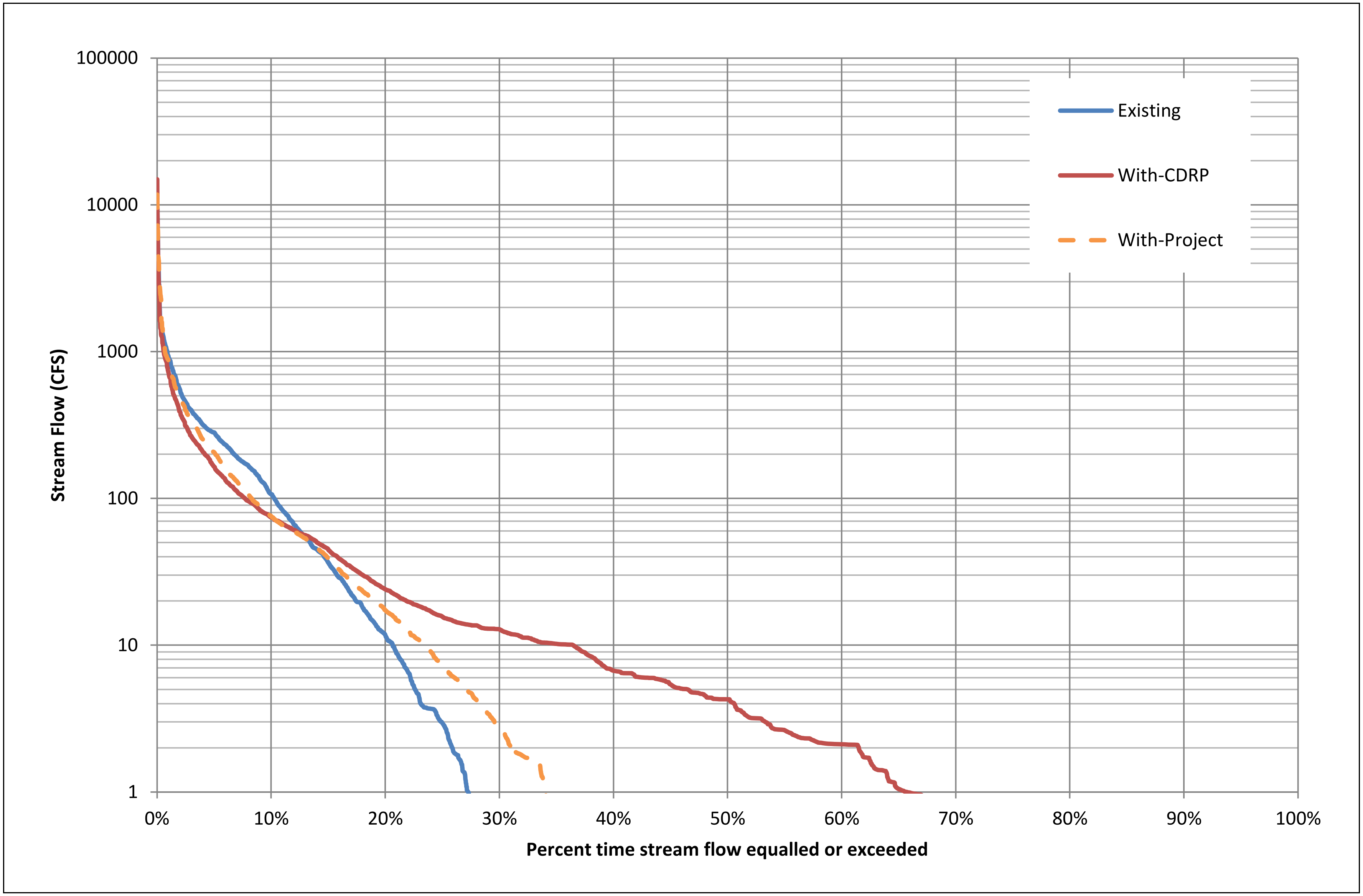


SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure HYD 6-4

Flow Duration Curves for Node 5 (Alameda Creek above San Antonio Creek) for Existing, with-CDRP, and with-Project Conditions



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure HYD 6-5

Flow Duration Curves for Node 7 (Alameda Creek above Arroyo de la Laguna) for Existing, with-CDRP, and with-Project Conditions

Figure HYD6-3 shows flow duration curves based on daily data for with-CDRP and with-project conditions just downstream of the Welch Creek confluence (Node 4). Under with-CDRP and with-project conditions, flow is never less than 5 cfs on any day because of the releases from Calaveras Reservoir and bypasses at the ACDD that are part of the CDRP.

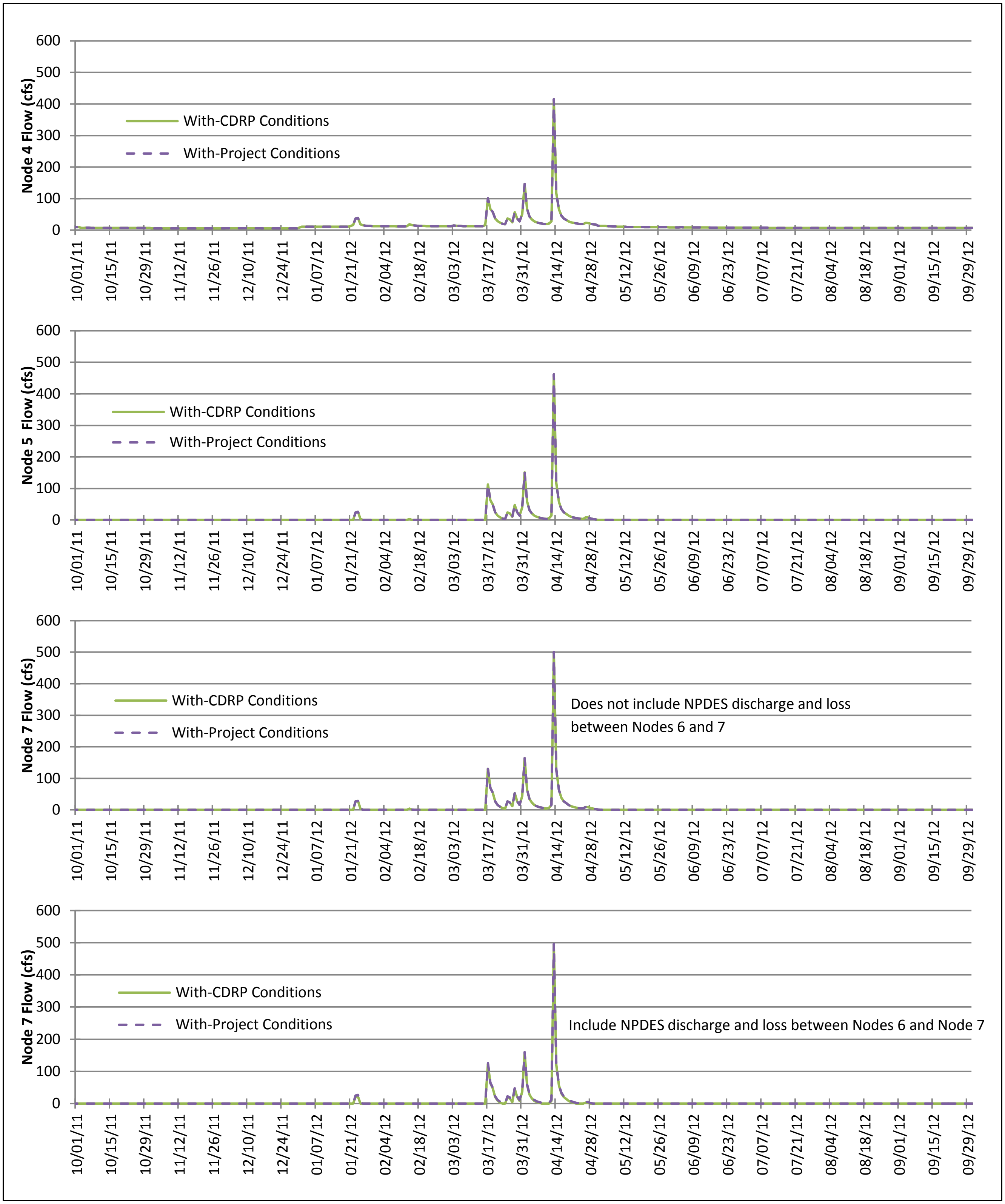
Figure HYD6-4 compares flow duration curves for with-CDRP and with-project conditions just upstream of San Antonio Creek confluence (Node 5). Under both with-CDRP and with-project conditions, flow exceeds one cfs on about 37 percent of the days. The reduced frequency of days when flows exceed one cfs under both conditions at this location compared to upstream at Node 4 is attributable to the losses to the subsurface that occur between the Welch Creek and San Antonio Creek confluences.

Figure HYD6-5 compares flow duration curves for with-CDRP and with-project conditions downstream of the proposed project area and just upstream of the Arroyo de la Laguna confluence (Node 7). Under with-CDRP conditions, flow exceeds one cfs on 65 percent of the days. Under with-project conditions, flow exceeds one cfs on 34 percent of the days. Under both conditions, surface water is added between the San Antonio Creek and Arroyo de la Laguna confluences as a result of the estimated quarry NPDES discharges but also lost to the subsurface by percolation. The estimated increase in flow due to the quarry discharges is greater under with-CDRP conditions.

Daily hydrographs from three selected water years (Water Years 2012, 2008, and 2011) representing ranges of exceedance probabilities from 28 percent to 94 percent (wet to dry water year types) are provided to illustrate daily flows at three different nodes. For each of these water years, daily hydrographs are provided that include quarry NPDES discharges and additional losses between the confluences of Alameda Creek with San Antonio Creek and the Arroyo de la Laguna, as well as without these accretions and depletions. These hydrographs are provided to illustrate the specific effects of the accretions and depletions.

Daily hydrographs are compared for two scenarios at Nodes 4, 5, and 7: (1) With-CDRP Conditions and (2) With-Project Conditions. Node 4 is downstream of SFPUC's compliance location and is the most upstream node of Sunol Valley. The change between Node 4 and Node 5 depicts the influence of loss in Sunol Valley. Node 7 represents flows downstream of the project before Alameda Creek meets Arroyo de la Laguna Creek (**Figures HYD 6-6A**, **HYD6-6B,** and **HYD6-6C**).

Because instream flows were the same in both conditions, in general, at Node 4, with-project conditions flows are the same as with-CDRP flows except in wet years when spill occur. In hydrologic years during which Calaveras Reservoir does not spill, with-project condition flows at Node 4 are always the same as with-CDRP flows. For example, Calaveras Reservoir does not spill in Water Year 2012 and Water Year 2008 and as depicted in Figures HYD6-6A and HYD6-6B under with-project and with-CDRP conditions flows at Node 4 are identical throughout hydrologic years. However, in wet years there are instances during which Calaveras Reservoir is full resulting in spill under both



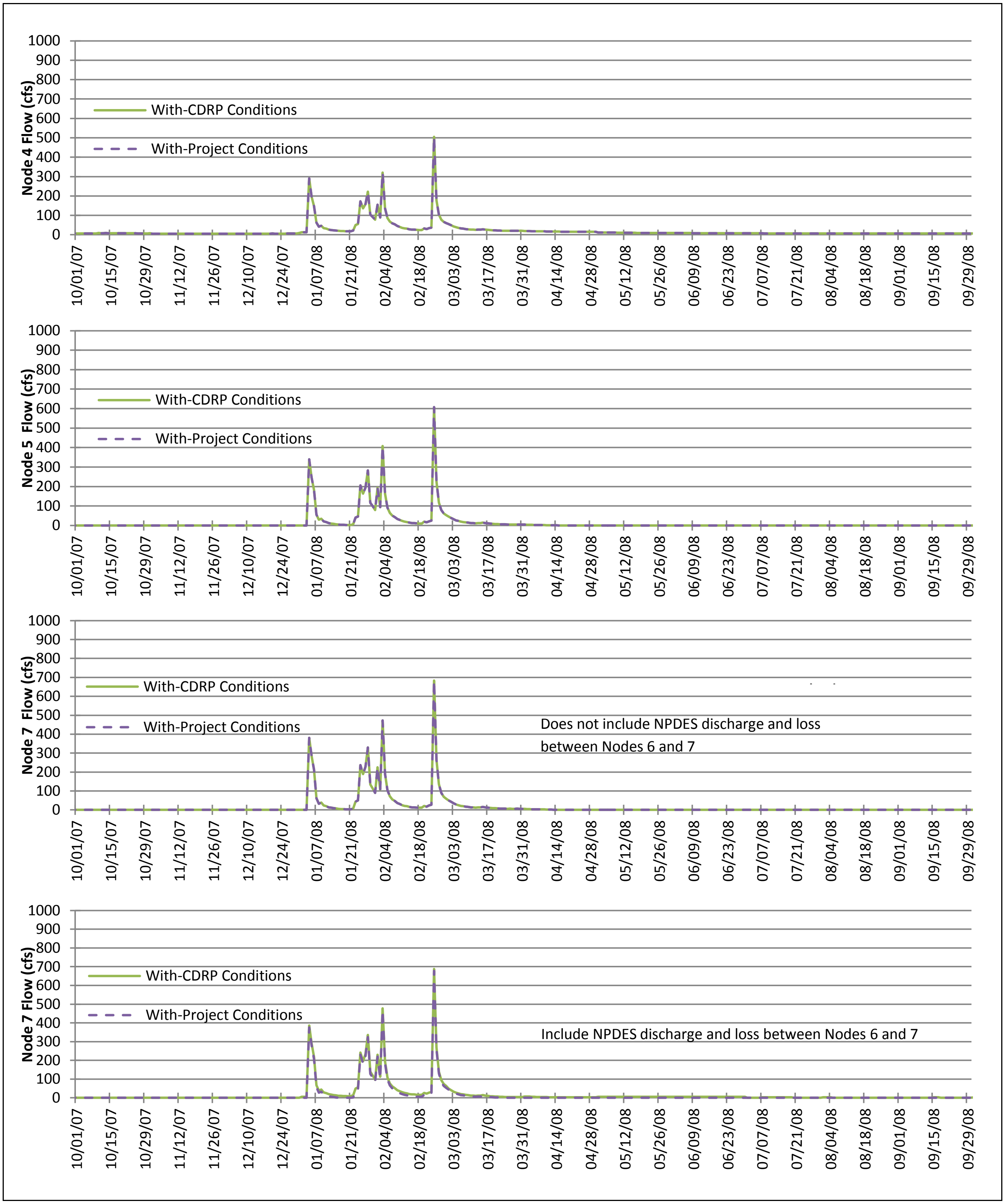
SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted by ESA/Orion.

NOTE: The adjusted ASDHM Node 7 which included NPDES discharge and loss is depicted on bottommost graph.

SFPUC Alameda Creek Recapture Project

Figure HYD 6-6A

Daily Hydrographs for WY 2012 (Ex. Prob. 91%) at Nodes 4, 5, and 7 for with-CDRP and with-Project Conditions



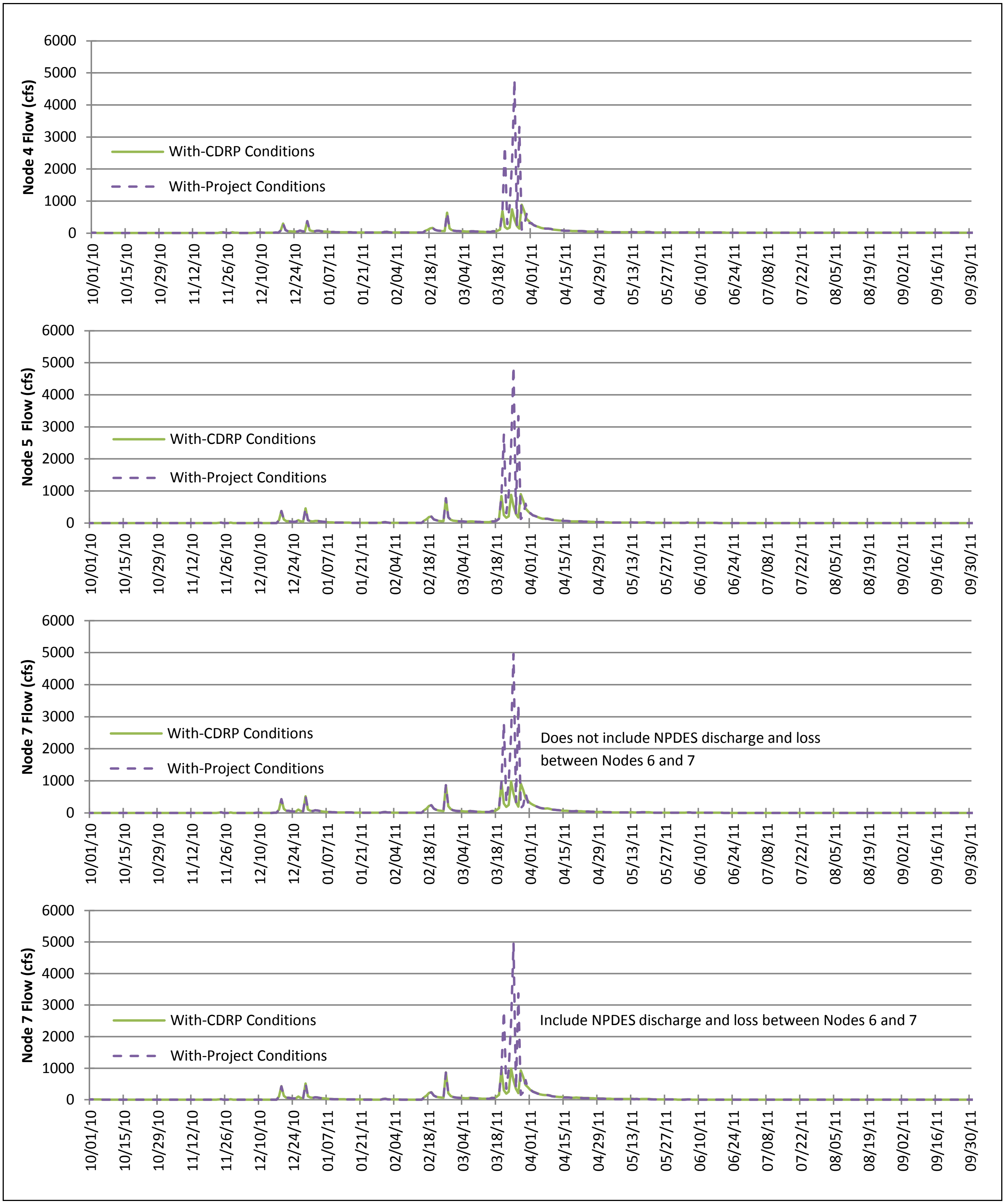
SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted by ESA/Orion.

NOTE: The adjusted ASDHM Node 7 which included NPDES discharge and loss is depicted on bottommost graph.

SFPUC Alameda Creek Recapture Project

Figure HYD 6-6B

Daily Hydrographs for WY 2008 (Ex. Prob. 64%) at Nodes 4, 5, and 7 for with-CDRP and with-Project Conditions



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted by ESA/Orion.

NOTE: The adjusted ASDHM Node 7 which included NPDES discharge and loss is depicted on bottommost graph.

SFPUC Alameda Creek Recapture Project

Figure HYD 6-6C

Daily Hydrographs for WY 2011 (Ex. Prob. 28%) at Nodes 4, 5, and 7 for with-CDRP and with-Project Conditions

conditions (or only in with- Project conditions like in Water Year 2005, not shown in the figure). Under the with-project conditions, because ACRP helps to meet water demand, Calaveras Reservoir is generally at higher elevations than under with-CDRP conditions. This is because under with-CDRP conditions, Calaveras Reservoir is drawn down further to meet demand. In Water Year 2011(wet year), Calaveras Reservoir spills under both with-project and with-CDRP conditions. Since Calaveras Reservoir is at a much higher elevation in with-project conditions compared to with-CDRP conditions spill rates are higher in with-project conditions (see 03/2011 peaks in Figure HYD 6-6C).

The pattern of flows at Node 5 is similar to Node 4 for all flows during both conditions. In Water Year 2012 and 2008, during which Calaveras Reservoir does not spill, flows at Node 5 are the same under both with-project and with-CDRP conditions for the entire hydrologic periods. Node 5 receives the same additional contributions from the watershed between Node 4 and Node 5 during rainy periods under both conditions. Therefore, flow peaks are slightly higher at Node 5 compared to Node 4 under both conditions despite losses in Sunol Valley. Due to the Sunol Valley loss of 17 cfs, in general, Node 5 does not have flows from June to November under both conditions. Although ACDD is not operated between April and November under both conditions, Alameda Creek around ACDD does not have significant flows during June to November. The maximum instream flow from Calaveras Reservoir during June to November is 12 cfs.

The pattern of flows at Node 7 is similar to Node 5 for all flows under both conditions. In Water Years 2012 and 2008, during which Calaveras Reservoir does not spill, flows at Node 7 are the same under both with-project and with-CDRP conditions for the entire hydrologic periods. Node 7 receives the same additional contributions from the watershed between Node 5 and Node 7 during rainy periods under both conditions. Therefore, flow peaks are higher at Node 7compared to Node 5. In earlier applications of the model both NPDES quarry discharges gain and losses in this reach were not included. Therefore, as for Node 5, in general, Node 7 does not have flows from June to November. In the analytical results presented in this report, both NPDES quarry discharges and losses between Node 6 and Node 7 have been incorporated. Losses of 7.5 cfs have been assumed between Node 6 and Node 7 and NPDES quarry discharges are estimated. When NPDES quarry discharges at Node 6 are less than 7.5 cfs, Node 7 flows are the same in both methods of calculations. Therefore, the addition of the NPDES quarry discharge gain and loss incorporated between Node 6 and Node 7 does not pose hydrologic significance to affect hydrographs during rainy periods. However, Node 7 in this new calculation may receive small flows under both conditions during the period when the estimated NPDES quarry discharge at Node 6 is greater than 7.5 cfs. Therefore, at times, Node 7 has flows in this new calculation during June and November. During such hydrologic situations there are no flows between Nodes 4 and 5 and there are flows between Node 6 and Node 7, albeit very small. For the three examples presented here, the average NPDES quarry discharge gain in Water Years 2012, 2008, and 2011 in with-CDRP conditions are 0.4 cfs, 7.4 cfs, and 9.1 cfs, respectively. They are 1.2 cfs, 3.6 cfs, and 7.7 cfs, in Water Years 2012, 2008 and 2011, respectively for with-project conditions. Because 7.5 cfs is lost between Nodes 6 and 7, this new calculation at Node 7 has an insignificant effect on flow rate at Node 7.

Average annual flow volumes calculated from estimated daily flows

Comparison to Existing Conditions

Tables HYD5-7, HYD5-8 and HYD5-9 show estimated annual surface flow volumes under existing and with-project conditions for the 18-year period from Water Year 1996 to Water Year 2013 at three locations of Alameda Creek. Table HYD5-7 shows estimated Alameda Creek flow volumes below the Welch Creek confluence (Node 4); Table HYD5-8 shows creek flow volumes above the San Antonio Creek confluence (Node 5); and Table HYD5-9 shows creek flow volumes above the Arroyo de la Laguna confluence (Node 7). Between the Welch Creek confluence and the Arroyo de la Laguna confluence, water is added to Alameda Creek by accretion; that is, water from storm runoff and tributaries. It is also added by NPDES discharges from the quarries. It is lost to the subsurface by percolation into the streambed. About 70 percent of the losses to the streambed occur between the Welch Creek and San Antonio Creek confluences and the remainder between the San Antonio Creek and Arroyo de la Laguna confluences.

As shown in Table HYD5-7, average annual flow volume in Alameda Creek below the Welch Creek confluence (Node 4) under existing conditions between Water Year 1996 and Water Year 2013 is estimated to be 36,007 acre-feet. Estimated annual flow volume ranged from 126,329 acre-feet in 1998 to 2,803 acre-feet in 2001. Average annual flow volume in the same location between Water Year 1996 and Water Year 2013 under with-project conditions is estimated to be 39,029 acre-feet. Estimated annual flow volume would range from 131,491 acre-feet to 9,710 acre-feet.

As shown in Table HYD5-8, average annual flow volume in Alameda Creek above the San Antonio Creek confluence under existing conditions is estimated to be 34,999 acre-feet. Estimated annual flow volume in the 18-year period ranged from 128,445 acre-feet in 1998 to 1,673 acre-feet in 2012. Average annual flow volume in Alameda Creek at the same location under with-project conditions is estimated to be 33,150 acre-feet. Estimated annual flow volume in the 18-year period would range from 129,315 acre-feet to 3,250 acre-feet in 2012.

As shown in Table HYD5-9, average annual flow volume in Alameda Creek above the Arroyo de la Laguna confluence under existing conditions is estimated to be 38,274 acre-feet. Estimated annual flow volume in the 18-year period ranged from 142,178 acre-feet in 1998 to 1,634 acre-feet in 2012. Average annual flow volume in Alameda Creek at the same location under with-project conditions is estimated to be 35,934 acre-feet. Estimated annual flow volume in the 18-year period would range from 146,031 acre-feet to 3,167 acre-feet.

Comparison to With-CDRP Conditions

As shown in Table HYD5-7, average annual flow volume in Alameda Creek below the Welch Creek confluence (Node 4) under with-CDRP conditions between Water Year 1996 and Water Year 2013 is estimated to be 33,157 acre-feet. Estimated annual flow volume ranged from 124,809 acre-feet in 1998 to 9,710 acre-feet in 2001. Average annual flow volume in the same location between Water Year

1996 and Water Year 2013 under with-project conditions is estimated to be 39,029 acre-feet. Estimated annual flow volume would range from 131,491 acre-feet to 9,710 acre-feet.

The average annual flow volume in Alameda Creek at the Welch Creek confluence under with-project conditions is greater than under-CDRP conditions because of differences in storage in Calaveras Reservoir. Under with-CDRP conditions, the water level in Calaveras Reservoir will be drawn down in the drier months to meet water demand and as a result of the releases that will be made to meet the instream flow schedule. Under with-project conditions, a portion of the water demand is met with water from the ACRP and so the water level in Calaveras Reservoir is not drawn down as far as it is under with-CDRP conditions. Because of this, spills in wet years would be more frequent under with-project conditions than they are under with-CDRP conditions. As a result, average annual flow volumes in Alameda Creek at the Welch Creek confluence would be greater under with-project conditions than they are under with-CDRP conditions.

As shown in Table HYD5-8, average annual flow volume in Alameda Creek above the San Antonio Creek confluence under with-CDRP conditions is estimated to be 27,637 acre-feet. Estimated annual flow volume in the 18-year period ranged from 122,634 acre-feet in 1998 to 3,250 acre-feet in 2012. Average annual flow volume in Alameda Creek at the same location under with-project conditions is estimated to be 33,150 acre-feet. Estimated annual flow volume in the 18-year period would range from 129,315 acre-feet to 3,250 acre-feet in 2012.

As shown in Table HYD5-9, average annual flow volume in Alameda Creek above the Arroyo de la Laguna confluence under with-CDRP conditions is estimated to be 32,752 acre-feet. Estimated annual flow volume in the 18-year period ranged from 137,869 acre-feet in 1998 to 2,961 acre-feet in 2012. Average annual flow volume in Alameda Creek at the same location under with-project conditions is estimated to be 35,934 acre-feet. Estimated annual flow volume in the 18-year period would range from 146,031 acre-feet to 3,167 acre-feet.

Average monthly flows calculated from estimated daily flows

Comparison to Existing Conditions

Table HYD6-2 compares average monthly flows in Alameda Creek at a location just downstream of the San Antonio Creek confluence (Node 6) for existing and with-project conditions. The monthly flows at this location include water discharged by the quarries under their NPDES permits. Average monthly flows under with-project conditions would be less than average monthly flows under existing conditions in eight months of the year. It would be greater than average monthly flows under existing conditions in November, February, March and April. During the summer months, all of the water in this reach of the creek under both conditions would be a result of the estimated quarry NPDES discharges. Flows would be lower under with-project conditions in the summer months than under existing conditions because the estimated volume of NPDES discharge from the quarries would be less under with-project conditions than it is under existing conditions. The quarry NPDES discharges are erratic and occur primarily during the night so under both conditions summertime flow in the reach would be discontinuous.

TABLE HYD6-2
AVERAGE MONTHLY FLOWS
IN ALAMEDA CREEK BELOW SAN ANTONIO CREEK CONFLUENCE (NODE 6)
FOR EXISTING CONDITIONS, WITH-CDRP CONDITIONS, AND WITH-PROJECT CONDITIONS AS ESTIMATED FOR CEQA ANALYSIS PURPOSES
WY 1996 TO WY 2013 (cfs)

Scenario	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions	4.3	4.5	44.5	137.1	198.1	131.2	95.6	32.0	12.3	4.8	4.3	4.6
With-CDRP Conditions	7.0	8.9	35.9	110.4	202.2	98.3	76.1	20.2	11.6	9.4	8.2	9.0
With-project Conditions	3.0	5.0	32.6	118.7	205.7	152.9	80.3	13.7	5.1	3.4	3.0	3.0
Difference in flow between with-project condition and existing condition (With-project conditions minus existing conditions)	-1.3	0.5	-11.9	-18.4	7.6	21.7	-15.3	-18.3	-7.2	-1.4	-1.3	-1.6
Difference in flow between with project condition and with CDRP conditions (With-project Conditions minus with CDRP Conditions)	-4.0	-3.9	-3.3	8.3	3.5	54.6	4.2	-6.5	-6.5	-6.0	-5.2	-6.0

SOURCE SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted to include NPDES quarry discharges at Node 6 and loses between Node 6 and 7 by ESA/Orion.

Table HYD6-3 shows average monthly flows in Alameda Creek just downstream of the San Antonio Creek confluence for existing, with-CDRP conditions, and with-project conditions as used in the analysis for the CDRP's Biological Opinion. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry NPDES discharges are included under existing conditions but not in the other scenarios.

Comparison to With-CDRP Conditions

Table HYD6-2 compares average monthly flows in Alameda Creek at a location just downstream of the San Antonio Creek confluence for with-CDRP and with-project conditions. Average monthly flow under with-project conditions would be less than average monthly flow under with-CDRP conditions in eight months of the year. It would be greater than average monthly flow under with-CDRP conditions in November, February, March, and April. During the summer months, all of the water in this reach of the creek under both conditions would be a result of the estimated quarry NPDES discharges. Flow would be lower under with-project conditions in the summer months than under with-CDRP conditions because the volume of estimated NPDES discharge from the quarries would be less under with-project conditions than it is under with-CDRP conditions.

**TABLE HYD6-3
ESTIMATED AVERAGE MONTHLY FLOWS
IN ALAMEDA CREEK BELOW SAN ANTONIO CREEK CONFLUENCE (NODE 6)
FOR EXISTING CONDITIONS, WITH-CDRP CONDITIONS, AND WITH-PROJECT CONDITIONS AS USED IN THE ANALYSIS FOR THE CDRP'S BIOLOGICAL OPINION
WY 1996 TO WY 2013 (cfs)**

Scenario	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions	4.3	4.5	44.5	137.1	198.1	131.2	95.6	32.0	12.3	4.8	4.3	4.6
With-CDRP Conditions	0.0	2.6	28.9	101.2	192.5	87.1	64.4	9.3	1.5	0.1	0.0	0.0
With-project Conditions	0.0	2.6	29.8	115.3	201.6	148.4	75.5	9.5	1.5	0.1	0.0	0.0
Difference in flow between with-project condition and existing condition (With-project conditions minus existing conditions)	-4.3	-1.9	-14.7	-21.8	3.4	17.2	-20.1	-22.5	-10.9	-4.7	-4.3	-4.6
Difference in flow between with project condition and with CDRP conditions (With-project Conditions minus with CDRP Conditions)	0.0	0.0	0.9	14.1	9.1	61.3	11.1	0.1	0.0	0.0	0.0	0.0

Table HYD6-3 shows estimated monthly flows in Alameda Creek at Niles for with-CDRP and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry NPDES discharges are included under existing conditions but not in the other scenarios.

Summary of ACRP Effects on Streamflow

The SFPUC's operation of its Alameda System, and particularly its operation of Calaveras Reservoir, would differ under the four scenarios. The full storage capacity of the reservoir was available under pre-2001 conditions and will be again under with-CDRP and with-project conditions. Storage in the reservoir is limited under existing conditions. The need to make bypasses at the ACDD and releases from Calaveras Reservoir under with-CDRP and with-project conditions create a deficit in Calaveras Reservoir that did not exist under pre-2001 conditions. Recapture of some of the water bypassed and released under with-project conditions reduces the size of the deficit in Calaveras Reservoir and increases the frequency of spills from the reservoir. As a result, flows in Alameda Creek downstream of the Calaveras Creek confluence would be greater for with-project conditions than they are for the with-CDRP conditions.

Flow in Alameda Creek is altered downstream of the San Antonio Creek confluence by NPDES discharges from the aggregate quarries that are located near the confluence. Under with-CDRP conditions, the amount of water the quarry operators would have to manage would increase and therefore quarry NPDES discharges are estimated to increase compared to existing conditions.

Under with-project conditions, the SFPUC would pump water from Pit F2 for municipal use. The pumping by the SFPUC would substitute for part of the amount of water the quarry operators would have to manage. As a result, the average annual amount of water discharged to Alameda Creek under NPDES permits by the quarry operators under with-project conditions is estimated to be less than the average annual amount discharged under existing conditions.

Downstream of the quarries and just upstream of the Arroyo de la Laguna (Node 7), average annual flow volume in Alameda Creek would be about 6 percent less under with-project conditions than it is under existing conditions. It would be about 10 percent greater than it will be under with-CDRP conditions.

During the summer months, there is no streamflow in Alameda Creek under existing conditions at the San Antonio Creek confluence just upstream of the quarry discharge points. There will be no streamflow in the summer at this location under with-CDRP conditions nor would there be under with-project conditions. The only flow in Alameda Creek below the San Antonio Creek confluence and below the quarry discharges in the summer is that provided by the NPDES discharges from the quarries under their NPDES permits. Estimated quarry NPDES discharges under with-project conditions would be less voluminous than they are under existing conditions and are estimated to be less than they would be under with-CDRP conditions.

Notes for Section 6

1. It is difficult to precisely locate the base of the stream channel deposits when examining samples taken from boreholes so it was decided to rely on information from groundwater monitoring wells close to Pit F2. The water level in the monitoring wells has not fallen below elevation 224 feet during several years of monitoring so the base of the permeable stream channel deposits are assumed to be at that elevation. For more information, see Appendix HYD2.
2. The other quarry operator, ODS, also discharges water from the quarries it manages to Alameda Creek under NPDES permits. ODS’s past discharge volume has been small compared to the Hanson Aggregates’ discharge volume and water management changes at ODS’ quarries has further reduced their NPDES discharge volume. For these reasons, ODS discharges were not included in the estimates of future discharges to Alameda Creek by the quarries.

7. Implications of ACRP-Caused Surface Water Hydrology Changes for Biological Resources

Hydrologic conditions under existing conditions and with-CDRP conditions are described in detail in Section 5, Alameda Creek Surface Water Hydrology. The changes in hydrologic conditions attributable to the ACRP are described above in Section 6, Effects of ACRP on Surface Water Hydrology. This section describes the implications of ACRP-caused hydrologic changes on fish, terrestrial wildlife, and riparian vegetation.

7.1 Fish

A number of fish species exist in Alameda Creek including migratory species. This section describes the relationship between fish habitat and surface water flow in Alameda Creek under existing, with-CDRP and with-project conditions.

7.1.1 Existing Conditions

Alameda Creek and its tributaries provide habitat for a diverse assemblage of native and non-native fishes. A total of 14 native and at least 13 non-native species have been observed in non-tidal reaches of the Alameda Creek watershed during the past century. Several other species may have also occurred in the watershed based on collections from tidal portions of the creek, evidence from archeological investigations, and other accounts (1) (2). Anadromous species including steelhead (*Oncorhynchus mykiss*) are excluded from most of the watershed by passage barriers in the lower catchment, most notably by the Bay Area Rapid Transit (BART) weir (3).

Fish habitat is extremely limited between the Welch Creek confluence and the Arroyo de la Laguna confluence because there is little flowing water in this reach for much of the year and the physical habitat is heavily altered and degraded. Some native and non-native warm water fish survive in isolated pools that form within the Alameda Creek channel during the dry season. The pools extend from just upstream of the I-680 bridge to just upstream of the Arroyo de la Laguna confluence. The fish populations inhabiting the pools appear to be dominated by non-native species that compete and prey on native species and are of little conservation concern. Consequently, the pools are not described in this section, but they are discussed in Section 7.2, because any changes to the pools could affect terrestrial wildlife, and in particular special status amphibians.

7.1.2 With-CDRP Conditions

Under with-CDRP conditions, the CDRP will be completed and placed into operation and releases and bypasses will be made at Calaveras Reservoir and the Alameda Creek Diversion Dam in accordance with instream flow schedules shown in Table HYD5-6 and described in the text in Section 5.2.3. To be conservative, the EIR impact analysis also assumes that human-made barriers to anadromous steelhead migration will be removed or other measures taken to enable fish migration.

Due to limiting factors, specifically warm water temperatures, steelhead are not expected to spawn or rear within the reaches of Alameda Creek between the Welch Creek confluence and the Arroyo de la Laguna confluence, but would be expected to migrate through this area during winter spawning migrations and late spring out-migrations.

Flow in the reaches of Alameda Creek between the Welch Creek and Arroyo de la Laguna confluences under with-project conditions will differ from flow under existing conditions. The pattern of daily flows will be altered by operation of the CDRP and implementation of the instream flow schedules as shown in Figures HYD6-3, HYD6-4, and HYD6-5. The figures are flow duration curves constructed from daily flows estimated using the ASDHM for locations just downstream of the Welch Creek confluence (Node 4), just upstream of the San Antonio Creek (Node 5), and just upstream of the Arroyo de la Laguna (Node 7). The flow duration curves for Nodes 4 and 5 are not affected by discharges of water from the quarries under their NPDES permits; the flow duration curves for Node 7 are affected by the quarry NPDES discharges and losses between San Antonio Creek and Arroyo de la Laguna.

The three figures show that under with-CDRP conditions the frequency of flows greater than about 60 cfs will decrease compared to the existing condition and the frequency of flows less than about 60 cfs will increase. As shown in Figure HYD6-3, flow at the Welch Creek confluence will always be greater than 5 cfs under with-CDRP condition; under existing conditions it is less than one cfs on about 40 percent of the days. The reasons for the increase in frequency of small flows are the releases from Calaveras Reservoir and the bypasses at the Alameda Creek Diversion Dam, in accordance with the instream flow schedules. The reason for the decrease in frequency of large flows is the increased availability of storage in Calaveras Reservoir under with-CDRP conditions, which will enable the SFPUC to divert more water from Alameda Creek than it does under existing conditions.

The fact that flow between the Calaveras Creek and Welch Creek confluences will always be greater than 5 cfs under with-CDRP conditions will benefit over-summering steelhead as a result of both the flow increase itself and reduced water temperature. Steelhead habitat in this reach of the creek under existing conditions suffers from inadequate flow and high water temperature.

Tables HYD5-7, HYD5-8 and HYD5-9 show annual flow volumes in Alameda Creek at three locations between the Welch Creek and Arroyo de la Laguna confluences for with-CDRP and existing conditions. Estimated average annual flow volume under with-CDRP conditions below the Welch Creek confluence (Node 4) is 8 percent less than it is under existing conditions. Estimated average annual flow volume under with-CDRP conditions above the San Antonio Creek confluence (Node 5) is 21 percent less than it is under existing conditions. Estimated average annual flow volume under with-CDRP conditions above the Arroyo de la Laguna confluence (Node 7) is about 13 percent less than it is under existing conditions. The reasons for the decreases in flow under with-CDRP conditions compared to existing conditions is because the flow-increasing effects of the bypasses and releases is more than offset by the flow-decreasing effects of restoration of storage in Calaveras Reservoir.

During the drier months, released and bypassed water from Calaveras Reservoir and the Alameda Creek Diversion Dam will largely percolate into the ground between the Welch Creek and San Antonio Creek confluences. Downstream of the San Antonio Creek confluence, NPDES discharges from the quarries contribute water to Alameda Creek and maintain several permanent pools in the creek channel during the drier months. The quarry NPDES discharges are very variable in volume and timing and depend on quarry operations. Under with-CDRP conditions, the volume of water that the quarry operators will need to manage will increase and therefore NPDES discharges from the quarries will increase by an average of several thousand acre-feet per year compared to existing conditions, and this increase is accounted for in the daily flow-duration curve for Node 7 in Figure HYD6-5 and the average annual flow volumes for Node 7 in Table HYD5-9.

7.1.3 With-project Conditions

The proposed ACRP would affect flow in Alameda Creek downstream of the Calaveras Creek confluence. Flow in the reach of the creek between the Calaveras Creek confluence and San Francisco Bay would be affected by changes in operations of the SFPUC's Alameda System, and particularly of Calaveras Reservoir. Operation of the Alameda System for with-CDRP conditions will be different from operations under with-project conditions because under with-project conditions, a portion of summertime municipal water demand would be met with water from the ACRP (i.e., water accumulated in Pit F2). As a result, average annual flows under with-project conditions would be greater than they will be under with-CDRP conditions. However, as depicted by the flow duration curves for Alameda Creek below the Welch Creek confluence (Figure HYD6-3 for Node 4) and above the San Antonio Creek confluence (Figure HYD6-4 for Node 5), most of the time flows in Alameda Creek between the Calaveras Creek and San Antonio Creek confluences would be the same for the two conditions. The frequency of flows of 60 cfs or less would be the same for with-project and with-CDRP conditions. Flows in the range 60 to 1,000 cfs would be more frequent under with-project conditions than they will be under with-CDRP conditions.

The differences in flows described above are the result of differences in operation of Calaveras Reservoir under with-project and with CDRP conditions. Downstream of the quarry NPDES discharge point, the ACRP could further affect flow in Alameda Creek. There are two ways that this might occur: if ACRP operations in Pit F2 led to a rapid increase in seepage into the pit, which would reduce peak flows in the creek; and if ACRP operations resulted in a reduction in quarry NPDES discharges, which, in combination with other flow changes caused by the ACRP, would reduce peak flows in the creek.

The first possibility was examined by monitoring water surface elevations in Pit F2 during a large storm that occurred in December 2012 after a long dry period, as described in Section 6.2.1. To summarize, flow in the creek peaked at 733 cfs and 1,769 acre-feet of water passed by the quarries during the storm. There was almost no change in the water surface elevation in Pit F2 indicating that there was almost no change in the seepage rate into the pit during the storm. At the time of the storm, the water surface elevation in Pit F2 was close to the lower end of the ACRP's planned operating range. Therefore, it is clear that operation of the ACRP will not increase seepage rates enough to have any effect on high flows in Alameda Creek that are needed to facilitate fish migration.

With respect to the second possibility, assuming no other factor causes changes in estimated NPDES discharges, the ACRP would result in a reduction in NPDES discharges from the quarries as shown in HYD4-2. The reduction in NPDES discharges from the quarries, the changes in operations at Calaveras Reservoir associated with the ACRP, and the losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences, are reflected in the flow duration curve for Alameda Creek above its confluence with the arroyo and shown in Figure HYD6-5. The higher flows in the figure are those needed to facilitate fish migration. Daily flows would exceed 60 cfs on about 14 percent of the days under existing, with-CDRP and with-project conditions. Daily flows under with-project conditions would exceed 100 cfs on about 8 percent of the days; corresponding values for existing and with-CDRP conditions are about 10 percent and about 7 percent of the days. Daily flows would exceed 500 cfs under with-project and with-CDRP conditions on about 2 percent of the days; the corresponding value for existing conditions is about 3 percent of the days. The frequency of flows between 60 cfs and 500 cfs would increase slightly under with-project conditions compared to with-CDRP conditions. This probably would have no effect on fish migration but if it had an effect it would be modestly beneficial.

Just as they do under existing conditions, the quarry NPDES discharges under with-project conditions would be expected to have an erratic effect on flow in Alameda Creek between the San Antonio Creek and Arroyo de la Laguna confluences. Although the average annual NPDES discharges under with-project conditions are estimated to be about two-thirds of those under existing conditions, their timing and daily volume would be variable and would depend on quarry operations. Table HYD3-2 shows historical NPDES discharges by Hanson Aggregates to Alameda Creek. There is no obvious seasonal pattern to Hanson Aggregates' NPDES discharges to the creek. Hanson Aggregates' highest volumetric NPDES discharge in the second quarter between 2002 and 2010 was 1,317 acre-feet, which is equivalent to a continuous discharge of about 7.4 cfs. Because the Hanson Aggregates discharges most of its excess water at night the actual discharge rate would be higher, perhaps in the range of 10 to 15 cfs. Although this is a sufficient amount of water to theoretically affect migration flows in the quarry reach, it probably has little actual effect on migration flows for two reasons: the discharge is discontinuous, starting and stopping in the course of a day; and it only affects the portion of the quarry reach below the NPDES discharge point downstream of the San Antonio Creek confluence as this flow is eventually lost in the reach between San Antonio Creek and Arroyo de la Laguna Creek.

7.2 Terrestrial Wildlife

Terrestrial wildlife species are present in a reach of Alameda Creek that could be affected by changes in surface and subsurface hydrology attributable to the proposed ACRP. The wildlife species are associated with a series of pools within the Alameda Creek channel that are shown in **Figure HYD7-1**.

Table HYD7-1 is a summary description of hydrologic and riparian conditions in the Alameda Creek channel between Pit F2 and the Arroyo de la Laguna under existing, with-CDRP and with-project conditions for each of the subreaches identified in Figure HYD7-1. Separate descriptions are provided for surface water conditions, subsurface water conditions, instream wetlands and woody riparian vegetation. The evaluation of surface water conditions was made by ESA/Orion and the evaluation of subsurface water conditions was made by Luhdorff & Scalmanini. The probable effects of the surface and subsurface flow changes on the pools within the Alameda Creek channel were made jointly by ESA/Orion and Luhdorff & Scalmanini. The probable effects of the changes in surface and subsurface flow on biological resources were made by ESA/Orion biologists.

This section provides information on those aspects of Alameda Creek's surface water hydrology that affect terrestrial wildlife habitat under existing, with-CDRP and with-project conditions. Information on those aspects of subsurface water hydrology that affect terrestrial wildlife habitat is contained in Appendix HYD2.

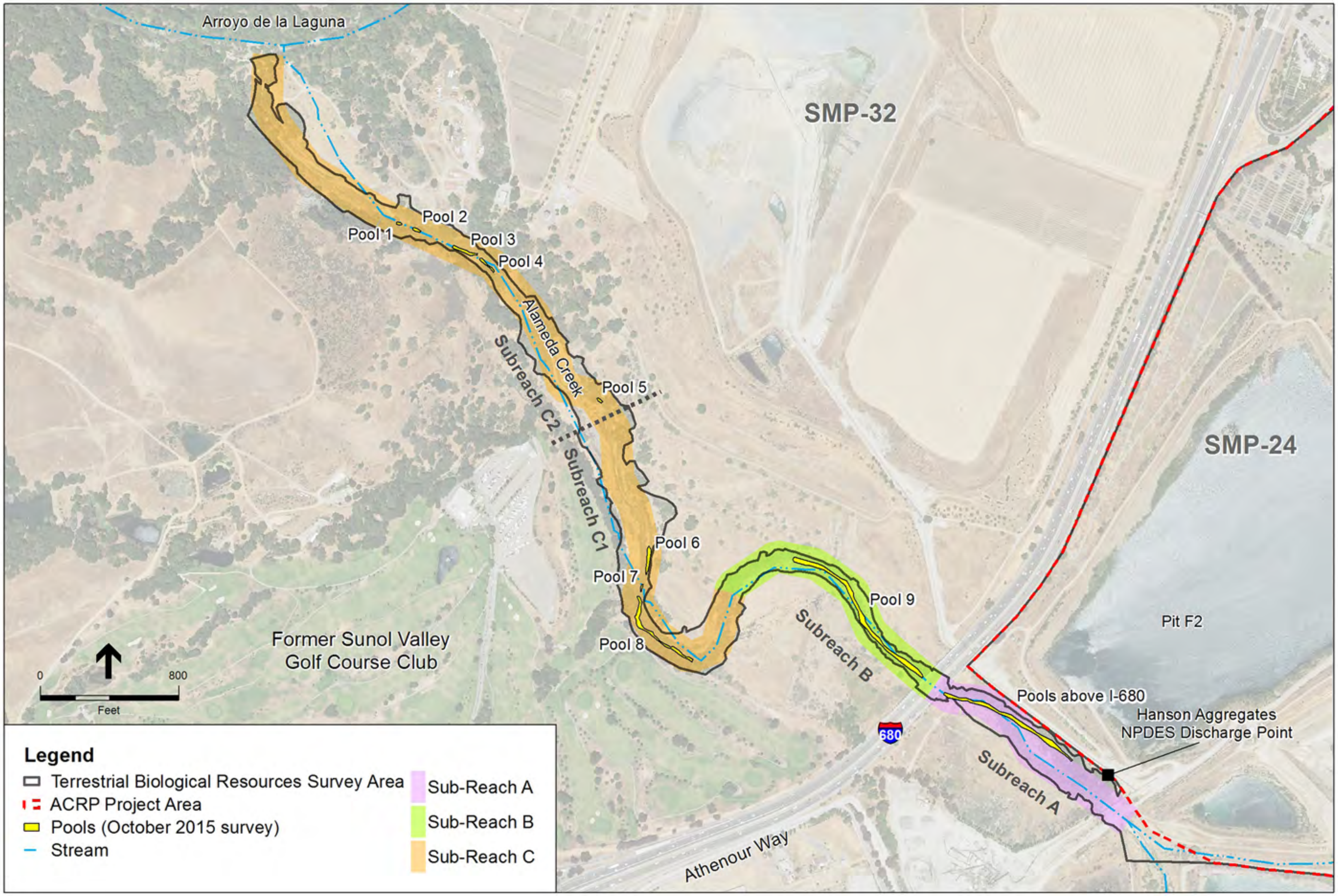
7.2.1 Existing Conditions

There are a number of isolated pools that form within the Alameda Creek channel during the dry season between Pit F2 and the creek's confluence with the Arroyo de la Laguna. The pools are a consequence of current hydrologic conditions in Alameda Creek including the NPDES discharges from the quarries which occur just upstream of the pools. The pools provide habitat for amphibians, including the federally-listed California red-legged frog (4).

The pools are shown in Figure HYD7-1 and were plotted based on a survey made in October 15, 2015. There was no significant streamflow in this reach of Alameda Creek for many months before the survey and so the inflow needed to maintain these ponds is presumed to be from a combination of NPDES discharges from the quarries and emerging subsurface flow. These processes are described in greater depth in Appendix HYD2.

7.2.2 With-CDRP Conditions

As described in Table HYD7-1, the pools within the Alameda Creek channel that support amphibians are supplied with water by a combination of NPDES discharges of surface water from the quarries and subsurface water emerging from the ground. A change in the rate of NPDES discharge of water by the quarries or a change in the rate of emergence of water from the subsurface would alter the water supply to the pools. As a result, the attributes of the pools could change, which could in turn affect habitat for amphibians. Completion and commissioning of the CDRP could affect both the volume of water discharged by the quarries and subsurface water flow in the vicinity of the quarries.



SOURCE: ESA

SFPUC Alameda Creek Recapture Project

Figure HYD 7-1

Pools in Alameda Creek channel observed in October 2015

TABLE HYD7-1
SUMMARY OF HYDROLOGICAL AND RIPARIAN CONDITIONS ALONG ALAMEDA CREEK SUBREACHES A, B, AND C UNDER EXISTING, WITH-CDRP, AND WITH-PROJECT CONDITIONS
(See Figure HYD7-1 for Location of Subreaches)

Location	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Subreach A	**Surface Water**. Surface water conditions in this reach are represented by Node 6 in the ASDHM. Average annual flow volume at Node 6 = 40,100 acre-feet per year, including quarry NPDES discharges. Live stream in wet months. Average total flow volume over the 18-year study period of 834 acre-feet (min: 21 acre-feet, max: 1,534 acre-feet) in dry-season 3-month period of July, August and September, entirely attributable to quarry NPDES discharges.	**Surface Water**. Average annual flow at Node 6 = 35,422 acre-feet per year, including quarry NPDES discharges. Live stream in wet months. Average ASDHM total flow volume over the 18-year study period of 1,618 acre-feet (min: 61 acre-feet, max: 3,667 acre-feet) in dry-season 3-month period of July, August and September, entirely attributable to quarry NPDES discharges.	**Surface Water**. Average annual flow volume at Node 6 = 37,207 acre-feet per year, including quarry NPDES discharges. Live stream in wet months. Average ASDHM flow volume over the 18-year study period of 576 acre-feet (min: 112 acre-feet, max: 1,660 acre-feet) in dry-season 3-month period of July, August and September, entirely attributable to quarry NPDES discharges.
	Subsurface Water. Subsurface water conditions in this reach are represented by measurements in MW5. Subsurface water levels at MW5 have varied seasonally from at or above the projected creek thalweg[2] elevation of 242 feet elevation in the winter and spring to 223 feet at the end of the dry season in the fall. Altered water management by ODS since 2012 has raised minimum elevations in the fall from 223 feet to about 230 feet. Subsurface water elevations fluctuate within the observed range as a function of hydrology and mining activities, including timing and duration of precipitation through spring, timing and magnitude of dewatering activities by mining operators, and in recent years, water management practices such as by ODS.	**Subsurface Water**. Subsurface water levels at MW5 will vary seasonally from at or above the thalweg elevation of 242 feet in the winter and spring to 230 feet at the end of the dry season in the fall.[1] Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology and mining activities.	**Subsurface Water**. Subsurface water levels at MW5 would vary seasonally from at or above the thalweg elevation of 242 feet in the winter and spring to 230 feet at the end of the dry season in the fall.[1] Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology, mining activities, and variations in ACRP operations.
	Pools. Live stream through pools in wet months. Pools persist through dry months.	**Pools.** Live stream through pools in wet months. Pools persist longer in dry months. Pools will be larger in the dry months than under existing conditions due to greater quarry NPDES discharges.	**Pools.** Live stream through pools in the wet months. Pools persist in dry months. Pools would be smaller and possibly dry out in the dry season compared to with-CDRP conditions and somewhat smaller in the dry season compared to existing conditions due to ACRP recapture and projected smaller quarry discharges. In some years, about one in three of the hydrologic base period, ACRP would have limited operations leading to a wetter condition. The range from dry to wetter conditions as a function of ACRP operations would produce pooling that is consistent with variability seen under existing conditions.

2 Thalweg is the path of a line connecting the lowest points of cross-sections along a streambed.

TABLE HYD7-1 (Continued)
SUMMARY OF HYDROLOGICAL AND RIPARIAN CONDITIONS ALONG ALAMEDA CREEK SUBREACHES A, B, AND C UNDER EXISTING, WITH-CDRP, AND WITH-PROJECT CONDITIONS
(See Figure HYD7-1 for Location of Subreaches)

Location	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Subreach A (cont.)	**Instream Wetlands.** Instream wetlands are of two types**: perennial instream wetlands** occupy margins of more or less permanent pools and other perennial reaches of the creek. Perennial instream wetlands are the result of the combination of surface and subsurface flows. In Subreach A, perennial instream wetlands exist only because of the additional contribution of quarry NPDES discharges and would not exist due to surface flows alone. **Seasonal instream wetlands** occupy the periphery of pools, isolated seasonal pools within the floodplain, and other low areas subject to seasonal saturation or inundation from surface flows or groundwater seepage, generally drying in the dry season.	**Instream Wetlands.** The extent of instream perennial wetlands around the margins of permanent pools and other perennial reaches of the creek could increase compared to existing conditions because of increased CDRP releases, potentially replacing seasonal wetlands in these areas. The extent of isolated seasonal pools and the instream seasonal wetlands they support would not change substantially from existing conditions because the seasonal pattern of groundwater elevations would not change substantially due to instream flow schedules.	**Instream Wetlands.** The extent of instream perennial wetlands around the margins of permanent pools and other perennial reaches of the creek could decrease compared to with-CDRP and existing conditions, although seasonal wetlands may replace areas supporting perennial wetlands to some extent. The extent of isolated seasonal pools and the seasonal wetlands they support would not change substantially from with-CDRP or existing conditions. No net loss of wetlands expected, although the proportion (seasonal vs. perennial) could vary slightly.
	Woody Riparian Vegetation. Tree-supporting riparian alliances (including willow thicket and riparian forest alliances) and dense mulefat thicket are found in areas along the low-flow channel. Dense vegetative growth depends on consistent access to surface or shallow groundwater supplied by quarry NPDES discharges, especially during the dry summer months. Sparse mulefat thicket alliance is found in the floodplain away from the low-flow channel.	**Woody Riparian Vegetation.** Tree-supporting riparian alliances could increase compared to existing conditions due to increased dry-season flows attributable to increased quarry NPDES discharges. Extent of mulefat thicket would not change except that some might be replaced by tree-supporting alliances. Density of mulefat could increase along the low-flow channel.	**Woody Riparian Vegetation.** Tree-supporting riparian alliances could decrease compared to existing and with-CDRP conditions due to reduction in dry-season quarry NPDES discharges. Mulefat thicket alliance could replace tree-supporting alliances and mulefat density could decrease in some areas.
Subreach B	**Surface Water.** Live flow in wet months. Average ASDHM annual flow volume lower than at Node 6 (40,100 acre-feet per year) in Subreach A due to seepage losses to groundwater. Lower total dry-season flow volume in July, August and September in Subreach B than at Node 6 for the same reason. Dry-season flow and pooling attributable to quarry NPDES discharges.	**Surface Water.** Live flow in wet months. Average ASDHM annual flow volume lower than at Node 6 (at 35,422 acre-feet per year) in Subreach A due to seepage losses to groundwater. Lower total dry-season flow volume in July, August and September than at Node 6 for the same reason. Greater dry-season flow compared to existing conditions due to expected increased quarry NPDES discharges.	**Surface Water.** Live flow in wet months. Average ASDHM annual flow volume lower than at Node 6 (at 37,207 acre-feet per year) in Subreach A due to seepage losses to groundwater. Lower total flow volume in July, August and September than at Node 6 for the same reason. Lower dry-season flow volume compared to existing or with-CDRP conditions because of expected reduced dry season quarry NPDES discharges.
	Subsurface Water. Subsurface water conditions in this reach are represented by measurements in MW6. Subsurface water levels at MW6 have varied seasonally from at or above the projected creek thalweg elevation of 236 feet elevation in the winter and spring to 221 feet in the fall. Altered water management by ODS since 2012 has raised minimum elevations to about 227 feet.	**Subsurface Water**. Subsurface water levels at MW6 will vary seasonally from the thalweg elevation of 236 feet in the winter and spring to 227 feet in the fall.[1] Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology and mining activities.	**Subsurface Water**. Subsurface water levels at MW6 would vary seasonally from as high as the thalweg elevation of 236 feet in the winter and spring to 227 feet in the fall.[1] Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology, mining activities, and variations in ACRP operations.

TABLE HYD7-1 (Continued)
SUMMARY OF HYDROLOGICAL AND RIPARIAN CONDITIONS ALONG ALAMEDA CREEK SUBREACHES A, B, AND C UNDER EXISTING, WITH-CDRP, AND WITH-PROJECT CONDITIONS
(See Figure HYD7-1 for Location of Subreaches)

Location	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Subreach B (cont.)	**Pools**. Live stream through pools in wet months. Pools persist through dry months.	**Pools**. Live stream through pools in wet months. Pools persist longer in dry months. Pools will be larger than under existing conditions due to greater quarry discharges and greater subsurface flow.	**Pools**. Live stream through pools in wet months. Pools persist in dry months. Pools would be smaller and possibly dry out in the dry season compared to with-CDRP conditions and somewhat smaller in the dry season compared to existing conditions due to ACRP recapture and projected smaller quarry discharges. In some years, about one in three of the hydrologic base period, ACRP would have limited operations leading to a wetter condition. The range from dry to wetter conditions as a function of ACRP operations would produce pooling that is consistent with variability seen under existing conditions.
	Instream Wetlands. Instream perennial wetlands occupy margins of permanent pools and other perennial reaches of the creek. Instream seasonal wetlands occupy the periphery of permanent pools, isolated seasonal pools within the floodplain, and other low areas subject to seasonal saturation or inundation from surface flows or groundwater seepage, generally drying in the dry season.	**Instream Wetlands.** The extent of instream perennial wetlands around the margins of permanent pools and other perennial reaches of the creek could increase compared to existing conditions. The extent of seasonal pools and the instream seasonal wetlands they support will not change substantially from existing conditions.	**Instream Wetlands.** The extent of instream perennial wetlands could decrease compared to with-CDRP and existing conditions, although instream seasonal wetlands may replace areas supporting perennial wetlands somewhat. The extent of isolated seasonal pools and the instream seasonal wetlands they support would not change substantially from with-CDRP or existing conditions. No net loss of wetlands expected, although the proportion (seasonal vs. perennial) could vary slightly.
	Woody Riparian Vegetation. Tree-supporting willow and riparian forest alliances and dense mulefat thickets found in areas along the low-flow channel. Dense growth depends on consistent access to surface or shallow groundwater supplied by quarry NPDES discharges, especially during the dry summer months. Sparse mulefat thicket alliance found in the floodplain away from the low-flow channel.	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances could increase compared to existing conditions due to increased dry-season quarry NPDES discharges. Extent of mulefat thicket alliance would not change except that a small amount might be replaced by tree-supporting riparian vegetation because of increased dry-season flows.	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances could decrease compared to existing and with-CDRP conditions due to reduction in dry-season quarry NPDES discharges. Mulefat thicket could replace tree-supporting alliances.
Subreach C1	**Surface Water.** Live flow in wet months. Average annual flow volume lower than at Node 6 (40,100 acre-feet per year) and in Subreach B due to seepage losses to groundwater. Lower total flow volume in dry-season July, August and September than at Node 6 and in Subreach B for the same reason. Dry-season flow and pooling attributable to quarry NPDES discharges.	**Surface Water.** Live flow in wet months. Average annual flow volume lower than at Node 6 (35,422 acre-feet per year) and in Subreach B due to seepage losses to groundwater. Lower total flow volume in dry-season July, August and September than at Node 6 and in Subreach B for the same reason. Greater dry-season flows compared to existing conditions due to increased quarry NPDES discharges.	**Surface Water.** Live flow in wet months. Average annual flow volume lower than at Node 6 (37,207 acre-feet per year) and in Subreach B due to seepage losses to groundwater. Lower total flow volume in July, August and September than at Node 6 and in Subreach B for the same reason. Lower dry-season flow volume compared to existing or with-CDRP conditions because of reduced dry-season quarry NPDES discharges.

TABLE HYD7-1 (Continued)
SUMMARY OF HYDROLOGICAL AND RIPARIAN CONDITIONS ALONG ALAMEDA CREEK SUBREACHES A, B, AND C UNDER EXISTING, WITH-CDRP, AND WITH-PROJECT CONDITIONS
(See Figure HYD7-1 for Location of Subreaches)

Location	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Subreach C1 (cont.)	**Subsurface Water.** Subsurface water conditions in the downstream portion of this subreach are represented by measurements in MW8. Groundwater levels at MW8 have varied seasonally within a narrow range from at or above the projected creek thalweg elevation of 224 feet in the winter and spring to 220 feet in the fall. In the absence of a monitoring well in the upstream portion of this reach, using the aquifer profile, it can be inferred that the subsurface water in the upstream portion of this subreach would fluctuate similar to Subreach B and the downstream portion similar to Subreach C2. Streambed gravels are thin and the aquifer has less storage capacity than in upstream reaches.	**Subsurface Water**. Subsurface water levels at MW8 will vary seasonally from at or above the thalweg elevation of 224 feet in the winter and spring to 220 feet in the fall. Subsurface water levels in average years could be comparable to subsurface water levels in wetter years under existing conditions. Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology and mining activities.	**Subsurface Water**. Subsurface water levels at MW8 would vary seasonally from at or above the thalweg elevation of 224 feet in the winter and spring to 220 feet in the fall. Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology, mining activities, and variations in ACRP operations.
	Pools. Live stream through pools in wet months. Pools probably persist through dry months. Water-bearing streambed gravels are thin and the pools may extend to their base.	**Pools.** Live stream through pools in wet months. Pools persist in dry months. Pools could be larger than under existing conditions due to greater quarry discharges and greater subsurface flow. Live flow may persist longer through pools in dry months.	**Pools**. Live stream through pools in wet months. Pools persist in dry months. Pools would be smaller and possibly dry out in the dry season compared to with-CDRP conditions and somewhat smaller in the dry season compared to existing conditions due to ACRP recapture and smaller quarry discharges ACRP recapture and projected smaller quarry discharges. In some years, about one in three of the hydrologic base period, ACRP would have limited operations leading to a wetter condition. The range from dry to wetter conditions as a function of ACRP operations would produce pooling that is consistent with variability seen under existing conditions.
	Instream Wetlands. Instream perennial wetlands occupy margins of permanent pools and other perennial reaches of the creek. Instream seasonal wetlands occupy the periphery of permanent pools, isolated seasonal pools within the floodplain, and other low areas subject to seasonal saturation or inundation from surface flows or groundwater seepage, generally drying in the dry season.	**Instream Wetlands.** The extent of instream perennial wetlands around the margins of permanent pools and other perennial reaches of the creek could increase compared to existing conditions. The extent of seasonal pools and the instream seasonal wetlands they support will not change substantially from existing conditions.	**Instream Wetlands.** The extent of instream perennial wetlands around the margins of permanent pools and other perennial reaches of the creek could decrease compared to with-CDRP and existing conditions. Instream seasonal wetlands may replace areas supporting instream perennial wetlands to some extent. Other than this small effect, the extent of seasonal pools and the instream seasonal wetlands they support would not change substantially from with-CDRP or existing conditions. No net loss of wetlands expected, although the proportion (seasonal vs. perennial) could vary slightly.

TABLE HYD7-1 (Continued)
SUMMARY OF HYDROLOGICAL AND RIPARIAN CONDITIONS ALONG ALAMEDA CREEK SUBREACHES A, B, AND C UNDER EXISTING, WITH-CDRP, AND WITH-PROJECT CONDITIONS
(See Figure HYD7-1 for Location of Subreaches)

Location	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Subreach C1 (cont.)	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances, and dense mulefat thickets found along the low-flow channel. Dense growth depends on consistent access to surface or shallow groundwater supplied by quarry NPDES discharges, especially during the dry summer months. Sparse mulefat thicket alliance found in the floodplain away from the low-flow channel.	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances could increase compared to existing conditions due to increased dry-season quarry NPDES discharges. Extent of mulefat thicket would not change except that some might be replaced by dense woody riparian vegetation because of increased dry-season flows.	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances could decrease compared to existing and with-CDRP conditions due to reduction in dry-season quarry NPDES discharges. Mulefat thicket alliance could replace tree-supporting alliances.
Subreach C2	**Surface Water.** Surface water conditions in this reach are represented by Node 7 in the ASDHM. Average annual flow volume at Node 7 = 38,274 acre-feet per year, about 5 percent lower than at Node 6. Average total flow volume over the 18-year study period of 16 acre-feet (min: 0 acre-feet, max: 275 acre-feet) in dry-season 3-month period of July, August and September, entirely attributable to quarry NPDES discharges.	**Surface Water.** Average ASDHM annual flow volume at Node 7 = 32,752 acre-feet per year, about 8 percent lower than at Node 6. Average ASDHM total flow volume over the 18-year study period of 476 acre-feet (min: 0 acre-feet, max: 2,301 acre-feet) in dry-season 3-month period of July, August and September, entirely attributable to quarry NPDES discharges.	**Surface Water.** Average ASDHM annual flow at Node 7 = 35,934 acre-feet per year, about 3 percent lower than at Node 6. Average ASDHM total flow volume over the 18-year study period of 39 acre-feet (min: 0 acre-feet, max: 356 acre-feet) in dry-season 3-month period of July, August and September, entirely attributable to quarry NPDES discharges.
	Subsurface Water. Subsurface water conditions in this reach are represented by measurements in MW10. Subsurface water levels at MW10 have varied seasonally within a narrow range from at or above the projected creek thalweg elevation of 215 feet in the winter and spring to 211 feet in the fall. Streambed gravels are thin and the aquifer has less storage capacity than in upstream reaches. Groundwater elevations higher than 215 feet may occasionally occur as a result of inundation from nearby Arroyo de la Laguna.	**Subsurface Water.** Subsurface water levels at MW10 will vary seasonally from 215 feet in the winter and spring to 211 feet in the fall. Subsurface water levels in average years could be comparable to ground water levels in wetter years under existing conditions. Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology and mining activities.	**Subsurface Water.** Subsurface water levels at MW10 will vary seasonally from 215 feet in the winter and spring to 211 feet in the fall. Little change from existing conditions due to the limited aquifer thickness. Fluctuations will occur within this range and will resemble existing conditions as a function of hydrology, mining activities, and variations in ACRP operations.
	Pools. Live stream through pools in wet months. Pools may persist through dry months as permeable streambed gravels are thin.	**Pools.** Live stream through pools in wet months. Pools will persist through dry months. Extent of pools in average years will be similar to extent of pools in wetter years under existing conditions.	**Pools.** Live stream through pools in wet months. Pools may persist through dry months. Little change from existing conditions.
	Instream Wetlands. Instream perennial wetlands occupy margins of permanent pools and other perennial reaches of the creek. Instream seasonal wetlands occupy isolated seasonal pools within the floodplain and other low areas subject to seasonal saturation or inundation from surface flows or groundwater seepage, generally drying in the dry season.	**Instream Wetlands**. Slight increases in groundwater water levels may more consistently support instream perennial wetlands. The extent of seasonal pools and the instream wetlands they support will not change substantially from existing conditions.	**Instream Wetlands**. Little change from with-CDRP and existing conditions.

TABLE HYD7-1 (Continued)
SUMMARY OF HYDROLOGICAL AND RIPARIAN CONDITIONS ALONG ALAMEDA CREEK SUBREACHES A, B, AND C UNDER EXISTING, WITH-CDRP, AND WITH-PROJECT CONDITIONS
(See Figure HYD7-1 for Location of Subreaches)

Location	Existing Conditions	With-CDRP Conditions	With-Project Conditions
Subreach C2 (cont.)	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances dominate most of this Subreach. Dense growth depends primarily on consistent access to shallow groundwater rather than from quarry NPDES discharges. Sparse mulefat thickets found in the floodplain in the upstream portion of subreach.	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances expected to change little if at all because increased dry-season flows are likely to simply flow through the shallow stream channel gravels. Most of this subreach already contains tree-supporting alliances.	**Woody Riparian Vegetation.** Tree-supporting willow and riparian forest alliances expected to change little if at all compared to with-CDRP and existing. Increased dry-season flows with-CDRP are likely to simply flow through the shallow stream channel gravels. With-project dry-season flows are nearly the same as existing. Most of this subreach already contains tree-supporting alliances.

NOTES: See Appendix HYD1 for details and further explanation of surface water conditions, and see Appendix HYD2 for details and further explanation of subsurface and ground water conditions.

[1] Future scenarios assume that water management changes made by ODS in 2012 will continue in the future.

SOURCE: ESA, LSCE, and Orion, 2016

Under with-CDRP conditions, the NPDES discharges from the quarries are estimated to average 6,620 acre-feet per year as compared to 3,436 acre-feet per year under existing conditions (see Section 4, Analytical Methods, for more information). Because the volume of water discharged by the quarries under with-CDRP conditions is estimated to be greater than under existing conditions, the pools in the creek channel could increase in size. However, the increase in size is likely to be theoretical rather than real because the proposed ACRP would be commissioned soon after the CDRP (within one year). The proposed ACRP would likely cause a reduction in NPDES discharges from the quarries compared to existing conditions, as described below.

7.2.3 With-Project Conditions

As described in Table HYD7-1, the pools in the Alameda Creek channel that support amphibians receive their water from the quarry NPDES discharges and water emerging from the subsurface. If the ACRP resulted in a change in the volume of the quarry NPDES discharges or a change in the amount of subsurface water moving north in the Sunol Valley, it could alter habitat for amphibians.

As noted earlier, the NPDES discharges from the quarries are expected to average 6,620 acre-feet per year under with-CDRP conditions as compared to _3,436 acre-feet per year under existing conditions. When the proposed ACRP is in operation, the SFPUC would pump an average of 7,178 acre-feet per year from Pit F2 for municipal use. Under with-project conditions, the volume of water discharged from the quarries is estimated to average 2,532 acre-feet, about 74 percent of its value under existing conditions. Thus, the surface water supply to the pools in the creek channel under with-project conditions would be reduced compared to existing conditions. The reduced surface water supply to the pools as a result of the ACRP, would be expected to result in some reduction in size of the pools during dry months as compared to existing conditions.

7.3 Riparian Vegetation

Riparian vegetation is present in a reach of Alameda Creek that could be affected by changes in surface and subsurface hydrology attributable to the proposed ACRP. The riparian vegetation includes woody riparian vegetation and instream wetland vegetation.

Table HYD7-1 is a summary description of hydrologic and riparian conditions in the Alameda Creek channel between Pit F2 and the Arroyo de la Laguna under existing, with-CDRP and with-project conditions for each of the subreaches identified in Figure HYD7-1. Separate descriptions are provided for surface water conditions, subsurface water conditions, instream wetlands and woody riparian vegetation.

This section provides information on those aspects of Alameda Creek's surface water hydrology that affect riparian vegetation habitat under existing, with-CDRP, and with-project conditions. Information on those aspects of subsurface water hydrology that affect riparian vegetation is contained in Appendix HYD2.

7.3.1 Existing Conditions

Most of the Alameda Creek channel from the San Antonio Creek confluence to the Arroyo de la Laguna confluence is currently covered with riparian shrubs and trees. Emergent wetland vegetation exists around the pools shown in Figure HYD7-1 and elsewhere in the creek channel. During the dry season when there is no surface water flow in Alameda Creek at the San Antonio Creek confluence, the riparian vegetation is probably sustained by a combination of water discharged from the quarries under their NPDES discharge permit and groundwater. Riparian vegetation upstream of the I-680 bridge is probably primarily sustained by the quarry NPDES discharges because groundwater levels fall to 15 or 20 feet below the ground surface in this location in the dry season. Groundwater probably plays a more important role in sustaining riparian vegetation downstream of the I-680 bridge because, even in the dry season, groundwater levels there only fall to 5 or 10 feet below the ground surface (5).

The riparian vegetation that exists in the Alameda Creek channel between the San Antonio Creek and Arroyo de la Laguna confluences in 2016 is a product of the conditions that have existed in the channel over the last several decades, including the amount, depth and seasonal pattern of surface and subsurface water flow, the soil conditions, exposure to sunlight, among other factors. The CDRP will not, and the ACRP would not, alter any of the factors important to the abundance and health of riparian vegetation other than to the extent that it would indirectly affect the amount, depth and seasonal pattern of surface and subsurface water flow.

Daily streamflow is probably too transient to have much effect on the abundance and health of riparian vegetation except the rare very high daily flows that may uproot vegetation. Of more importance for riparian vegetation, is the season in which surface flow exists in the Alameda Creek channel. Surface water in the channel and associated elevated levels of subsurface water in the spring and summer supplies water to growing riparian vegetation; the vegetation is dormant in the fall and winter. Average annual streamflow is also important to riparian vegetation because if there was a long-term trend toward drier conditions, then the abundance and perhaps health of riparian vegetation would be expected to decline.

The rate of subsurface water flow is only important to riparian vegetation in the sense that it affects the groundwater level under the channel which, depending how far it is below the surface, may sustain riparian vegetation during periods when there is no surface water flow. Groundwater levels change less rapidly than surface water levels in the creek channel and their location on any particular day is not of much importance for riparian vegetation. Much more important is the seasonal pattern of groundwater levels and their relationship to the root zone for vegetation. Information on subsurface water conditions in the reach of Alameda Creek between Pit F2 and the creek’s confluence with the Arroyo de la Laguna is contained in Appendix HYD2 and summarized in Table HYD7-1, together with information on surface water conditions. The following paragraphs focus on those aspects of surface water flow that most influence the abundance and health of riparian vegetation; that is low flows and flows during the growing season.

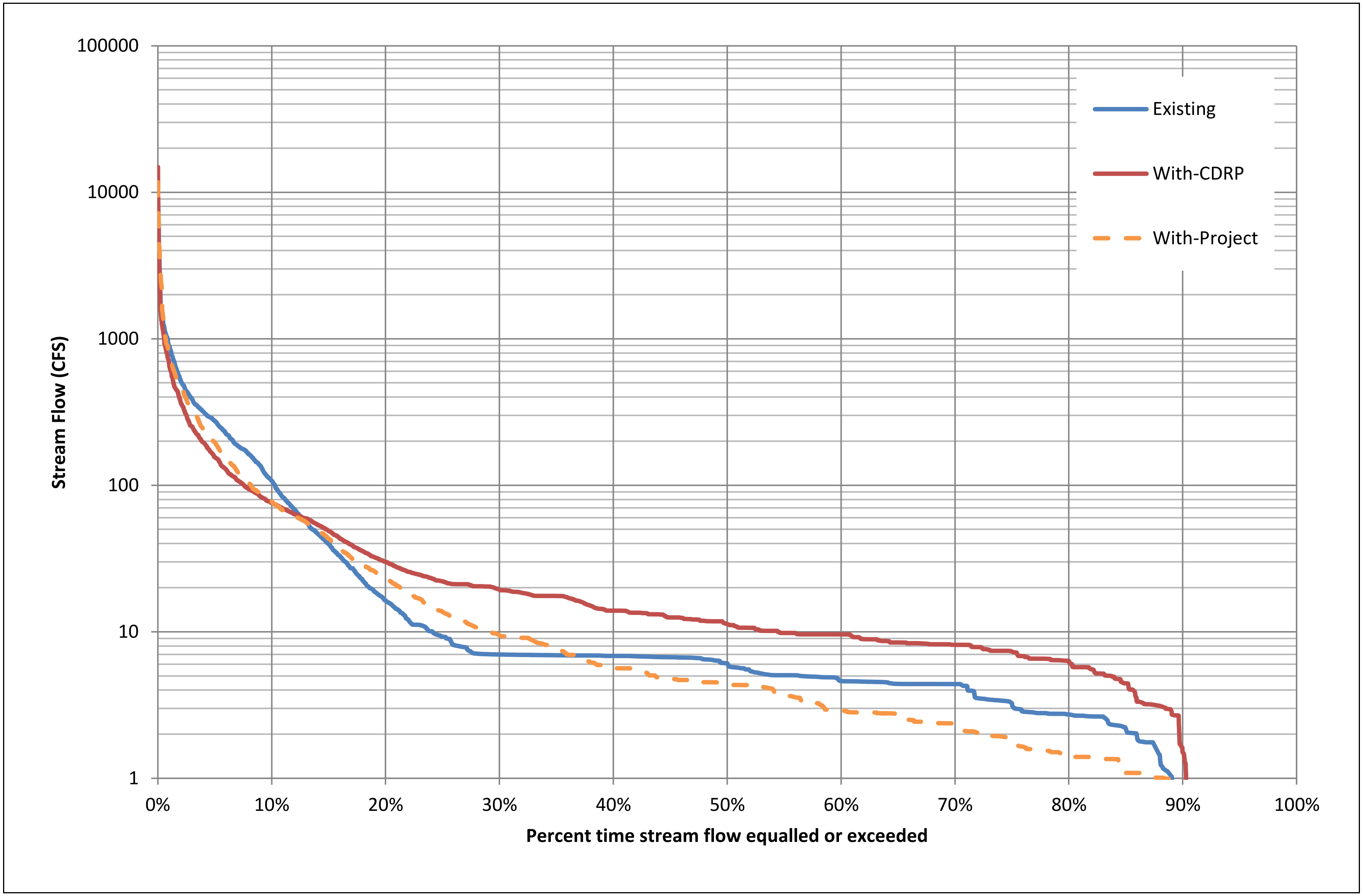
7.3.2 Surface Flow Effects Under With-CDRP Conditions

The ASDHM was used to estimate surface water flow in Alameda Creek immediately above and below the San Antonio Creek confluence. Flow immediately above San Antonio Creek depends solely on runoff from upper Alameda Creek. Figure HYD6-4 shows flow duration curves at that location (Node 5) for existing, with-CDRP conditions and with-project conditions. It is estimated that flow exceeds one cfs on 24 percent of the days under existing conditions. There is little or no flow in the creek at this location most of the time under existing conditions. Under with-CDRP conditions, it is estimated that flow will exceed one cfs on 37 percent of the days. The increase is attributable to the bypasses at the ACDD and releases at Calaveras Reservoir that are part of the CDRP.

Node 6, immediately below the San Antonio Creek confluence is at the upstream end of the reach where the proposed project could affect riparian vegetation. This reach is affected by flow from upper Alameda Creek, flow from San Antonio Creek, and the NPDES discharges of water from the quarries. **Figure HYD7-2** shows flow duration curves for Alameda Creek below the San Antonio Creek confluence (Node 6) for the existing condition, with-CDRP condition, and with-project condition.

Flow exceeds one cfs on about 90 percent of the days under both existing and with-CDRP conditions. A comparison between Figures HYD6-4 and HYD 7-2 is instructive. As shown in Figure HYD6-4, Alameda Creek upstream of the quarry NPDES discharges is dry or close to dry most of the time under existing and with-CDRP conditions. As shown in Figure HYD7-2, the creek downstream of the quarry NPDES discharges is wet almost all the time. The difference between the two is attributable to the quarry NPDES discharges.

Flow downstream of the quarry NPDES discharge point exceeds 10 cfs for about 60 percent of the days under with-CDRP conditions but only for about 25 percent of the days under existing conditions. The difference is a result of greater estimated quarry NPDES discharges under with-CDRP conditions. As noted above, the average annual quarry NPDES discharge under existing conditions is 3,436 acre-feet per year; under with-CDRP conditions it is estimated to be 6,620 acre-feet per year. Table HYD6-2 shows average monthly flows in Alameda Creek below the San Antonio Creek confluence (Node 6) for existing and with-CDRP conditions, calculated from daily flows. Daily flows were calculated by adding estimated daily NPDES discharges from the quarries to daily flows for Node 6, estimated using the ASDHM. Average annual flow volume at this location under existing conditions is estimated to be 40,100 acre-feet per year. Under with-CDRP conditions, it is estimated to be 35,422 acre-feet per year. Average annual flow is lower under with-CDRP conditions than under existing conditions, because restoration of full capacity of Calaveras Reservoir enables the SFPUC to divert more water from Alameda Creek for municipal use than it can under existing conditions. Under existing conditions, storage in Calaveras Reservoir is restricted by order of the DSOD.



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

Figure HYD 7-2

Flow Duration Curves for Node 6 (Alameda Creek below San Antonio confluence) for Existing, with-CDRP, and with-Project Conditions

Average monthly flow volume will be greater under with-CDRP conditions than under existing conditions, about half the time. Average flow volume under with-CDRP conditions will be greater than under existing conditions in October, November, July, August, and September. Because riparian vegetation is dormant through the fall and winter, the health of the vegetation depends on spring and summer flows. Average monthly flow will be greater under with-CDRP conditions in three of the six spring and summer months than it is under existing conditions.

The changes in flow in Alameda Creek under with-CDRP conditions are likely to be theoretical rather than real because the proposed ACRP would be commissioned soon after the CDRP (within one year). This period of time would be too short for riparian vegetation to be much affected by the change in flows attributable to the CDRP. The proposed ACRP would further change Alameda Creek flow as compared to existing and with-CDRP conditions as described below.

7.3.3 Surface Flow Effects Under With-Project Conditions

If the ACRP resulted in a change in Alameda Creek surface water flows in the quarry reach it could alter conditions for the riparian vegetation that exists downstream of the San Antonio Creek confluence. For information on ACRP-caused changes in subsurface flow that could affect riparian vegetation, see Appendix HYD2.

Figure HYD7-2 shows flow duration curves for Alameda Creek below the San Antonio Creek confluence for existing, with-CDRP, and with-project conditions. Under all three conditions, flow in the creek would be greater than one cfs in about 90 percent of the days in the 18-year hydrologic period. Under with-project conditions, flow in the creek would be greater than 10 cfs in about 30 percent of the days in the 18-year hydrologic period. Under existing conditions flow would be greater than 10 cfs on about 25 percent of the days. The differences in frequencies of relatively low flows between the scenarios is largely attributable to the differences in NPDES discharges from the quarries. Under with-project conditions, the average annual quarry NPDES discharge is estimated to be 2,532 acre-feet; under existing and with-CDRP conditions it is estimated to be 3,436 acre-feet and 6,620 acre-feet, respectively (see Table HYD4-2, above).

Table HYD6-2 shows annual average flow volumes in Alameda Creek below the San Antonio Creek confluence for existing, with-CDRP, and with-project conditions. Average annual flow volume under existing conditions is estimated to be 40,100 acre-feet. Average annual flow volume under with-CDRP conditions is estimated to be 35,422 acre-feet. Under with-project conditions, the average annual flow volume is estimated to be 37,207 acre-feet. The differences in annual average flow volumes under the different scenarios are too small to have much effect on riparian vegetation.

Table HYD6-2 also shows monthly average flows in Alameda Creek below the San Antonio Creek confluence. Monthly average flows under with-project conditions would be greater than they are under existing conditions in three months of the year, November, February and March, and less in the other months of the year. Monthly average flows under with-project conditions would be greater than they are under with-CDRP conditions in four months of the year, January, February, March and April, and less in the other months of the year. In both cases, flows under with-project conditions would be less in most drier months than they are under existing and with-CDRP conditions. Riparian vegetation is most affected by flows in the drier months when it is actively growing but water supply may be limited. The differences in drier month flows between scenarios are primarily attributable to differences in estimated quarry NPDES discharges.

Table HYD7-2 shows average flow volumes in Alameda Creek downstream of the San Antonio Creek confluence in the spring and summer for existing, with-CDRP, and with-project conditions. Under with-project conditions, estimated flow volumes are lower in the spring and summer than they are under either existing or with-CDRP conditions. They are lower in the spring because of changes in operations at Calaveras Reservoir and lower in summer because of differences in estimated quarry NPDES discharges. Thus, the water supply to the riparian vegetation in and around the Alameda Creek channel downstream of the San Antonio Creek confluence in the spring and summer would be lower under with-project conditions than it is under existing conditions and will be under with-CDRP conditions. The reduction in surface water in Alameda Creek could have an adverse effect on riparian vegetation particularly in the creek reach between the San Antonio Creek confluence and I-680, where the persistence of the vegetation in dry periods appears to rely primarily on NPDES discharges by the quarry operators.

TABLE HYD7-2
ESTIMATED AVERAGE FLOW VOLUMES IN ALAMEDA CREEK BELOW THE SAN ANTONIO CREEK CONFLUENCE (NODE 6) IN SPRING AND SUMMER (acre-feet)

Scenario	Total flow volume in spring (April, May and June)	Total flow volume in summer (July, August and September)
Existing Conditions	8,390	834
With-CDRP Conditions	6,462	1,618
With-project Conditions	5,920	576

Notes for Section 7

1. Gunther, A.J., J.M. Hagar, and P. Salop, 2000. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed.* Prepared for the Alameda Creek Fisheries Restoration Workgroup. February 7, 2000.
2. Leidy, R.A., 2007. *Ecology, Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary*, California. San Francisco Estuary Institute, April 2007. Contribution No. 530.

3. Environmental Science Associates, 2016. *Alameda Creek Recapture Project, Alameda Creek Fisheries Habitat Assessment Report*. Prepared for the San Francisco Public Utilities Commission, November 2016. (See Appendix BIO2).
4. Environmental Science Associates, 2016. *San Francisco Public Utilities Commission Alameda Creek Recapture Project Terrestrial Biological Resources Report*, prepared for the San Francisco Public Utilities Commission, November 2016 (See Appendix BIO1).
5. Environmental Science Associates, 2016. *San Francisco Public Utilities Commission Alameda Creek Recapture Project Terrestrial Biological Resources Report*, prepared for the San Francisco Public Utilities Commission, November 2016 (See Appendix BIO1).

8. Implications of ACRP-Caused Surface Water Hydrology Changes for Alameda County Water District

Surface water hydrology under existing conditions and with-CDRP conditions are described in detail in Section 5. The changes in surface water hydrology attributable to the ACRP are described in Section 6. This section describes the implications of ACRP-induced changes in surface water hydrology for Alameda County Water District (ACWD), the only other user of Alameda Creek water besides the SFPUC that could potentially be affected by the ACRP. The question to be answered for the CEQA impact analysis is whether ACRP-induced changes in surface water hydrology could cause a change in ACWD operations that has adverse environmental effects.

8.1 Alameda County Water District's Water Sources

ACWD obtains its water from three sources, local supplies, the State Water Project and the San Francisco regional water system. The District obtains about 40 percent of its water from local sources, 40 percent from the State Water Project and 20 percent from the SFPUC regional water system (1).

The primary source of the local supplies is Alameda Creek. Alameda Creek water, emerging from Niles Canyon, infiltrates into the Niles Cone groundwater basin. The Niles Cone groundwater basin extends from the foothills of the Diablo Range on the east to San Francisco Bay on the west and from the city of Hayward on the north to the Alameda/Santa Clara County line on the south. ACWD pumps hard water from the Niles Cone groundwater basin, blends it with soft water purchased from San Francisco, and supplies it to its customers. San Francisco delivers Tuolumne River water to the ACWD blending facility from the Hetch Hetchy Aqueduct.

ACWD also collects and stores water from the Alameda Creek watershed in Del Valle Reservoir in the Livermore-Amador Valley. Water from the Del Valle Reservoir is conveyed to ACWD's water treatment plants by the State Water Project's South Bay Aqueduct. State Water Project water from the Sacramento-San Joaquin Delta is also conveyed to the District's treatment plants by the South Bay Aqueduct.

In addition to being delivered directly to ACWD in the South Bay Aqueduct, State Water Project water is released to Alameda Creek at a turnout on the South Bay Aqueduct on Vallecitos Creek, a tributary of the Arroyo de la Laguna. The State Water Project water together with Arroyo de la Laguna and Alameda Creek water flows downstream through Niles Canyon to the Niles Cone. ACWD enhances infiltration of the water into the Niles Cone by diverting water from Alameda Creek at several temporary dams into percolation ponds, some of which were gravel quarries.

The proposed ACRP has the potential to affect one of ACWD's water sources, Alameda Creek. It would not affect delivery of water to ACWD by the State Water Project or San Francisco. If the ACRP altered the amount of water or the seasonal pattern of water flowing through Niles Canyon to the Niles Cone, it could cause a change in ACWD operations that in turn could cause adverse environmental effects.

8.2 ACWD's Alameda Creek Operations

ACWD diverts water from Alameda Creek at two inflatable rubber dams near the downstream end of Niles Canyon. Diverted water is routed to the Quarry Lakes and other ponds, where it percolates into and recharges the Niles Cone. Water can be diverted from October 1 to May 31, with a maximum permissible diversion volume set by ACWD's water rights. The maximum permissible diversion volume does not constrain ACWD's operations because it is higher than the amount of water available. During the period the rubber dams are in place, ACWD is required to make releases of water to the downstream reaches of Alameda Creek to support aquatic life but there is no set minimum flow rate, rather the minimum rate is based upon targets for steelhead migration. Currently, ACWD suggests using 25 cfs as a reasonable estimate of the minimum flow rate. It is expected that a new schedule of releases from the rubber dams will replace the current schedule in the next few years. ACWD deflates the rubber dams when instantaneous flow in Alameda Creek exceeds 1,200 cfs to protect the integrity of the dams and diversion structures and they remain deflated when average daily flow exceeds 700 cfs (2).

Although many improvements have been made, ACWD basic operational mode has not changed for several decades. ACWD has been diverting water from Alameda Creek and purchasing it from San Francisco since the 1930s, and receiving water from the State Water Project since the 1960s.

8.3 Effects of ACRP on flow in Alameda Creek at Niles

Flow from upper Alameda Creek and Arroyo de la Laguna combine at their confluence upstream of Niles Canyon. Flow from the Arroyo de la Laguna is several times greater than flow from upper Alameda Creek. The proposed ACRP has the potential to affect flow in upper Alameda Creek but not flow from the Arroyo de la Laguna.

ACWD's locally-sourced water comes from Alameda Creek as it leaves Niles Canyon. If the proposed ACRP were to alter the rate of flow in Alameda Creek at that location, it could affect ACWD's operations.

In the following analysis of surface water hydrology three comparisons are made. With-project conditions are compared to pre-2001 conditions (the conditions that existing before the DSOD imposed limitations on storage in Calaveras Reservoir), existing conditions, and with-CDRP conditions.

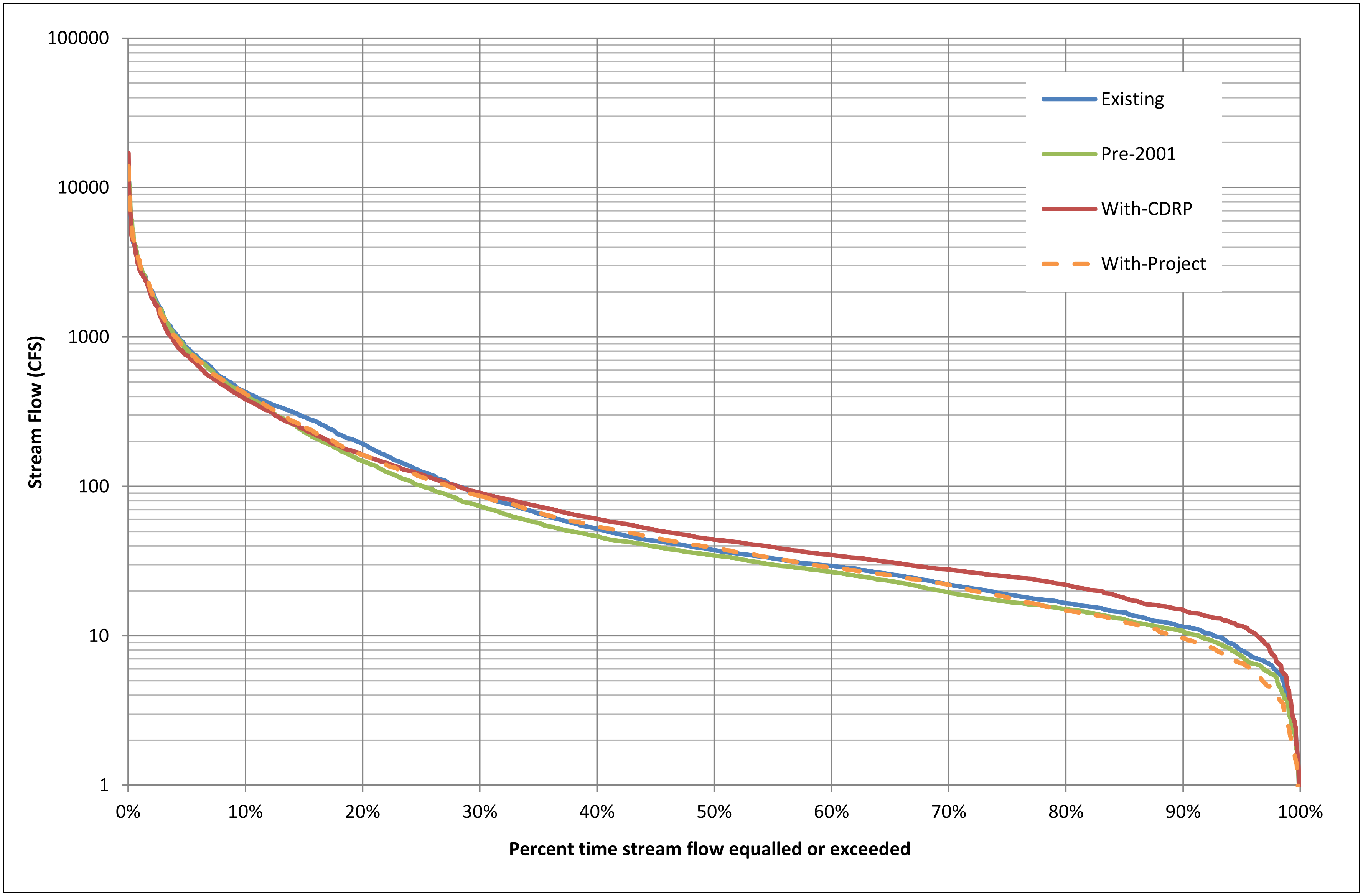
The ASDHM, with adjustments by ESA/Orion, was used to estimate daily flows in Alameda Creek at Niles (Node 9) for four scenarios: pre-2001 conditions, existing conditions, with-CDRP conditions, and with-project conditions. The comparisons between different conditions are made at the location of the USGS gage on Alameda Creek at Niles (Node 9). The gage is located close to the downstream end of Niles Canyon and upstream of ACWD's diversion point. Comparisons are made between the scenarios at flow rates of 25 cfs, 700 cfs, and 1,200 cfs.

8.3.1 Comparison of With-project Conditions to Pre-2001 Conditions

Estimated Daily Flows

Figure HYD8-1 shows flow duration curves for Alameda Creek at Niles (Node 9) for pre-2001 and with-project conditions. The flow duration curves were constructed using data from October 1 to May 31, the period during which ACWD is permitted to divert water from Alameda Creek. Although the flow duration curves in Figure HYD8-1 provide useful information on the potential impacts of the ACRP on flow in Alameda Creek at Niles, they should be viewed with caution. The quarry NPDES discharges in the ASDHM under existing conditions are represented by historical daily NPDES discharges between Water Year 1996 and Water Year 2013. For pre-2001, with-CDRP and with-project conditions, ASDHM output was modified by ESA/Orion to include the estimated NPDES quarry discharges and the losses of surface water to the subsurface between the San Antonio and Arroyo dela Laguna confluences. Under pre-2001, with-CDRP, and with-project conditions, the estimated NPDES quarry discharges are represented by the historical daily NPDES discharges between Water Year 1996 and Water Year 2013 multiplied by a factor (see Section 4, Analytical Methods, for more information). The methodology used to estimate quarry NPDES discharges under pre-2001, with-CDRP, and with-project conditions is based on the best available information — existing quarry NPDES discharge data. But, the methodology necessarily assumes the quarries will continue to operate in the future as they have in the past and given current daily variability, even if they continue to operate as before, they are unlikely to follow the exact same daily pattern. However, changes in the daily pattern of NPDES discharges is expected to have little effect on the flow duration curves for pre-2001, existing, and with-project conditions because under these three scenarios almost all of the water added by the NPDES discharges from the quarries percolates into the ground between the San Antonio Creek and Arroyo de la Laguna confluences and has little influence on surface water flow downstream of the arroyo confluence. A change in the daily pattern of NPDES discharges could be expected to affect the flow duration curve for with-CDRP conditions. Under with-CDRP conditions, the NPDES discharges from the quarries are more voluminous than under the other three scenarios and so some of the water added by these discharges does not percolate into the ground between the San Antonio Creek and Arroyo de la Laguna confluences but continues downstream.

It is expected that some of the water that percolates into the ground between the San Antonio Creek and Arroyo de la Laguna confluences reemerges as surface water flow in Alameda Creek between the arroyo confluence and Niles. No information is available on the quantity of water that might reenter the surface stream and so no allowance is made for it in the ASDHM results, as adjusted by ESA/Orion. As a result, it is possible that the estimates of flow in Alameda Creek at Niles shown in Figure HYD8-1, **Table HYD8-1** and **Table HYD8-3** are understated.



SOURCE: SFPUC, 2016. Simulated stream flows for different scenarios at 5 nodes and pond elevation for ACRP. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016.

NOTE: Data presented are derived from the Alameda System Daily Hydrologic Model (ASDHM) using from Water Years (1996 – 2013)

SFPUC Alameda Creek Recapture Project

Figure HYD 8-1

Flow Duration Curves for Node 9 (Alameda Creek at Niles) for ACWD Diversion Period (October 1 – May 31) for Existing, Pre-2001, with-CDRP, and with-Project Conditions

TABLE HYD8-1
FLOW VOLUME IN ALAMEDA CREEK AT NILES (NODE 9) FROM OCTOBER 1 THROUGH MAY 31 FOR WY1996-WY2013 AS ESTIMATED FOR CEQA ANALYSIS (acre-feet)

Water Year	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions
1996	216,303	216,303	217,707	216,318
1997	190,068	190,068	186,241	192,639
1998	349,584	349,584	344,306	352,207
1999	71,672	71,672	73,351	75,467
2000	93,267	97,206	87,309	94,436
2001	29,822	29,477	38,428	32,568
2002	30,399	56,130	38,047	33,584
2003	57,573	65,733	69,310	64,031
2004	40,625	42,614	47,768	44,090
2005	121,718	127,878	96,237	113,082
2006	160,492	168,038	138,362	161,199
2007	28,277	32,541	37,115	30,721
2008	50,255	52,354	54,543	51,806
2009	44,788	38,026	40,120	41,707
2010	72,845	69,440	72,665	73,736
2011	121,868	127,120	102,364	123,516
2012	21,651	22,542	24,243	25,942
2013	31,546	43,358	34,236	33,306
Average	96,264	100,005	94,575	97,797
Maximum	349,584	349,584	344,306	352,207
Minimum	21,651	22,542	24,243	25,942

SOURCE SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted to include NPDES quarry discharges at Node 6 and losses between Node 6 and 7 by ESA/Orion.

Figure HYD8-1 shows that flow at Niles (Node 9), under pre-2001 conditions is estimated to exceed 25 cfs on about 63 percent of the days. Under with-project conditions, it would exceed 25 cfs on 65 percent of the days. Under both pre-2001 and with-project conditions, it would exceed 1,200 cfs on about 4 percent of the days and 700 cfs on 6 percent of the days. But it is impossible to know what flow at Niles would be on any given day in the future because the NPDES discharges from the quarries are so variable in volume and timing and are unlikely to mirror the daily pattern they exhibited between Water Year 1996 and Water Year 2013. Similarly, due to the loss between San Antonio Creek and Arroyo de la Laguna, it is not known what portion of the NPDES discharge from quarries would actually reach Alameda Creek at Niles.

Flow Volumes for Period October 1 through May 31 Calculated from Simulated Daily Flows

Table HYD8-1 shows flow volumes in Alameda Creek at Niles for the period when ACWD is permitted to divert water from the creek, October 1 through May 31, for pre-2001 and with-project conditions as estimated for CEQA purposes. Under pre-2001 conditions, the average flow volume was

96,264 acre-feet. The average flow volume under with-project conditions would be 97,797 acre-feet or about 1.6 percent more than under pre-2001 conditions.

Table HYD8-2 shows estimated flow volumes in Alameda Creek at Niles for the period when ACWD can divert water for pre-2001 and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry discharges are included under existing conditions but not in the other scenarios.

TABLE HYD8-2
ESTIMATED FLOW VOLUME IN ALAMEDA CREEK AT NILES (NODE 9)
FROM OCTOBER 1 THROUGH MAY 31
FOR WY1996-WY2013 AS USED IN ANALYSIS FOR CDRP BIOLOGICAL OPINION (acre-feet)

Water Year	Pre-2001 Conditions	Existing Conditions	With-CDRP Conditions	With-Project Conditions
1996	217,935	219,925	217,641	218,685
1997	191,706	193,690	186,096	195,165
1998	351,153	353,206	344,792	351,483
1999	73,310	75,294	73,362	74,986
2000	95,102	100,828	86,013	95,269
2001	31,035	33,099	34,446	34,446
2002	32,223	59,752	36,756	36,756
2003	58,483	69,355	66,989	66,989
2004	42,820	46,236	47,302	47,302
2005	123,387	131,500	96,134	115,991
2006	161,433	171,660	137,347	162,636
2007	29,760	36,164	32,252	32,252
2008	52,708	55,976	54,911	54,911
2009	47,007	41,649	39,202	44,815
2010	73,659	73,062	70,157	75,571
2011	122,420	130,742	100,272	122,546
2012	25,223	26,165	27,636	27,636
2013	34,909	46,980	36,633	36,633
Average	98,015	103,627	93,788	99,671
Maximum	351,153	353,206	344,792	351,483
Minimum	25,223	26,165	27,636	27,636

SOURCE SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Does not include NPDES quarry discharges at Node 6 or losses between Node 6 and 7.

Monthly Flows Calculated from Simulated Daily Flows

Table HYD8-3 compares average monthly flows in Alameda Creek at Niles for pre-2001 and with-project conditions as estimated for CEQA purposes. Average monthly flows would be greater under with-project conditions than they were under the pre-2001 condition for 8 of 12 months. Average monthly flow volumes would be lower under with-project conditions than under pre-2001 conditions in March, July, August, and September. However, three of these months, July, August and September are months when ACWD is not permitted to divert water from Alameda Creek.

TABLE HYD8-3
AVERAGE MONTHLY FLOWS IN ALAMEDA CREEK AT NILES FOR WITH-CDRP CONDITIONS AND WITH-PROJECT CONDITIONS ESTIMATED FOR CEQA ANALYSIS PURPOSES
WY 1996 TO WY 2013 (CFS)

Scenario	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Pre-2001 Conditions	35.0	46.8	151.4	320.5	527.4	330.1	165.5	40.3	26.1	24.5	24.2	24.7
Existing Conditions	36.3	47.7	171.1	342.3	528.1	305.1	184.8	63.2	33.9	25.4	25.0	25.6
With-CDRP Conditions	39.0	52.2	162.5	315.5	532.2	272.1	165.4	51.4	33.1	30.0	28.9	30.0
With-project Conditions	35.0	48.2	159.1	323.8	535.7	326.7	169.5	44.9	26.6	24.0	23.7	24.0
With-project Conditions minus Pre-2001Conditions	0	1.4	7.7	3.3	8.3	-3.4	4.0	4.6	0.5	-0.5	-0.5	-0.7
Difference in flow between with project conditions and existing conditions (With-project conditions minus Existing Conditions)	-1.3	0.5	-12.0	-18.5	7.6	21.6	-15.3	-18.3	-7.3	-1.4	-1.3	-1.6
Difference in flow between with project conditions and with CDRP conditions (With-project conditions minus With-CDRP)	-4.0	-4.0	-3.4	8.3	3.5	54.6	4.1	-6.5	-6.5	-6.0	-5.2	-6.0

SOURCE SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted to include NPDES quarry discharges at Node 6 and losses between Node 6 and 7 by ESA/Orion

Table HYD8-4 shows estimated monthly flows in Alameda Creek at Niles for pre-2001 and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry discharges are included under existing conditions but not in the other scenarios.

TABLE HYD8-4
AVERAGE MONTHLY FLOWS IN ALAMEDA CREEK AT NILES FOR WITH-CDRP CONDITIONS AND WITH-PROJECT CONDITIONS AS USED IN ANALYSIS FOR CDRP BIOLOGICAL OPINION
WY 1996 TO WY 2013 (CFS)

Scenario	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Pre-2001 Conditions	39.5	51.7	155.9	324.3	530.7	332.9	168.0	43.2	29.4	28.0	28.2	28.5
Existing Conditions	43.8	55.2	178.6	349.8	535.6	312.6	192.3	70.7	41.4	32.9	32.5	33.1
With-CDRP Conditions	39.5	53.3	163.0	313.9	530.0	268.4	161.1	48.1	30.5	28.1	28.2	28.5
With-project Conditions	39.5	53.3	163.9	327.9	539.1	329.8	172.2	48.2	30.5	28.1	28.2	28.5
With-project Conditions minus Pre-2001Conditions	0.0	1.7	8.0	3.6	8.4	-3.1	4.2	5.0	1.1	0.1	0.0	0.0
Difference in flow between with project conditions and existing conditions (With-project conditions minus Existing Conditions)	-4.3	-1.9	-14.7	-21.8	3.4	17.2	-20.1	-22.5	-10.9	-4.7	-4.3	-4.6
Difference in flow between with project conditions and with CDRP conditions (With-project conditions minus With-CDRP)	0.0	0.0	0.9	14.1	9.1	61.3	11.1	0.1	0.0	0.0	0.0	0.0

SOURCE: SFPUC, 2016. Simulated streamflows for different scenarios at 5 nodes. Excel spreadsheet file provided by Amod Dhakal on July 7, 2016. Adjusted to include NPDES quarry discharges at Node 6 and losses between Node 6 and 7 by ESA/Orion

8.3.2 Comparison of With-project Conditions to Existing Conditions

Estimated Daily Flow

Figure HYD8-1 shows flow duration curves for existing conditions and with-project conditions at Niles (Node 9). Flow at Niles, under existing conditions is estimated to exceed 25 cfs on about 65 percent of the days. Under with-project conditions, it would also exceed 25 cfs on 65 percent of the days. Under both with-project and existing conditions, it would exceed 1,200 cfs on about 4 percent of the days and 700 cfs on 6 percent of the days.

Flow Volumes from October 1 through May 31 Calculated from Simulated Daily Flows

Table HYD8-1 shows flow volumes in Alameda Creek at Niles for the period when ACWD is permitted to divert water from the creek, October 1 through May 31, for existing and with-project conditions as estimated for CEQA purposes. Under existing conditions, the average flow volume in Alameda Creek at Niles is estimated to be 100,005 acre-feet. Under with-project conditions, it would be 97,797 acre-feet, about 2.2 percent less than under existing conditions.

Table HYD8-2 shows estimated flow volumes in Alameda Creek at Niles for the period when ACWD is permitted to divert water from the creek for existing and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry NPDES discharges are included under existing conditions but not in the other scenarios.

Monthly Flows Calculated from Daily Flows

Table HYD8-3 compares average monthly flows in Alameda Creek at Niles for existing and with-project conditions as estimated for CEQA purposes. Average monthly flows would be lower under with-project conditions than under existing conditions for nine months of the year. However, four of these months are June, July, August, and September when ACWD is not permitted to divert water from Alameda Creek. Average monthly flows under with-project conditions would be higher than under existing conditions in November, February and March.

Table HYD8-4 shows estimated monthly flows in Alameda Creek at Niles for existing and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry NPDES discharges are included under existing conditions but not in the other scenarios.

8.3.3 Comparison of With-project Conditions to With-CDRP Conditions

Estimated Daily Flow

Figure HYD8-1 shows flow duration curves for with-CDRP conditions and with-project conditions at Niles (Node 9). Flow at Niles, with-CDRP conditions is estimated to exceed 25 cfs on about 75 percent of the days. Under with-project conditions, it would exceed 25 cfs on 65 percent of the days. Under both with-CDRP and with-project conditions, flows would exceed 1,200 cfs on about 4 percent of the days and 700 cfs on 6 percent of the days.

Flow Volumes for October 1 through May 31 Calculated from Simulated Daily Flows

Table HYD8-1 shows flow volumes in Alameda Creek at Niles for the period when ACWD is permitted to divert water from the creek for with-CDRP and with-project conditions as estimated for CEQA purposes. Under with-CDRP conditions, the average flow in Alameda Creek at Niles is estimated to be 94,575 acre-feet. Under with-project conditions, it would be 97,797 acre-feet, about 3.4 percent more than under with-CDRP conditions. This is because the reduction in storage in Calaveras Reservoir caused by the releases to meet the instream flow schedule is greater for with-CDRP conditions than it is for with-project conditions and, as a result spills are less frequent.

Table HYD8-2 shows estimated flow volumes in Alameda Creek at Niles for the period when ACWD can divert water for with-CDRP and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the

San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry NPDES discharges are included under existing conditions but not in the other scenarios.

Monthly Flows Calculated from Daily Flows

Table HYD8-2 compares average monthly flows in Alameda Creek at Niles for with-CDRP and with-project conditions as estimated for CEQA purposes. Average monthly flows would be lower under with-project conditions than under with-CDRP conditions for eight months of the year. However four of these months are June, July, August, and September when ACWD is not permitted to divert water from Alameda Creek. Average monthly flows under with-project conditions would be higher than with-CDRP conditions in January, February, March, and April.

Table HYD8-4 shows estimated monthly flows in Alameda Creek at Niles for with-CDRP and with-project conditions as used in the analysis for the Biological Opinion for the CDRP. The estimates do not include losses to the subsurface between the San Antonio Creek and Arroyo de la Laguna confluences in any of the scenarios. Quarry NPDES discharges are included under existing conditions but not in the other scenarios.

8.4 Implications of ACRP-caused Flow Changes for ACWD Operations

For decades before 2001, the SFPUC operated its Alameda System in a manner that took full advantage of Calaveras Reservoir's full storage capacity. Under these pre-2001 conditions, the average flow volume in Alameda Creek at ACWD's diversion point for the eight-month period between October and May when ACWD can divert water is estimated to be 96,264 acre-feet.

In 2001, the DSOD imposed restrictions on storage in Calaveras Reservoir and from 2001 until the present the SFPUC has operated the reservoir with a fraction of its pre-2001 storage capacity. Under existing conditions, the average flow volume in Alameda Creek at ACWD's diversion point for the eight-month period between October and May when ACWD can divert water is estimated to be 100,005 acre-feet.

In the future, when both the CDRP and the proposed ACRP (if approved) are in operation, the SFPUC will again take advantage of Calaveras Reservoir's full capacity. Under these with-project conditions, the average flow volume in Alameda Creek at ACWD's diversion point for the eight-month period between October and May when ACWD can divert water would be 94,575 acre-feet.

From the 2001 until the present, as a result of the SFPUC's reduced diversion of water necessitated by the storage restrictions at Calaveras Reservoir, an annual average of about 4,000 acre-feet more water has flowed down Alameda Creek to the ACWD diversion point between October and May than did prior to 2001. These conditions will continue until the CDRP and the proposed ACRP (if approved) are commissioned in about 2019. Once the CDRP and the proposed ACRP are commissioned and Calaveras Reservoir's full storage capacity is available to the SFPUC, flow volume at ACWD's diversion point between October and May would be reduced, but it would still be an annual average of about 1,500 acre-feet, or 1.6 percent, higher than under pre-2001 conditions.

Although operation of the proposed ACRP is not expected to have an adverse effect on the overall amount of water available to ACWD from Alameda Creek, it may have an effect on the amount of water available on individual days. At 25 cfs and 1200 cfs, the amount of water available to ACWD on individual days under with-project conditions would be the same or nearly the same as under pre-2001 and existing conditions. It would be less than under with-CDRP conditions.

It is expected that any effects of the proposed ACRP on ACWD operations would be too small to cause ACWD to make substantial changes in the way it operates and uses its various sources of water. Therefore, it is not expected that the proposed ACRP would result in environmental impacts that stem from changes in ACWD operating practices.

Notes for Section 8

1. ACWD, 2014. *Reliability by Design: Integrated Resource Planning at Alameda County Water District*.
2. ACWD, 2016. Personal communication between Evan Buckland of ACWD and Joyce Hsiao of Orion Environmental Associates, September 21, 2016.

APPENDIX HYD2

Groundwater/Subsurface Water Interactions Technical Memorandum

This page intentionally left blank

TECHNICAL MEMORANDUM

GROUNDWATER-SURFACE WATER INTERACTIONS
ACRP BIOLOGICAL RESOURCES STUDY AREA

Prepared for: ESA

Date: November 2016

---

1. Introduction

This technical memorandum discusses interactions between groundwater and surface water with respect to aquatic and riparian habitats in the Alameda Creek Recapture Project (ACRP) biological resources study area. It was prepared to support the ACRP environmental impact analysis. The habitat areas occur between the ACRP project location and the Arroyo de la Laguna. The focus on impacts in this analysis is during seasonally dry months between April and November. The ACRP project location and study area are shown in **Figure 1**.

The data analyzed in this study show how groundwater responds to streamflow in Alameda Creek and, in turn, can be interpreted to determine how changes in streamflow in CEQA scenarios will affect shallow groundwater within reaches containing aquatic and riparian habitats. Sources of data included groundwater levels from monitoring wells installed within the study area, surface water elevations in quarry pits, and Alameda Creek streamflow. The monitoring wells in the ACRP study area are distributed such that conditions through any reach can be inferred by interpolation. The periods of record for all data sources encompass seasonal and water-year variations. Monitoring well locations and groundwater level data are shown in **Figure 2**. Monitored quarry pits and surface level data are shown in **Figure 3**. Both figures include Alameda Creek streamflow from a USGS gauge (1173575) located below Welch Creek.

2. Setting

For each monitoring well location, minimum and maximum recorded water levels correspond to physical features of the groundwater-surface water system in the study area. First, the minimum level is interpreted as the base of transmissive alluvial materials through which surface water percolates and recharges shallow groundwater. The alluvial materials include Stream Channel Gravels (Qg), consisting of sand and gravel, that occurs along the lowest elevations of stream channels of Alameda Creek and San Antonino Creek, and other tributary streams (LSCE, 1993). This formation and its properties are important because it comprises the Alameda Creek stream bed and serves as a conduit between surface water and groundwater. The distribution of this formation in the study area and vicinity is shown on **Figure 4**.

Younger Alluvium (Qa) underlies the Stream Channel Gravels and occurs on surfaces of slightly higher elevation adjacent to streams and on the Sunol Valley floor. The Younger Alluvium consists of unconsolidated sand and gravel with interbedded clay and silt and represents floodplain, stream channel and alluvial fan deposits. The Stream Channel Gravels and Younger Alluvium comprise the shallow aquifer system discussed in this memorandum and are the only formations that transmit groundwater that is of concern to potential impacts to riparian and aquatic habitat in the study area. Water level data indicate that the Stream Channel Gravels and Younger Alluvium are up to 30 feet in thickness in the quarry reach just upstream of the ACRP project area, decreasing to less than 15 feet near the Arroyo de la Laguna. By their thin nature, the shallow aquifer has limited storage capacity.

Underlying the shallow aquifer system are the Older Alluvium (Qoa) and Livermore Gravels (QTl) formations. These units are difficult to distinguish from borings and neither exhibits favorable water transmitting properties due to high content of fine-grained materials and clay. The Older Alluvium and Livermore Gravels are not feasible water supply sources for agriculture, large municipal, or industrial mining in the project setting. The minimum groundwater level data from monitoring wells delineate the boundary between the shallow aquifer and older non-water bearing formations and the depth to which surface water can percolate and move as underflow[1].

Another physical feature of the study area setting inferred from groundwater data is related to maximum observed water levels, which are interpreted as the fill point for subsurface flow and delineate the upper boundary of the water table aquifer through which groundwater flows and seeps into quarry pits. The groundwater level hydrographs in **Figure 2** indicate that the maximum water levels correspond to peak streamflow in winter months, which then recede as streamflow drops off.

3. Groundwater Occurrence and Movement

The primary source of recharge to groundwater in the ACRP study area is percolation of streamflow from Alameda Creek. Other sources may include recharge from older geologic units of the mountain blocks to the east and west, but this source is likely diffuse and potentially intercepted in pits within the quarry reaches south of Interstate 680. Downstream of the quarry reaches, there may be an accrual of recharge from the mountain blocks into the alluvial valley, but it is not apparent from groundwater or surface water observations proximal to Alameda Creek.

Below Welch Creek, streamflow splits into subsurface and surface components as surface water percolates through the Stream Channel Gravels and into unsaturated alluvial materials. Water in the saturated zone then flows under the prevailing down-valley gradient governed by the hydraulic properties of the aquifer materials. For this component of flow, the terms groundwater, subsurface flow, and underflow are interchangeable. In addition, as the system is unconfined, the term water table aquifer also applies. For the ACRP setting, groundwater flow is assumed to occur primarily within the Stream Channel Gravels and Younger Alluvium as the fines content in the Older Alluvium and Livermore Gravels impedes deeper groundwater recharge and movement.

The component of streamflow that enters the subsurface in Alameda Creek above the quarry reaches follows two pathways through the study area. First, a fraction seeps into quarry pits

[1] Underflow is the downstream movement of water through permeable materials underlying a streambed and which are limited by formations, or rocks, of less permeability (Langbein and Iseri, 1972).

through the Stream Channel Gravels. This pathway is evident through seepage faces on the walls of quarry excavations and is measurable through the rise in water levels in pits in wet months when groundwater and surface water flows peak (see **Figures 2** and **3**). Water that seeps into the pits generally has no outlet unless pit levels rise above the boundary between the Stream Channel Gravels/Younger Alluvium and the underlying Older Alluvium/Livermore Gravels units. Therefore, water that seeps into a pit is stored unless it is removed by pumping (e.g., operator discharges to the creek and consumptive use through processing), lost through evaporation, or it seeps out of pits when levels rise above the shallow groundwater elevation in the shallow aquifer.

A second pathway for the subsurface component of flow follows the stream channel past the quarry reaches and ultimately to the confluence of Alameda Creek and Arroyo de la Laguna. Groundwater monitoring data indicate that aquatic and riparian habitats may be supported by the shallow groundwater table and therefore some fraction of subsurface flow will be consumed by evapotranspiration. Subsurface flow is also intercepted by an infiltration gallery owned by SFPUC and used for irrigation on the adjacent Sunol Valley Golf Course, which closed at the end of 2016. Water is still diverted from the infiltration gallery to maintain the water system and will continue to be used for irrigation on the property. The flow pathways described above are shown schematically in **Figure 5**.

4. Groundwater Conditions

Groundwater conditions in the ACRP study area were interpreted from available monitoring data reflecting the pathways and gradients described above. Monitoring wells within the quarry reach above Interstate 680 are also discussed in relation to water levels in quarry pits. For the period of record, water level elevations in some of the quarry pits rose above the base of the shallow aquifer. Under such conditions, the gradient for seepage into quarry pits decreases and, if the pit level rises above the groundwater table, seepage would be rejected and water would seep from the pit to the groundwater.

The creek thalweg[2] elevation is also relevant to conditions observed in the study area. If projected groundwater levels from monitoring wells rise above the thalweg in the absence of a live stream, it will be observed as a pool. As a natural system, pools may be intermittent as a function of an irregular thalweg profile. In this setting, a pool is an expression of the shallow groundwater table and underflow. The Alameda Creek thalweg profile from a 2008 survey by ESA was used in this analysis to relate field observations with groundwater level data.

Using data presented in **Figures 2** and **3**, groundwater conditions and surface water interactions at each monitoring well location are summarized below and illustrated through conceptual cross sections.

<u>MW 4 – Immediately Upstream of ACRP Project Area</u>

MW 4 is located next to Pit F4 immediately upstream of the ACRP project area. Interpreted conditions for MW 4 are presented in **Figure 6**, which shows the projected Alameda Creek

[2] Thalweg is the path of a line connecting the lowest points of cross-sections along a streambed.

thalweg, the monitoring well profile, and Pit F4. The drawing is scaled vertically while the horizontal scale is generalized.

The maximum observed water level in MW 4, shown in **Figure 6(a)**, coincides with peak flow in Alameda Creek. This represents the fill point for the shallow aquifer at this location as it cannot store water at higher elevations. Pit F4 is shown at a stage in which it is filling from seepage from the shallow aquifer.

When streamflow decreases after wet months, groundwater rapidly recedes as shown on the hydrographs in **Figure 2** and conceptually in **Figure 6(b)**. Because of the aquifer geometry (i.e., its limited distribution and thin nature), groundwater levels exhibit the same flashy behavior associated with surface water in Alameda Creek. Here, the adjacent Pit F4 is shown in a partially dewatered state as quarry operators typically lowered pit levels and for mining purposes and discharged the water to the creek.

The minimum observed groundwater level at MW 4 is shown in **Figure 6(c)**. This is the interpreted base of the Stream Channel Gravels and Younger Alluvium layer (Qg/Qa) through which groundwater flows. In this figure, the entire aquifer thickness has drained down the valley toward Arroyo de la Laguna or seeped into quarry pits. This state would be typical for summer to late fall with Pit F4 at a lower stage of storage than earlier in the year. From **Figure 2**, it can be seen that such drainage occurred in dry months of each year until 2015.

In 2015, the water level in adjacent Pit F4 rose above the base of the shallow aquifer at MW 4. When this occurred, surface water in the pit seeped into the shallow aquifer in dry months and induced higher groundwater levels in MW 4 as compared to previous years (see **Figure 2**). The quarry pit and monitoring well levels are presented together in **Figure 7** showing the hydraulic connection between the pit and aquifer at this location.

The higher levels in Pit F4 occurred due to operational changes at the SMP 30 quarry where Pits F6 and F4 are located (see **Figure 1**). Since 2012, the operator made no direct discharges to Alameda Creek. This new water management practice resulted in higher storage levels in Pit F4 compared to previous years (as discussed below, the level in Pit F3 West also rose due to a hydraulic connection with Pit F4). Increased storage in Pit F4 can be seen through the gradual increase in pit level (see **Figures 3** and **7**). Direct influences on groundwater are seen in 2015 when water levels in MW 4 rose synchronously with pit levels above the base of the shallow aquifer (Qg/Qa). As discussed below, downstream monitoring wells also experienced influences from seepage from Pits F4 and F3 West, as indicated by their synchronous fluctuations.

<u>MWs 5 and 6 – Immediately Upstream and Downstream of ACRP Pit F2</u>

Figure 8 shows conditions for MW 5 in the ACRP project area where Pit F2 would serve as the storage facility and pumping location for the recapture project. The maximum observed groundwater water level is shown in **Figure 8(a)**. Also shown in **Figure 8(a)** is the maximum

storage level in Pit F2 (240 feet elevation) under the ACRP project operations plan[3], which would typically be expected to occur at the end of March.

Figure 8(b) shows the recession of groundwater with declining stream flow. **Figure 8(c)** shows the minimum observed groundwater level corresponding to the interpreted base of the shallow aquifer. The minimum level in Pit F2 (150 feet elevation) would be observed at summer to fall prior to the onset of the next wet season. In these figures, Pit F2 is shown at progressively lower levels representing ACRP pumping between spring and fall with **Figure 8(c)** showing the maximum drawdown that would occur according to the operations plan.

Historically, the minimum groundwater level occurred in summer to early fall of each year of record until 2012 when levels in Pits F4 and F3 West rose above the base of the shallow aquifer and provided a seepage source through the dry months. **Figure 9a** compares groundwater levels in MW 5 and pit levels in F4 and F3 West showing their hydraulic connection and the gradient for flow from the pits into the shallow aquifer.

A narrative description for MW 6 would be like that for MW 5. Elevated groundwater levels observed in 2012-15 due to higher storage in Pits F4 and F3 West is less evident at MW-6 (see **Figure 9b**), but there appears to be generally higher water levels when compared with readings in 2007-08 (see **Figure 2**).

After 2012, a gradient for seepage from Pits F4 and F3 West to MW 6 was created when the pit levels exceeded the elevation of the base of the shallow aquifer (Qa/Qg) as seen in **Figures 9a** and **9b**. Seepage from Pit F2 would have only occurred briefly in January 2016 when the pit level rose above the base of the aquifer (see **Figure 9b**). However, when Pit F2 is filled to 240 feet under ACRP operations, there will also be a gradient for seepage out of the pit to groundwater until the pit is pumped below the base of the shallow aquifer. **Figure 10** shows the conceptualization of stream-aquifer relationships for MW 6.

As discussed below, pools were observed in the reach from MW 5 to below MW 6 during a terrestrial survey conducted in October 2015. The surface of the pools in the stream channel is an expression of groundwater, or underflow. Seepage from upstream sources such as quarry pits F4 and F3 West would preferentially follow the stream and contribute to underflow. Examination of historical aerial photos in fall months in Google Earth indicate that pools occurred consistently in this area in years prior to 2012, even in a dry year such as 2008[4]. The occurrence of pools into fall are attributed to quarry NPDES discharges, which ranged from 2,512 acre-feet in 2009 to 7,664 acre-feet in 2011. Since 2012, quarry NPDES discharges decreased significantly to about 1,000 acre-feet per year in part due to water management changes at SMP 30. However, pools observed in October 2015 indicate conditions similar to prior years. The occurrence of pools in reaches below MWs 5 and 6 in fall 2015 are attributed to quarry NPDES discharges plus seepage out of Pits F4 and F3 West,

[3] Chapter 3.6 Operations and Maintenance
[4] e.g., Image August 31, 2008; Google Earth Pro 7.1.2.2041; 37° 34’ 45.45” N 121° 52’ 47.87” W; Elev. 243 ft.; Eye Alt. 2035 ft; Image U.S. Geological Survey; Accessed September 26, 2016.

most evident from higher groundwater levels in MW 5, which migrates downstream and contributes to underflow.

MWs 8 and 9 – Infiltration Gallery Reach

Figures 11 and **12** show conditions for the MW 8 and 9 locations, respectively. The conditions depicted in these cross sections are considerably different than up-gradient locations particularly with respect to decreased aquifer thickness[5].

At MW 8, the relationship between the stream thalweg and minimum and maximum groundwater levels indicates that pools and live stream conditions are most likely to occur during peak streamflow in wet months. Due to the thinning of the aquifer, groundwater levels fluctuate in a narrower range than upstream sites (i.e., MWs 4, 5, and 6).

At MW 9, the stream thalweg is nearer the interpreted base of the shallow aquifer than at the MW 8 site. As a result, groundwater elevations exceed the projected creek thalweg on a near year-round basis and water levels fluctuate in an even narrower range than at MW 8.
During wet months, the surface water elevation would be near or higher than groundwater. However, with groundwater levels generally above the thalweg elevation throughout the year at MW 9, pools of water would be observed even in dry months when there is no live stream (see **Figure 12(b)**). Pool formation at this site is more a function of the narrow separation between the thalweg and base of the aquifer so that any appreciable underflow may be exposed in the channel. In wet months, pools would merge as Alameda Creek becomes a live stream. Like upstream reaches, groundwater levels exhibit a flashy nature during the winter, only with lower amplitudes governed by the thinner nature of the aquifer. **Figure 13** shows the thalweg profile and thinning of the shallow aquifer through decreasing separation between the creek thalweg and the base of Stream Channel Gravels/Younger Alluvium (Qg/Qa).

MW 9 is located near the SFPUC filter gallery system and Sunol Pump Station. The gallery was previously used to capture groundwater and return it to either San Antonio or Calaveras reservoirs (URS, 2007). The wet well of the pump station was used until 2016 to pump water for irrigation at the adjacent Sunol Valley Golf Course property leased from SFPUC. Water from the infiltration gallery is still diverted to maintain the water system on the property and it will continue to be the source of irrigation supply for the property. The method of capture is by gravity flow of shallow groundwater into horizontally aligned galleries. Historically, capture was augmented by diverting stream flow into basins overlying the horizontal intake sections of the system (LSCE, 2009).

The Sunol Water Temple always has a water table which is about 4 feet higher than the projected creek thalweg at MW9. These galleries may have provided fixed gradient control (i.e., a sink) and, along with possible seepage from the pump station and other piping, may have affected groundwater conditions in the vicinity of MW 9. However, because the aquifer is thinner than upstream reaches, groundwater level fluctuations would be constrained by the

[5] Here, aquifer thickness is defined as the vertical distance between the interpreted base of the permeable aquifer materials (Qg/Qa) and the ground surface.

limited capacity of the aquifer to store or release water; i.e., it can only fill or drain within a narrow range of groundwater elevations (see **Figure 13**).

MW 10 – Immediately Upstream of Arroyo de la Laguna

Figure 14 shows conditions for MW 10. At this site, there would be less pooling due to the height of the thalweg relative to groundwater level fluctuations. Immediately downstream of this monitoring well, the thalweg drops 4 to 5 feet so that flow from Arroyo de la Laguna would inundate the area during storm events (see **Figure 13**).

5. Groundwater Recharge, Storage, and Discharge

Groundwater systems are characterized through characterization of recharge, storage, and discharge. For the study area setting, these characteristics are apparent in the available monitoring data discussed above. Recharge is seen in the strong relationship between Alameda Creek flow and responses in groundwater levels in monitoring wells. The rapid recession of groundwater after peak streamflow events indicates limited available storage space with discharge ultimately at the Arroyo de la Laguna. The shallow groundwater system exhibits the same flashiness associated with runoff in the watershed and flow in Alameda Creek.

The monitoring data also indicate that the shallow aquifer materials that transmit underflow have decreasing thickness in the lower reaches of the study area from MW 8 to the Arroyo de la Laguna (see **Figure 13**). The decreased thickness is reflected in lower amplitude of groundwater fluctuations. Examination of the transition from the ACRP project reach, where Pit F2 is located, to the area of decreased aquifer thickness reveals that the aquifer system has a spill point near MW 9 (see **Figure 15**). As a result, groundwater cannot be stored in upstream reaches after being recharged by winter storm events, but rather will discharge, or drain, out of the valley as underflow. This is illustrated in **Figure 15**, which compares conditions for a wet period (February 2008) to a dry period (October 2007). For the wet period, Alameda Creek would be a live stream or nearly so with groundwater levels in the adjacent monitoring wells near or exceeding the thalweg. Here, the projection of the water surface between MW 6 and MW 8 does not account for a sloping water surface that exists under peak flow conditions (since the stream is losing). Therefore, a pool or live stream is not interpreted from a direct comparison of thalweg elevation to water levels in the monitoring wells at some locations depending on the thalweg-aquifer configuration. After the wet season, groundwater drains from the upper reaches by gravity, particularly under the initial high gradients caused by peak streamflow events. The drainage is nearly complete through dry months in the absence of other recharge sources.

The groundwater conditions in wet and dry months shown in **Figure 15** represent a typical seasonal cycle for the ACRP setting in which groundwater rapidly recedes after being recharged in winter months. Examination of groundwater levels and pit surface water elevations indicate that recession was variable as a function of when quarry operators initiated pit dewatering for mining operations. Significantly, this cycle changed after 2012 when Pit F4 was maintained at a relatively high storage level due to changes in water management at SMP 30 (due to their hydraulic connection, a similar rise in surface water elevation was observed in Pit F3 West). The result of this practice is seen in **Figure 16** in which pit levels are superimposed on the thalweg-aquifer profiles showing the hydraulic gradient for seepage to the shallow aquifer from Pit F4 and F3 West. As a result, groundwater conditions in the dry months of 2015 were like those in wet months, or other months of considerable quarry NPDES discharges. The “wetter” condition is attributed to the contribution of seepage from the pits, plus regular quarry NPDES discharges.

6. Classification of Subreaches and Characteristics

CEQA scenarios are discussed in terms of potential impacts to aquatic and riparian habitats between San Antonio Creek and Arroyo de la Laguna. Based on the physical features of the creek thalweg and underlying shallow aquifer, the study area was subdivided to characterize potential changes to groundwater conditions for each CEQA scenario. The subreach classifications are listed below and shown in **Figure 17**. A location map is shown in **Figure 18**.

Subreach	Description	Approx. Stationing (ft)	Representative Monitoring Wells
A	San Antonio Creek to Interstate 680	98720 to 97200	MWs 4 - 6
B	Interstate 680 to Downstream MW 6	97200 to 95500	MWs 5 and 6
C1	Downstream MW 6 to Upstream MW 8	95500 to 93500	MW 6 and MW 8
C2	Upstream MW 8 to Upstream Arroyo de la Laguna	93500 to 90520	MWs 8 - 10

Subreaches A and B are the same as delineated in EIR Section 5.14, Biological Resources, and Subreaches C1 and C2 correspond to Subreach C in the EIR. Within the subreaches, groundwater conditions are governed by streamflow and aquifer thickness reflected in the vertical separation between the creek thalweg and base of the Stream Channel Gravels/Younger Alluvium (Qg/Qa) in **Figure 17** and the conceptual cross sections discussed in **Section 4**. Aquifer thickness is greatest in Subreach A where the ACRP facilities are located and least in Subreach C2. Within Subreach B, aquifer thickness is relatively constant, then begins to thin in Subreach C1 due to increasing thalweg slope. Subreach C1 represents a transition where the aquifer is thinnest in Subreach C2 and where intermittent pools are expected to be present year-round at MW 9.

7. CEQA Scenarios

This analysis considers potential impacts to groundwater conditions in the biological study area for three scenarios: Existing, With-CDRP, and With-Project scenarios as defined in Section 5.1.2 of the EIR. Each of these scenarios is discussed with respect to the subreaches delineated above.

<u>Existing Scenario</u>

This scenario is represented by the range of groundwater conditions from 2006 to 2015, as reflected by groundwater levels and quarry pit levels shown on **Figures 2** and **3**, and a smaller discrete dataset from a study of local groundwater conditions in Sunol Valley (LSCE, 1993).

The relationship between groundwater and aquatic or riparian habitat can be determined by relating water levels in MWs 4 – 6 to observed field conditions. For Subreach A, represented by MWs 5 and 6, groundwater levels peak during storm events coincident with peak flows in Alameda Creek. At MW5, the highest level recorded is just greater than the projected thalweg at 242 feet; at MW6, the peak level occasionally and briefly exceeds the projected thalweg at 236 feet (see **Figure 2**). These elevations represent the upper range of groundwater level fluctuations under the Existing Scenario. Outside the wet season from April to October and up to 2012, groundwater levels exhibited seasonal low levels reflective of the base of transmissive alluvial materials at 223 feet elevation at MW 5 and 221 feet elevation at MW 6. After 2012, the seasonal declines were not as great due to seepage effects from Pits F4 and F3 West with low water levels falling to only 230 feet in MW 5 and 227 feet at MW6 (see **Figures 2** and **3**). Wet conditions observed in this reach, including damp soil visible on Google Earth imagery and from in-person site visits, would be due to direct quarry NPDES discharges to the streambed and, after 2012, contribution of seepage to underflow from elevated storage in Pits F4 and F3 West as well.

Subreach B is represented by conditions at MW 6. In this subreach, the creek thalweg and base of the shallow aquifer are relatively flat (see **Figure 17**). Like Subreach A, elevated groundwater levels in MW 6 due to routine quarry NPDES discharges and seepage from stored water in upstream quarry pits support pools in this area outside of the periods when Alameda Creek is a live stream to the Arroyo de la Laguna.

Within Subreach C1, the thalweg profile drops in elevation while the interpreted base of Stream Channel Gravels is roughly flat indicating a thinning of the shallow aquifer. As the aquifer thins, the separation between groundwater and the creek thalweg decreases. As shown in **Figure 17**, the separation is about 15 feet at the upstream end of Subreach C1 and it is nearly 0 feet at the downstream end. Due to a lack of well control in this subreach, groundwater level data are not available. From the geometry of the aquifer system, it is assumed that the transition through which upstream conditions would be represented by data from MW 6 and downstream conditions by MW 8 is linear. From the October 2015 amphibian survey and in other years, pools were present to about halfway through the subreach. From the current analysis, this would be the point where data from MW 8 are more representative of the subreach.

Within Subreach C2, groundwater was exposed in intermittent pools in the October 2015 amphibian survey as well as other years (based on historical aerial imagery). Near MW 9 (see **Figure 2**), this condition would be typical in all years and would not be greatly influenced by upstream quarry practices since the aquifer system has little storage capacity at this location. While there are no available data to evaluate the effects of the historic filter gallery, Sunol Water Temple, and Sunol Pump Station on water levels in this subreach, influences would be the same for all CEQA scenarios.

<u>With-CDRP Scenario</u>

Under the With-CDRP scenario, the Calaveras Dam Replacement Project (CDRP) will be completed, Calaveras Reservoir will operate at full capacity, and in-stream flow requirements and bypassed flow at the Alameda Creek Diversion Dam will be implemented (see detailed descriptions in EIR). During wet months (November to April), peak Alameda Creek flows will exceed available storage space in the shallow aquifer and will also exceed seepage rates into mining pits. A live stream will prevail through all the subreaches with bypass flows at the Alameda Creek Diversion Dam serving to attenuate groundwater recession between storm events.

In dry months (April to November), after peak streamflow and groundwater levels recede, in-stream releases from Calaveras Reservoir will range from 7 to 12 cfs for dry and normal/wet schedules, respectively. At these release rates, two potential outcomes could occur depending on how water is managed in the quarries. First, if pit storage is employed to minimize direct NPDES discharges to Alameda Creek as seen at SMP 30 since 2012, the in-stream releases would induce a wetter condition through Subreaches A, B, and part of C1 as seepage to quarry pits would be rejected by high surface water elevations in pits. The pools observed in October 2015 and in other years would persist and likely extend or connect as groundwater elevations increase due to the addition of the continuous in-stream release flow. The increase might be on the order of a foot or less based on the relationship between streamflow and groundwater level responses. The largest influence would be due to the high storage elevations in Pits F4 and F3 West that induced groundwater levels to rise 5 to 10 feet at MWs 4 and 5 since 2013. A small rise in the water table could expose more underflow and create pools as the water table meets the thalweg in places where it was just below the surface. While wetter conditions are expected, the in-stream releases are not sufficient to produce a live stream throughout the quarry reach.

The second potential outcome considers quarry operations prior to 2013 in which pit storage was not used to avoid direct quarry NPDES discharges as in recent years at SMP 30. In this case, quarry NPDES discharges would occur into about mid-summer after which dry conditions in the shallow aquifer would prevail in the summer to fall. Under this assumption, a significant fraction of in-stream releases would seep into quarry pits (as evidenced from a 2008 experimental release study discussed below). In either case, the effects of bypasses and in-stream releases on groundwater levels are expected to fall within the range of past variations in hydrology and quarry NPDES discharges.

The proportion of releases that would seep into pits and be transmitted as underflow can be evaluated from 2008 experimental releases from Calaveras Reservoir. The experimental releases were part of an in-stream flow assessment study plan by McBain and Trush (2008), which, among other purposes, sought to evaluate seepage losses through the quarry reaches. This led to quantification of a threshold flow, 17 cubic feet per second (cfs), below Welch Creek for which a live stream would be sustained below the quarry reaches (SFPUC, ACWD and McBain and Trush, 2012). Since the in-stream release schedule in dry months under the With-CDRP scenario consists of flows less than this threshold, no live stream would occur within or past Subreach A; this assumes that the quarry operators do not continuously maintain high pit levels in dry months.

Examination of groundwater levels in MW 5 during the 2008 experimental release period was made to assess how the magnitude of the releases influence groundwater levels in the quarry reach. **Figure 19** shows groundwater levels and the experimental release flows measured at the USGS gauge below Welch Creek. The experimental releases were initiated at 33 cfs and followed by 4 two-week release periods at rates of 25, 18, 13, and 7 cfs. From 18 to 7 cfs, groundwater levels declined toward a baseline with no apparent stabilizing influences. It appears, then, that residual underflow from in-stream releases may have minor effects on conditions in the lower subreaches, particularly in a dry year. Thus, underflow from in-stream releases would be a contributory factor to conditions in the quarry reach where quarry NPDES discharges and seepage from pits are most evident in historical observations and groundwater data.

For the With-CDRP scenario, dry month in-stream releases would mainly influence groundwater levels in the study area subreaches by contributing to underflow. The releases would pass through the subreaches and extend or connect pools that are often observed downstream through addition to quarry discharges and seepage from pits. If the SMP 30 quarry operator does not store water on-site to limit direct NPDES discharges to the creek, then much of the in-stream flow could seep into quarry pits. Based on the stream flow studies cited above, the in-stream releases are not sufficient on their own to create a live stream to Arroyo de la Laguna during the dry season. The combined in-stream releases, quarry NPDES discharges, and pit seepage would be expected to support pools within the same range as historical conditions.

With-Project Scenario

Under the With-Project scenario, water that naturally seeps into Pit F2 would be stored in wet months and recaptured by pumping in dry months. The hydraulic connection between Pit F2 and groundwater would undergo changes during storage and recovery cycles that result in gradients for seepage into and out of the pit. The main difference in groundwater conditions between With-Project and Existing/With-CDRP scenarios is the systematic storage and pumping of water in Pit F2 that would occur with ACRP implementation, and it is primarily the systematic aspect that distinguishes the scenarios. Storage in Pit F2 under the ACRP would be indiscernible from natural seepage into the quarry pit that occurs each winter under any scenario. The recapture cycles in which water is pumped from Pit F2 would be analogous to quarry dewatering except that ACRP pumping does not discharge to the creek and it results in lower quarry NPDES discharges compared to the Existing scenario. While this would result in drier conditions in the creek downstream of the quarry operations discharge point compared to With-CDRP conditions, the in-stream releases and bypasses will serve to offset ACRP pumping relative to the Existing scenario. This is because the ACRP recapture volume is, on average over the historical hydrology and simulated operations, less than the bypasses and releases by an amount comparable to the estimated reduction in quarry NPDES discharges[6]. As detailed below, in one-third of the 18-year hydrology used in simulating ACRP recovery operations, the water level in Pit F2 will remain higher than the base of the shallow aquifer due to a lack of unused storage volume in Calaveras Reservoir governing recapture of bypassed or released water[7].

In years when SFPUC does not fully draw down or recapture stored water in Pit F2 stored water would seep into shallow groundwater throughout the dry months. This is analogous, but slower, than quarry NPDES discharges that occur the under Existing scenario and that will occur under the With-CDRP scenario.

[6] Chapter 3.6 Operations and Maintenance
[7] Ibid.

When water is stored in Pit F2 under the With-Project scenario, the surface water elevation is temporarily higher than groundwater, creating a gradient for seepage out of the pit as shown conceptually in **Figure 20(a)**. Under a typical storage and recapture cycle, seepage out of the pit would occur until the pit is pumped down to the elevation of the groundwater table in the adjacent shallow aquifer as shown in **Figure 20(b)**. This occurs rapidly within the first month of pumping as groundwater elevations would typically be close to the maximum pit storage level in the Existing scenario (see **Figure 2**). When the water level in the pit is drawn below the groundwater level, there would be no seepage from Pit F2 to the groundwater. And, when the water level falls below the base of the shallow aquifer at 221 to 224 feet elevation (corresponding to the base of the shallow aquifer at MWs 6 and 5, respectively), the pit and shallow aquifer are hydraulically disconnected as shown in **Figure 20(c)**. This occurs in two-thirds of the hydrologic period used in simulating ACRP recapture pumping.

In a year with little or limited recapture pumping (i.e., one-third of hydrologic period used in simulating ACRP operations), water stored in Pit F2 would contribute to underflow from other sources including variable quarry NPDES discharges and seepage from pits influenced by SMP 30 water management practices. This storage condition has the potential to influence groundwater conditions within Subreaches A, B, and the upper half of C1 by increasing underflow and supporting more expansive pools in fall months. This may not deviate substantially from the Existing scenario in years prior to 2012 when annual quarry NPDES discharges were consistently 3,000 to 5,000 acre-feet per year.

8. Conclusions

Potential impacts of the ACRP project on the Alameda Creek groundwater system are governed by the extent and distribution of shallow aquifer materials and their connection to Alameda Creek. This connection permits recharge by Alameda Creek and, in turn, seepage into quarry pits to store water for recapture operations under the With-Project CEQA scenario.

Before Calaveras Reservoir operation was restricted by DSOD (pre-2001), groundwater would seep into quarry pits and, depending on streamflow, would flow past the pits to the lower reaches as surface water and/or underflow. Ultimately, surface water and groundwater not consumed or stored in pits drains from the valley as outflow through Alameda Creek downstream of Arroyo de la Laguna. Underflow would occur until the aquifer pinches out at which point groundwater and surface water merge as surface flow. These pathways were previously described and are depicted in **Figure 5**.

Peak stream flows in Alameda Creek rapidly fill the shallow aquifer consisting of Stream Channel Gravels and Younger Alluvium formations. When streamflow recedes, groundwater levels decline similar to the flashiness of Alameda Creek surface flow. In dry months, in-stream releases under With-CDRP and With-Project scenarios have less influence on groundwater conditions than direct quarry NPDES discharges and high water levels in active quarries, which can produce wetter or drier conditions throughout the biological resources study area as a function of water year and water management practices. In recent years, water management practices have produced higher groundwater elevations in MW5, just upstream of ACRP Pit F2, and possibly downstream at MW6. While the With-Project scenario will be drier than With-CDRP due to recapture pumping, there will be only minor changes in groundwater conditions compared to the Existing scenario because of variability in the hydrologic base period analyzed for ACRP pumping and the fact that, on average, ACRP pumping is less than bypass and release volumes.

The following table summarizes characteristics of each scenario according to the groundwater-surface water interactions described in this report.

Location	Existing	With-CDRP	With-Project
Subreach A	There is sufficient streamflow in wet months to support a live stream in Subreach A. In dry months after recession of the live stream, pools in this subreach may be observed and supported primarily by quarry NPDES discharges. Since 2012, groundwater levels in nearby monitoring wells have increased to shallower depths due to water management practices at SMP-30 where the operator has maintained greater storage levels in Pit F4. This practice has in turn induced higher surface water levels in Pit F3 West and causes seepage to groundwater. This seepage source would also support pools in combination with quarry NPDES discharges. Water in this area is likely perennial or nearly perennial.	In-stream flow releases and bypasses will have minor effect on groundwater conditions compared to the Existing scenario. Pools may expand slightly due to increases in groundwater levels induced by in-stream releases.	In wet months, live streamflow will prevail through Subreach A just as in the Existing and With-CDRP scenarios. In two-thirds of years in the base hydrologic period, ACRP pumping will reduce direct quarry NPDES discharges. On average, the recapture amount is less than the bypasses and releases by about the average decrease in projected quarry NPDES discharges. In years that ACRP does not operate due to lack of available storage in Calaveras Reservoir, about one-third of the years, water will seep into shallow groundwater from Pit F2 as underflow in the subreach resulting in conditions similar to wet years in Existing scenario. The variability in groundwater levels in Subreach A over the base hydrologic period used to model ACRP operations will be similar to the Existing scenario.
Subreach B	Same as Subreach A.	Same as Subreach A.	Same as Subreach A.
Subreach C1	Quarry NPDES discharges and high pit levels influence groundwater in the upper half of this subreach. The lower half has characteristics similar to Subreach C2.	Effects on groundwater levels due to bypasses and in-stream releases will contribute to underflow and make this subreach wetter than Existing scenario. The wetter condition will extend and expand ponding according to the stream channel geometry.	Lower quarry NPDES discharges in two-thirds of the years will result in similar groundwater fluctuations and similar or slightly less pooling as ACRP pumping is offset by bypasses and releases in the upper part of this subreach. In one-third of years, wetter conditions will result as storage in Pit F2 seeps to the shallow groundwater and contributes to pooling as underflow.
Subreach C2	Intermittent pools exist year-	No change.	No change.

	round due to residual underflow. Quarry operations do not cause significant changes due to limited aquifer storage capacity.		

9. References

Langbein, W.B. and Iseri, Kathleen T. 1972. *Manual of Hydrology: Part 1 General Surface Water Techniques; General Introduction and Hydrologic Definitions*. Geologic Survey Water-Supply Paper 1541-A. United States Department of the Interior Geologic Survey.

LSCE. 1993. *Ground-Water and Aggregate Resources, Sunol Valley*. Prepared for San Francisco Water Department. December 1993. Prepared by Luhdorff & Scalmanini Consulting Engineers.

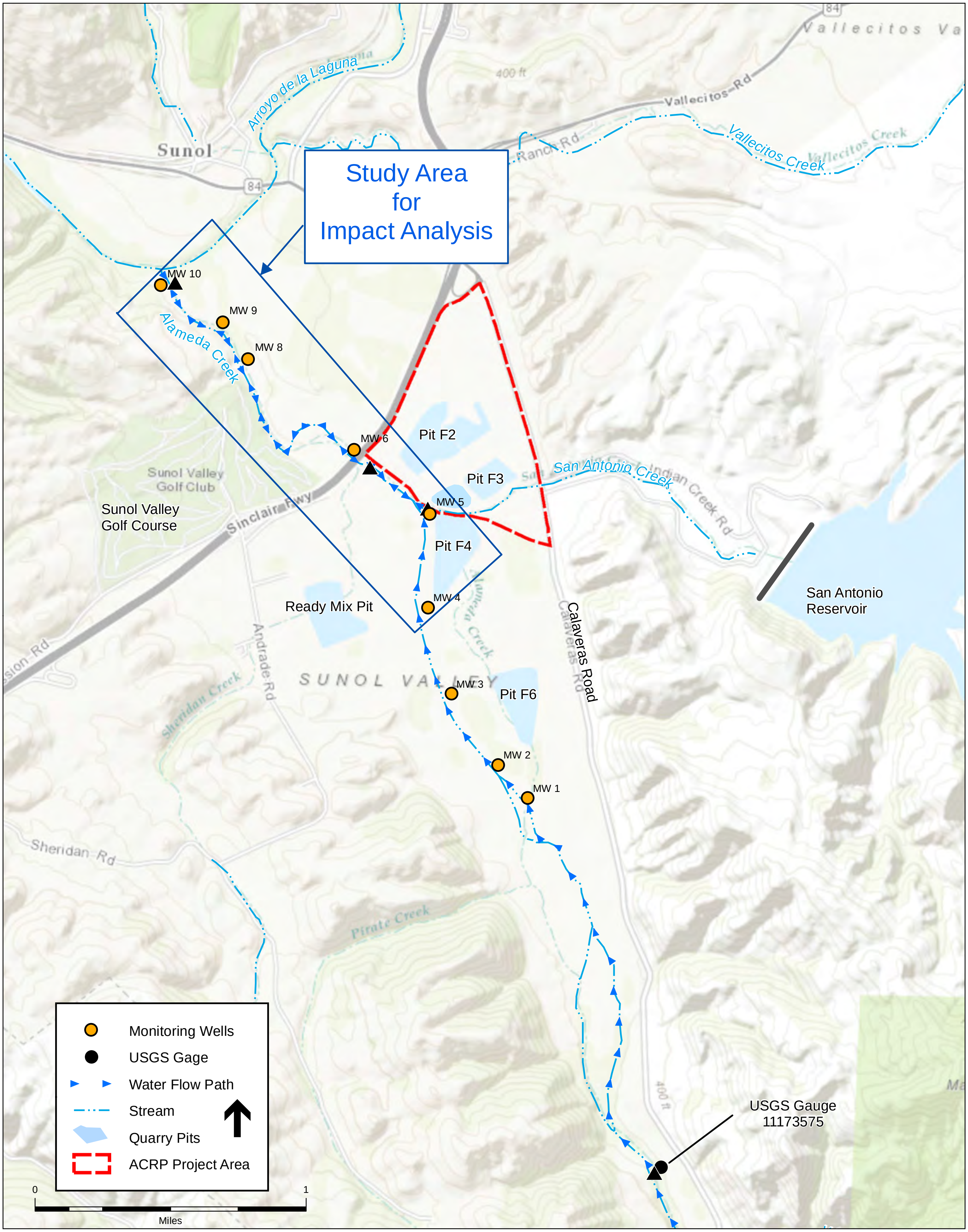
LSCE. 2009. *Final Report, Feasibility to Recapture Reservoir Releases, Alameda Creek*. Prepared for San Francisco Public Utilities Commission. April 22, 2009. Prepared by Luhdorff & Scalmanini Consulting Engineers.

2008. McBain & Trush, Inc. Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead Trout, Final Study Plan. Prepared for Alameda Creek Fisheries Restoration Workgroup. January 2008.

SFPUC, ACWD, and McBain & Trush, Inc. 2012. *Draft Technical Memorandum, Overview of Methods, Models, and Results to Develop Unimpaired, Impaired, and Future Flow and Temperature Estimates along Lower Alameda Creek for Hydrogeologic Years 199602009*. Prepared for Alameda Creek Fisheries Workgroup – Flows Subcommittee. April 13, 2012.

URS Corporation. 2007. *Sunol, California Task 1.3 – Condition Assessment Report Alameda County, California for SFPUC Alameda Creek Fishery Enhancement*. Prepared for San Francisco Public Utilities Commission. September 26.

Figures



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 1
ACRP Study Area Location Map

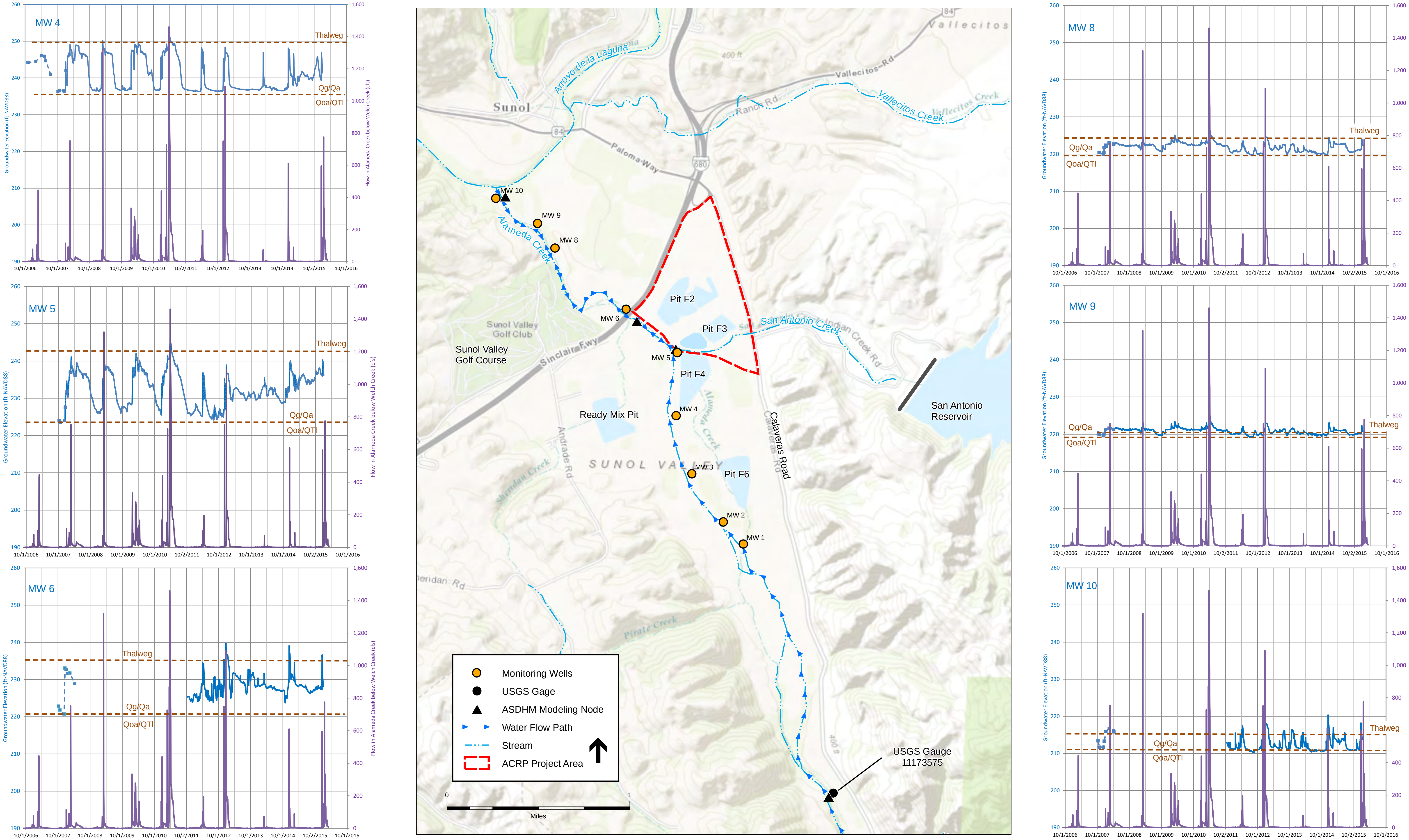


Figure 2
Groundwater Level Data for WY 2006 to Present

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

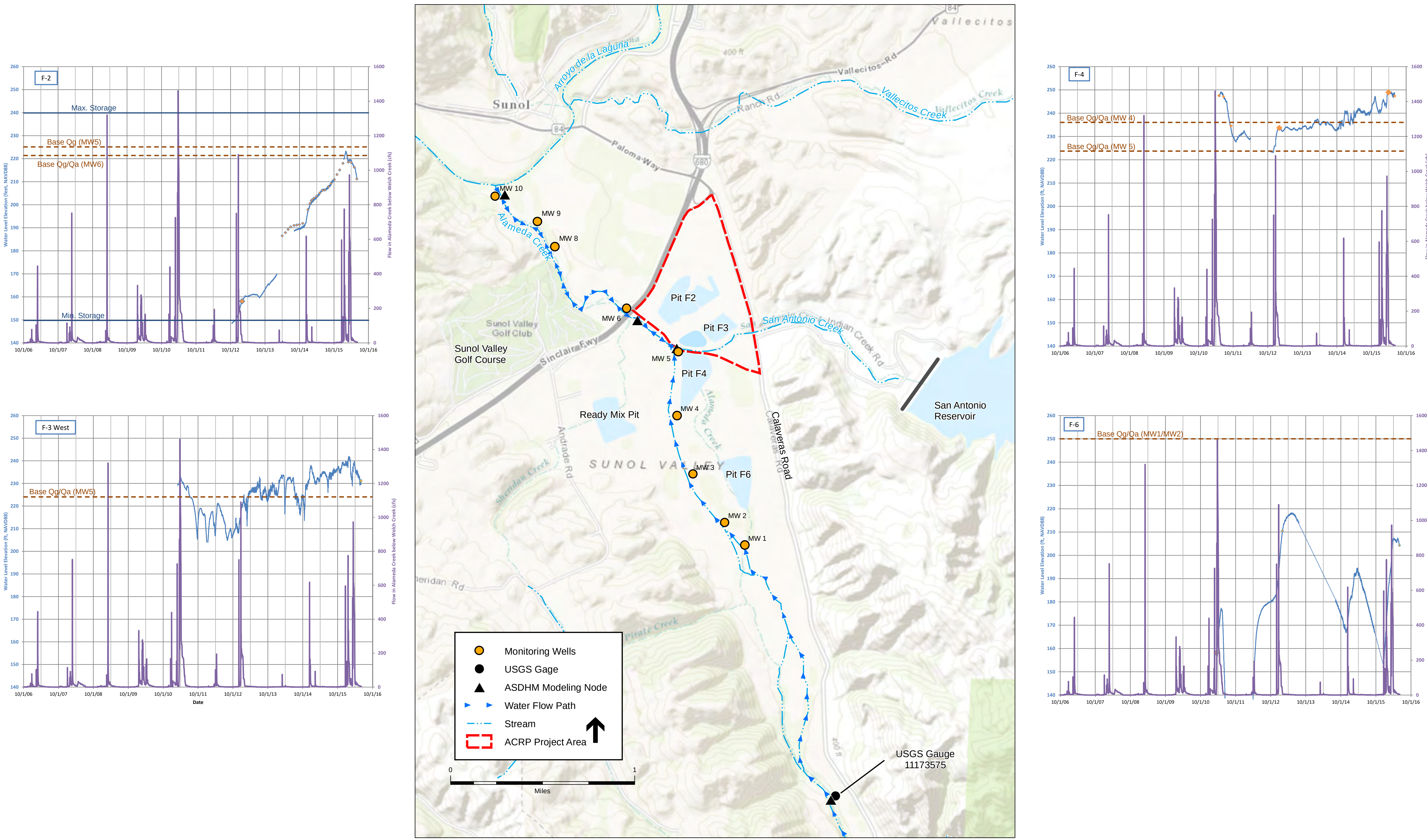
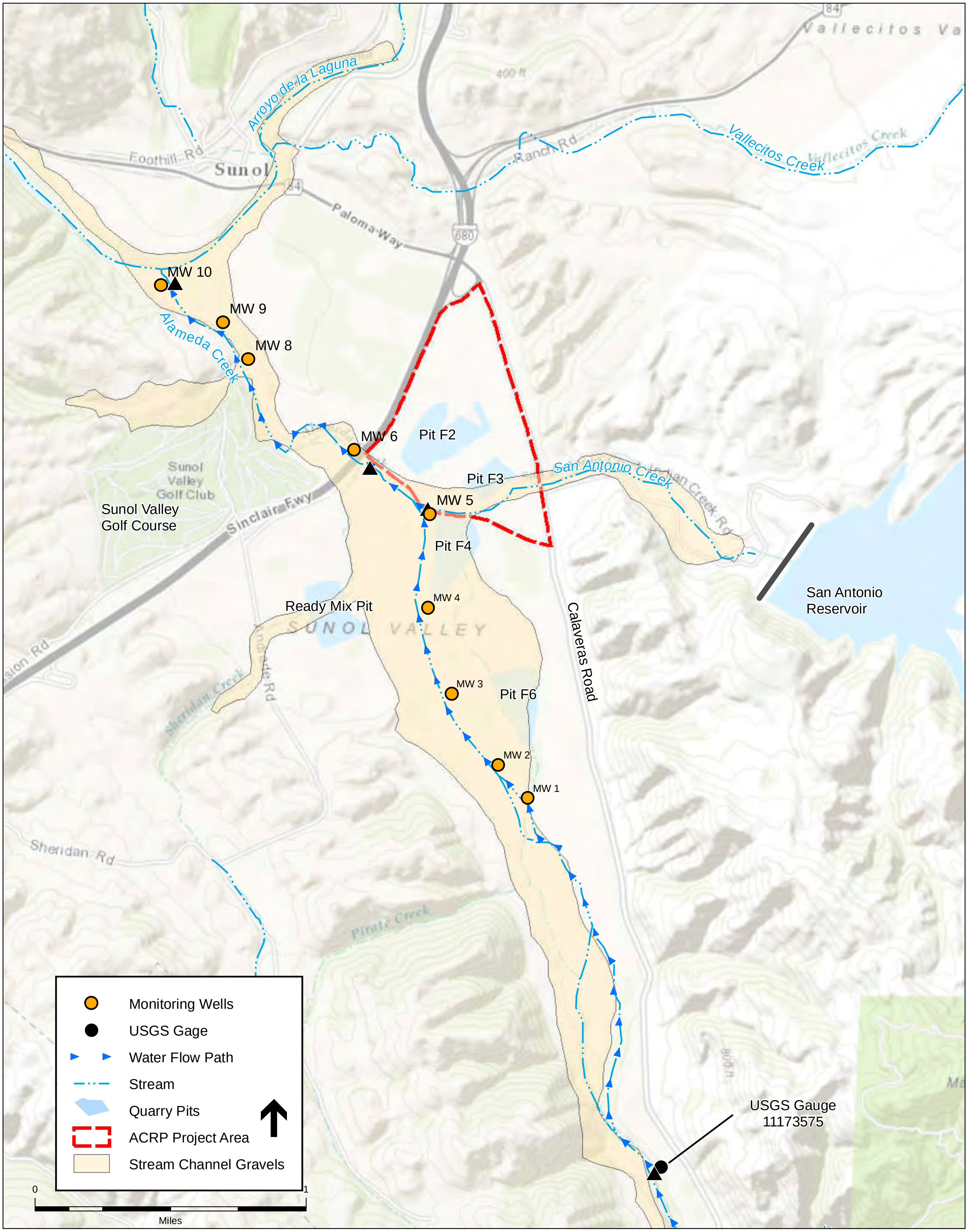
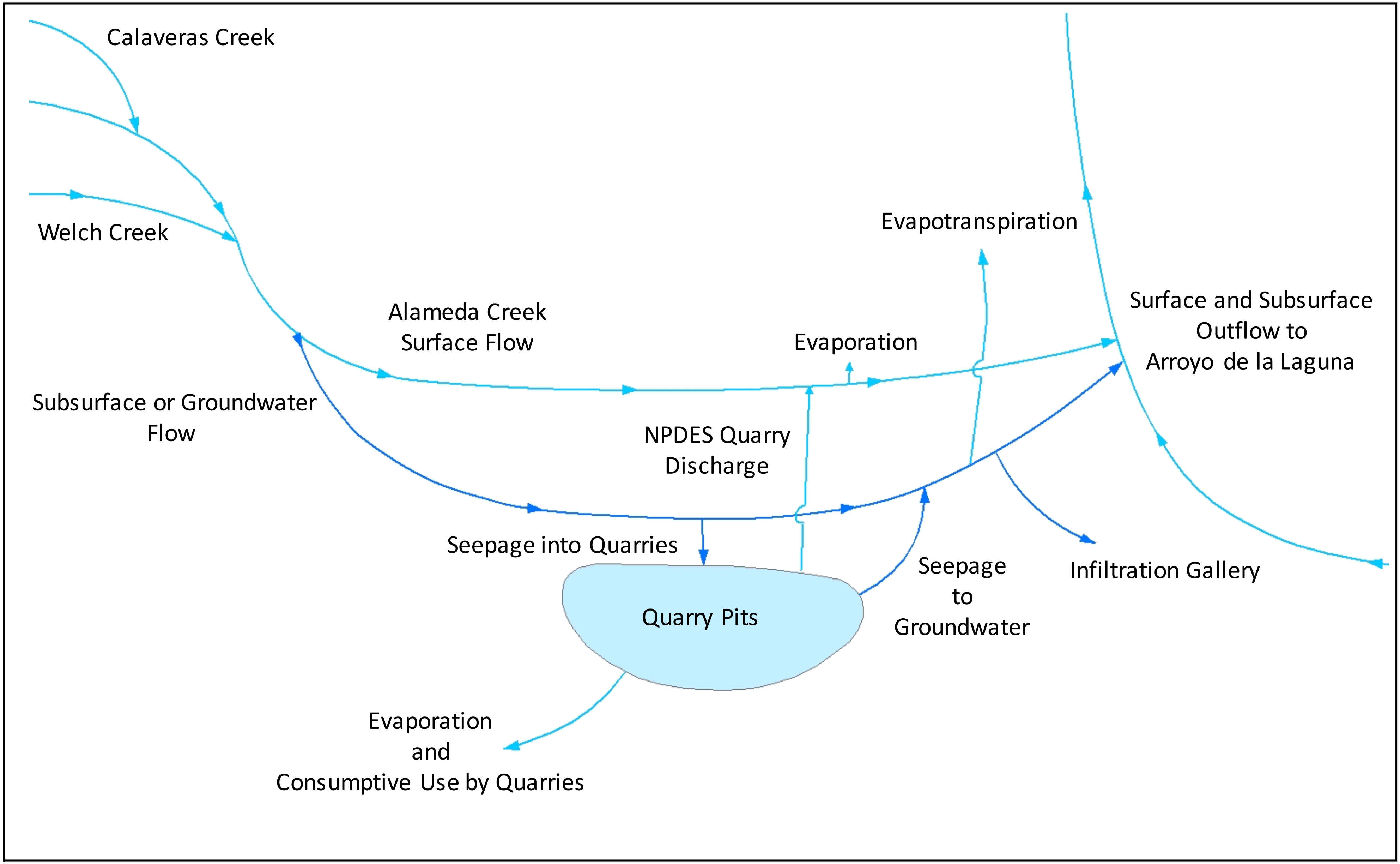


Figure 3
Water Levels in Quarry Pits for WY 2011 to Present



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4
Occurrence of Stream Channel Gravels (Qg)



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 5
Conceptual Flow Pathways
ACRP Groundwaeter - Surface Water Interactions

(a)

(b)

(c)

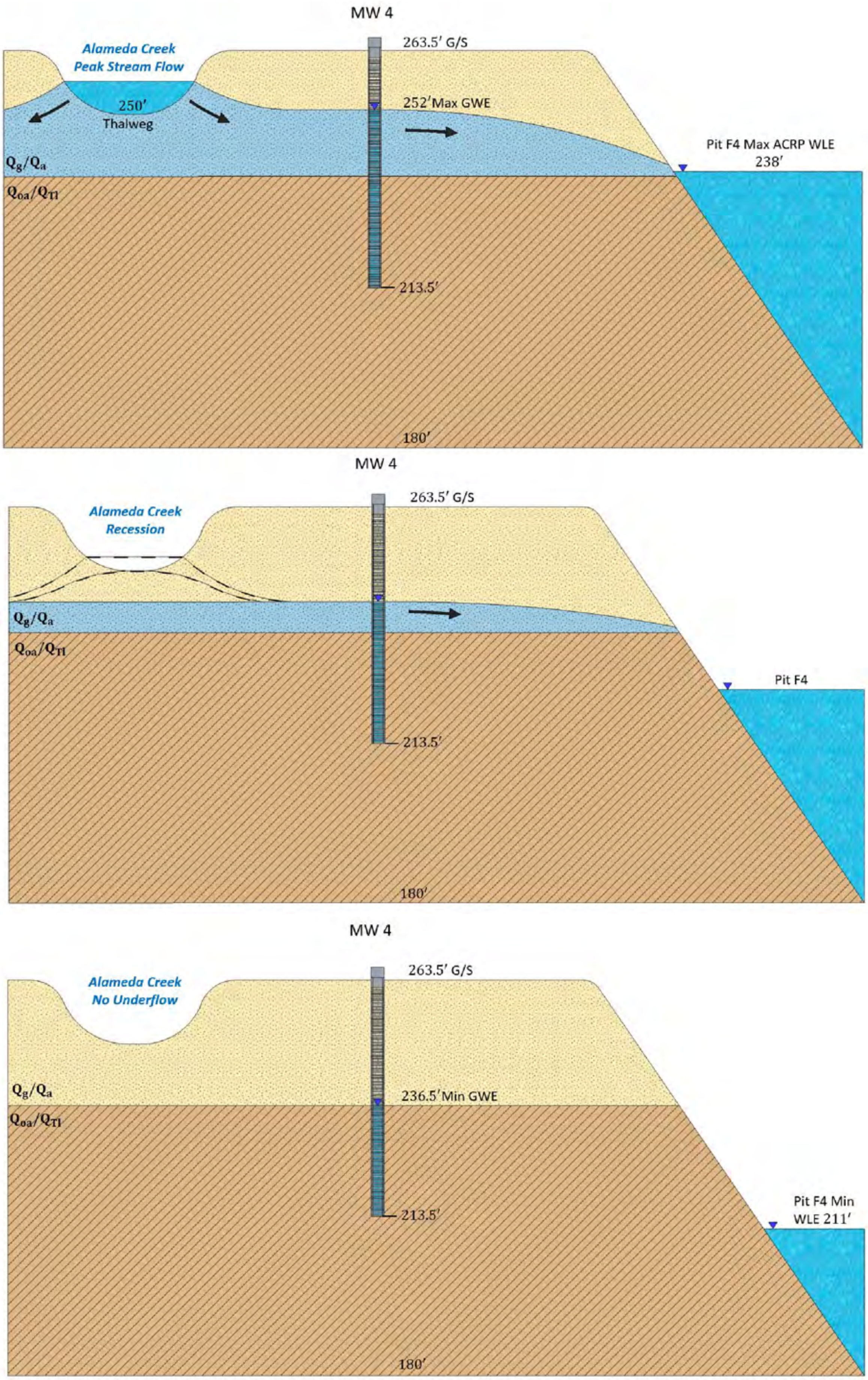
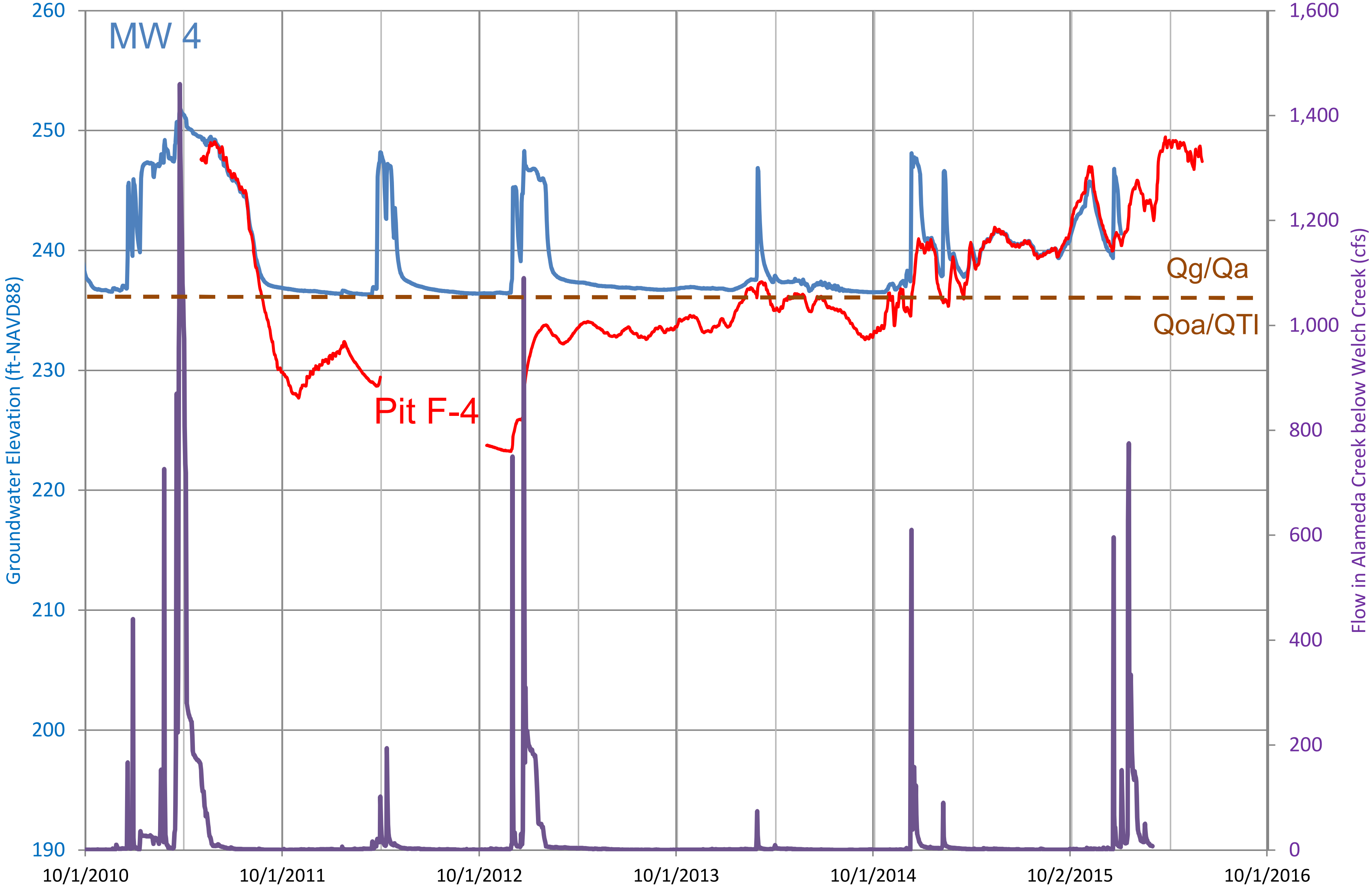
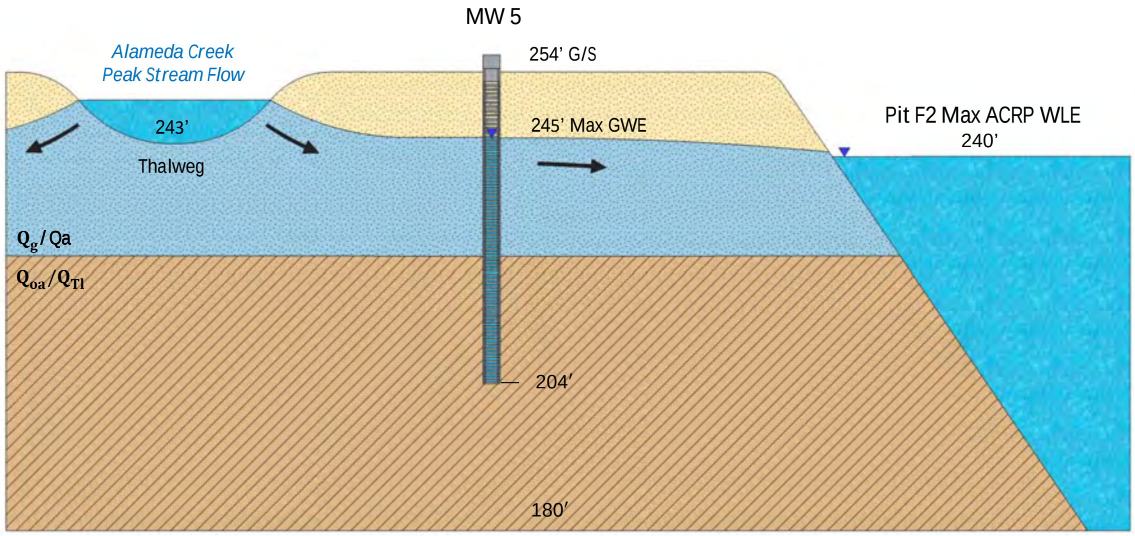


Figure 6
MW 4 and Peak Flow (a), Recession (b), and Minimum (c)

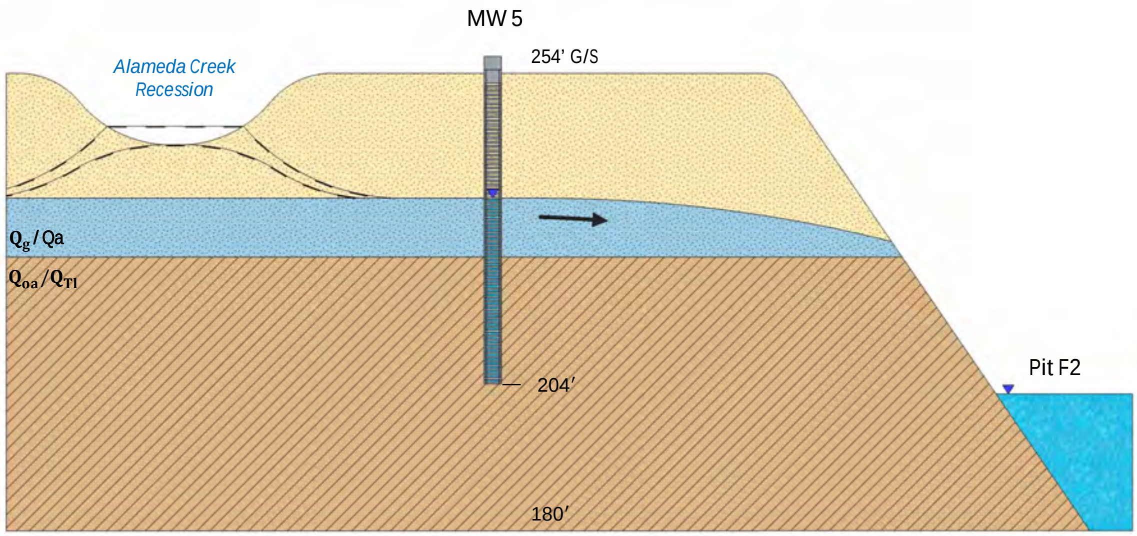


LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

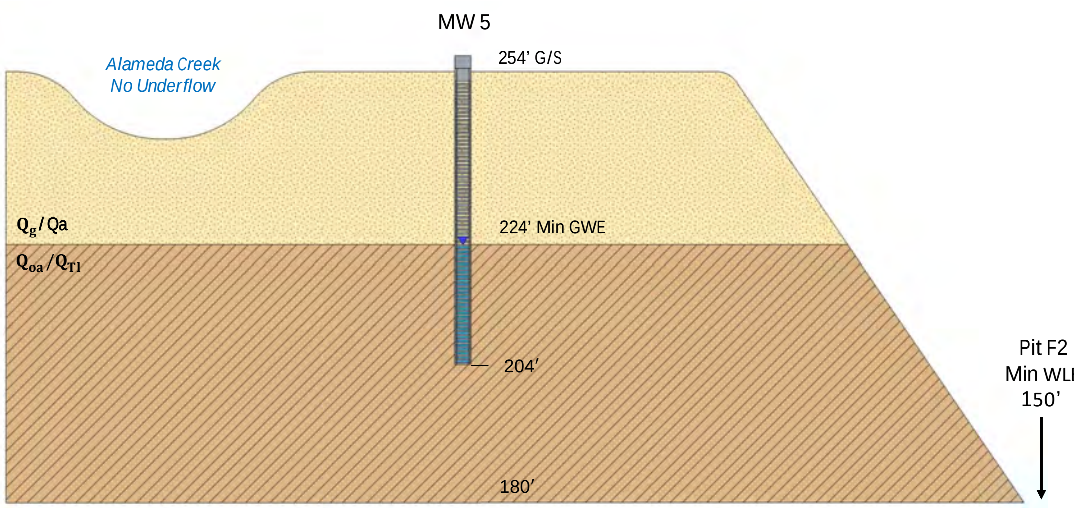
Figure 7
Hydraulic Connection Between MW 4 and Pit F-4



(a)

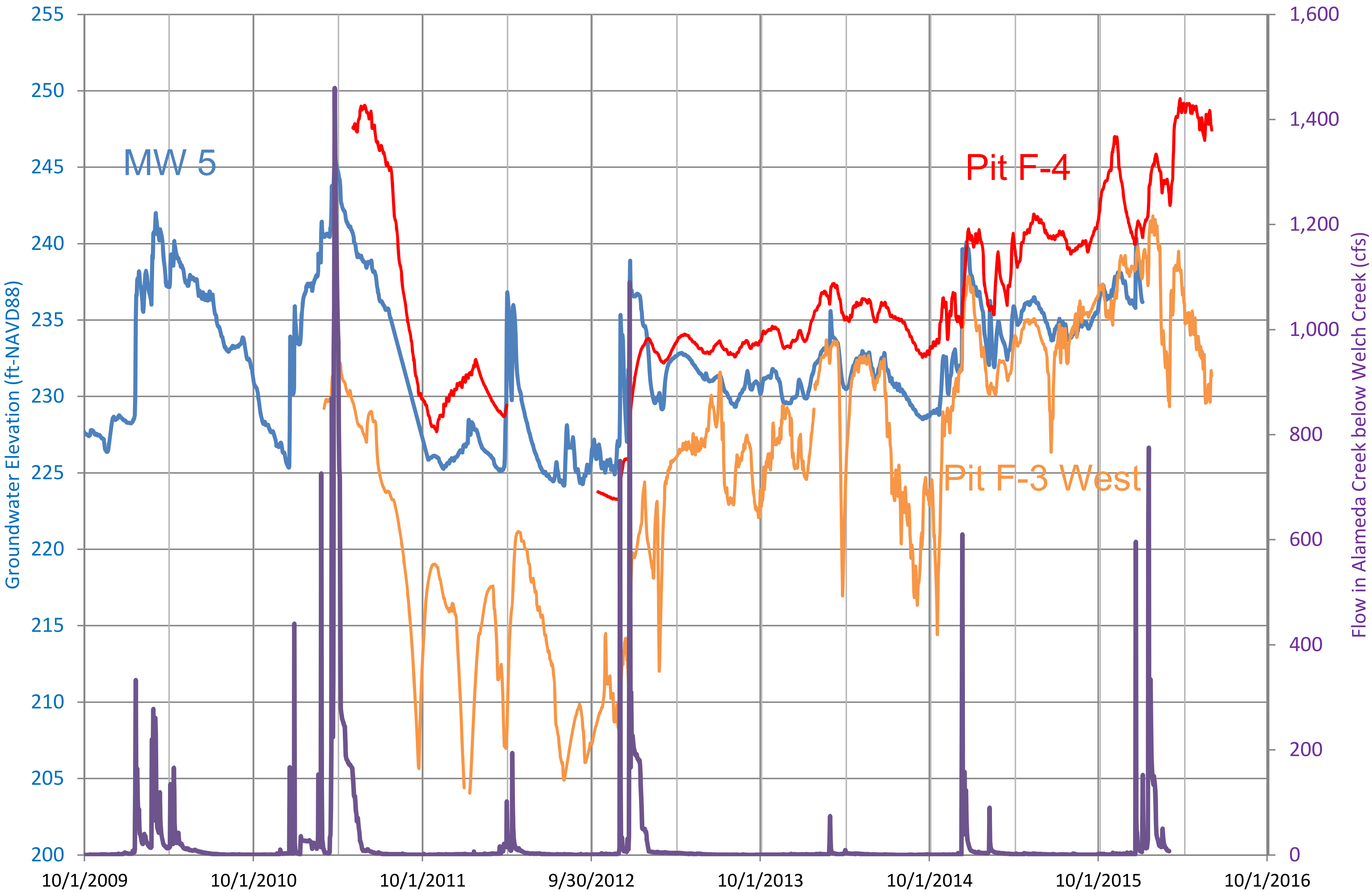


(b)



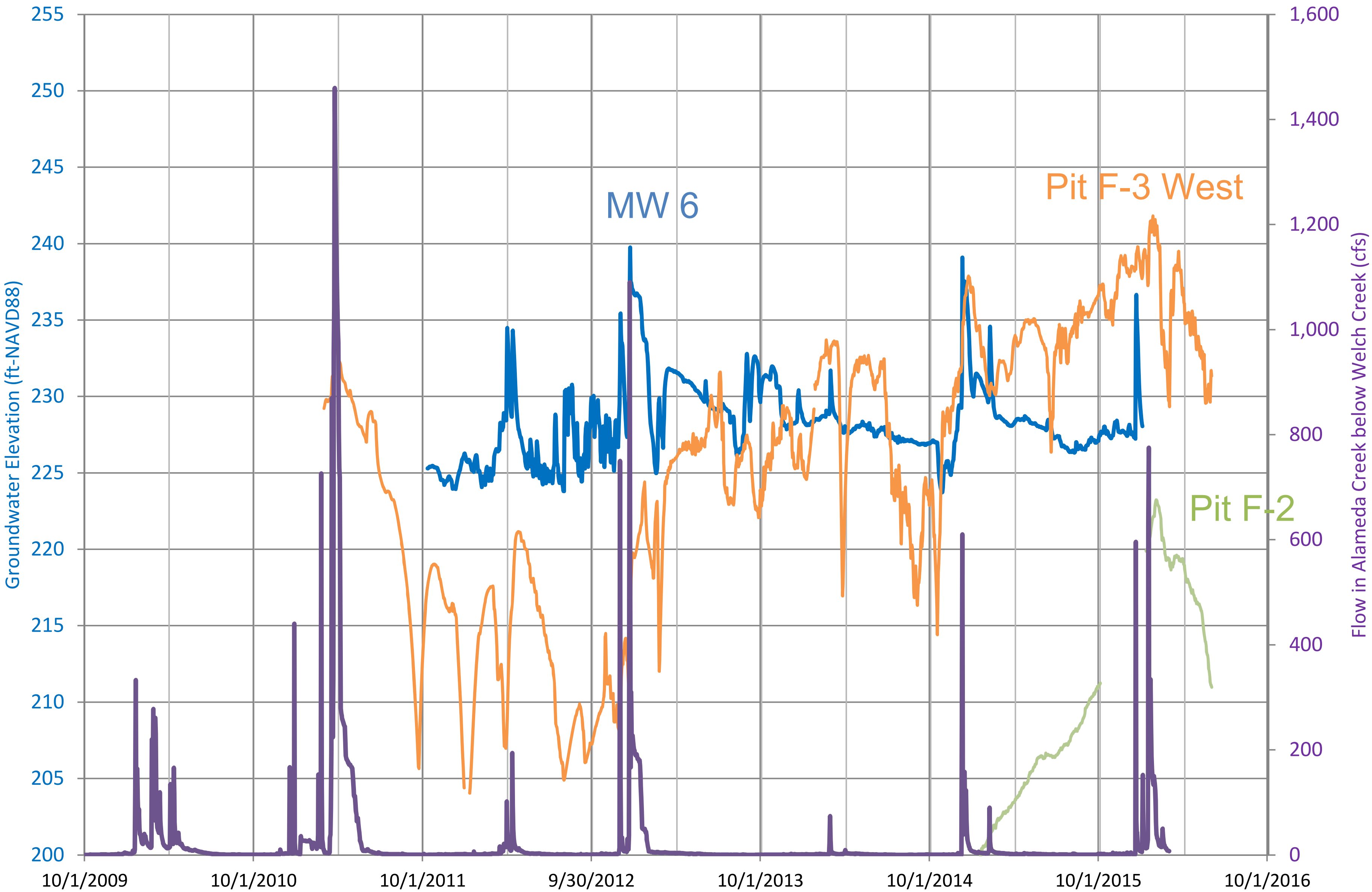
(c)

Figure 8
MW 5 and Peak Flow (a), Recession (b), and Minimum (c)



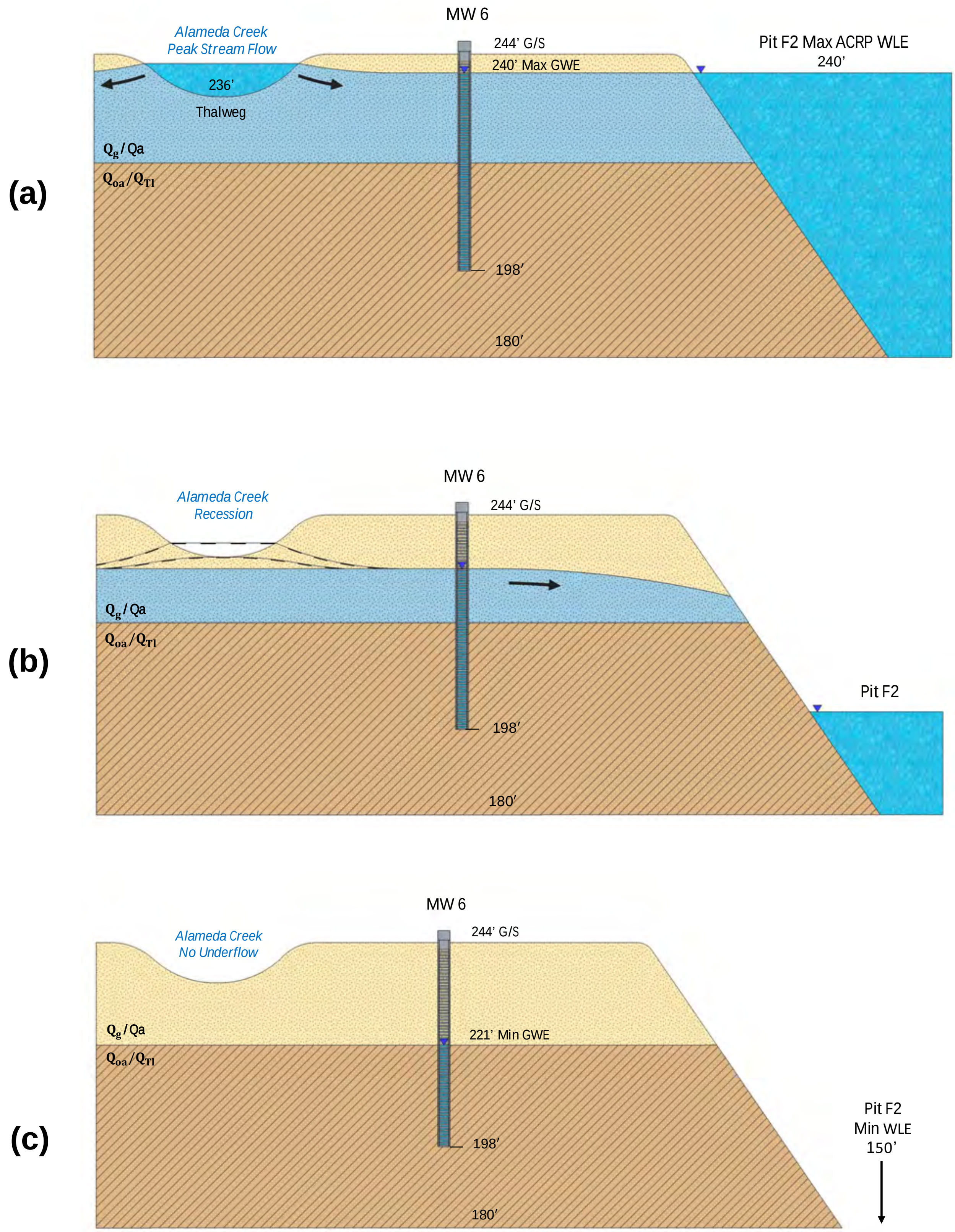
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 9a
Hydraulic Connection Between MW 5 and Pits F-4 and F-3 West



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

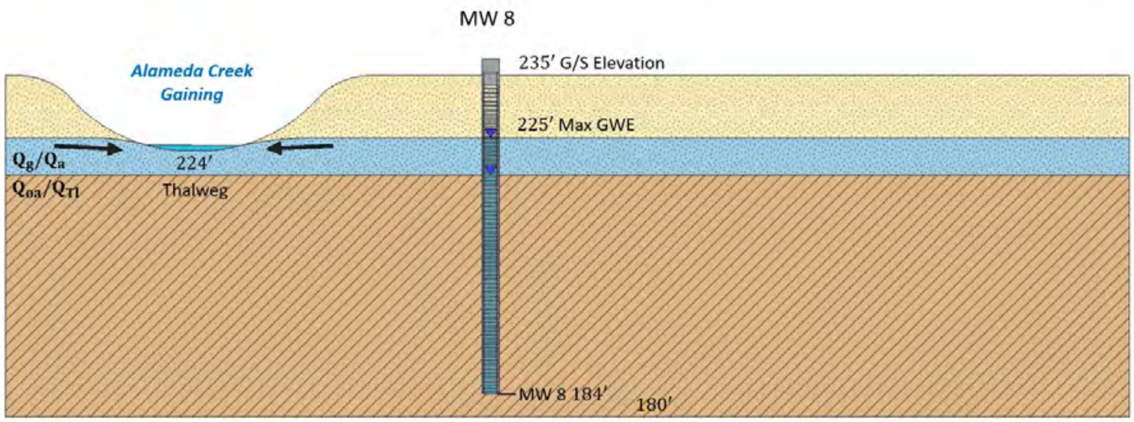
Figure 9b
Hydraulic Relationship between MW 6 and Pits F3-West and F-2



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 10
MW 6 and Peak Flow (a), Recession (b), and Minimum (c)

(a)



(b)

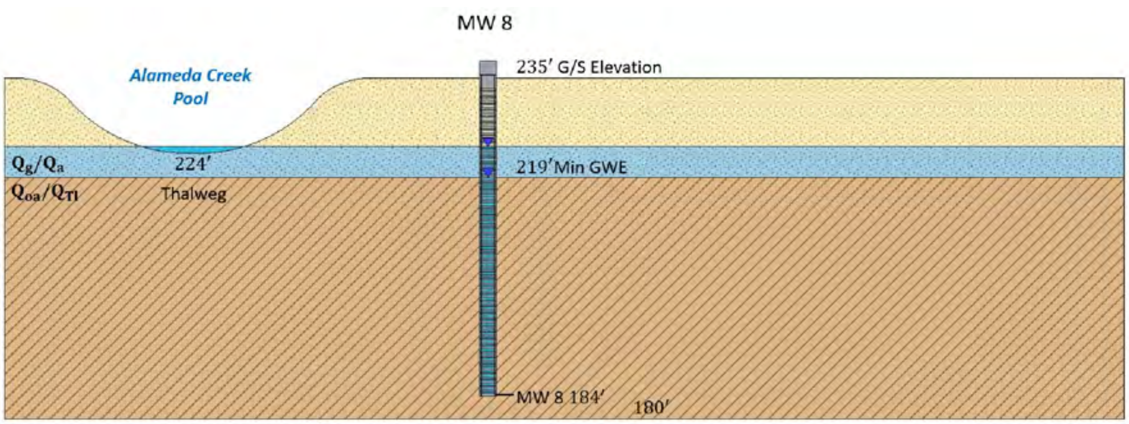
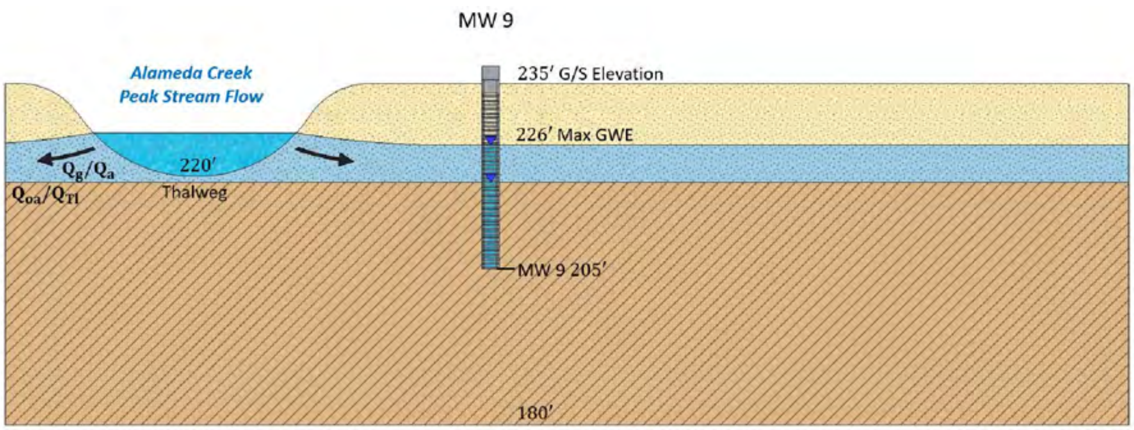


Figure 11
MW 8 Gaining (a), and Pool Recession (b)

(a)



(b)

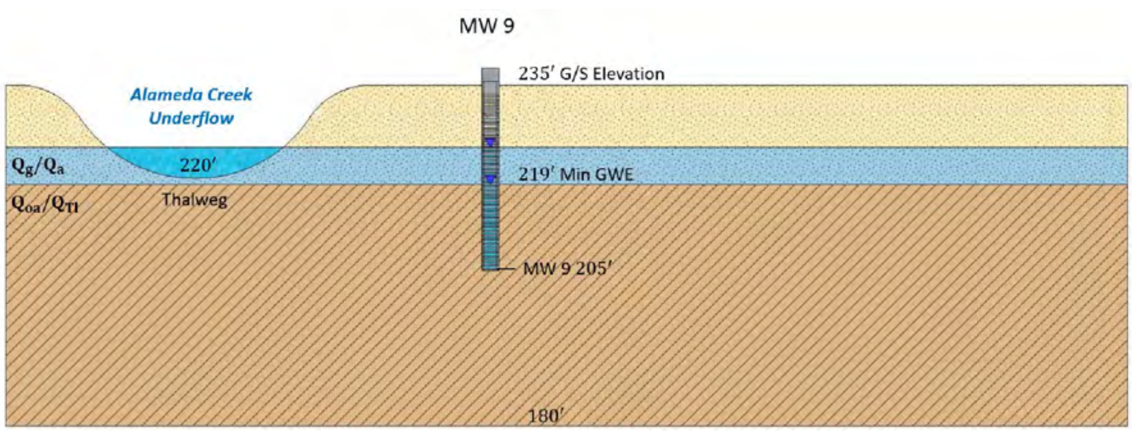
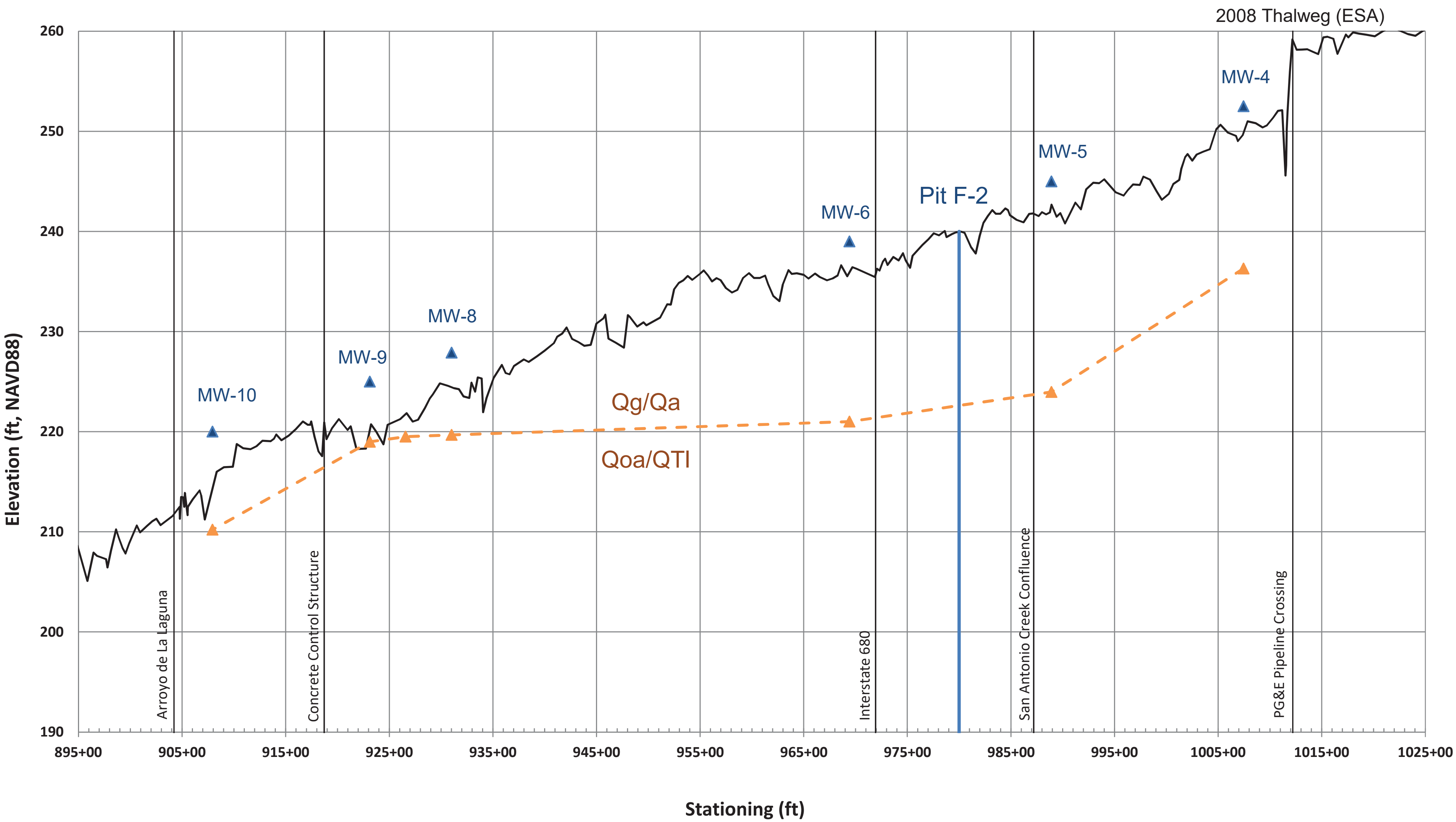


Figure 12
MW 9 Peak Flow (a) and Underflow (b)



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 13
Profiles of Thalweg and Shallow Aquifer Base (Qg/Qa)

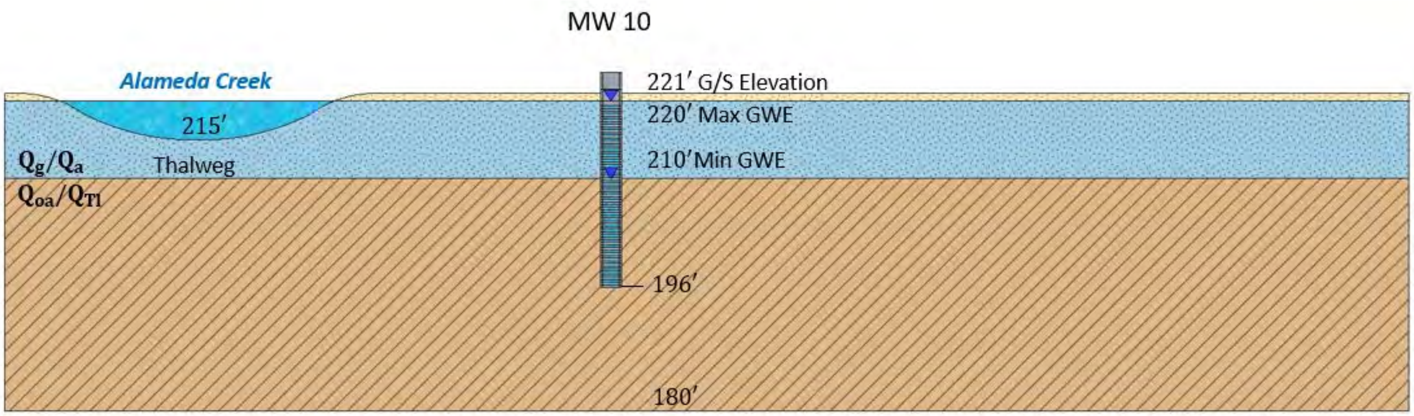
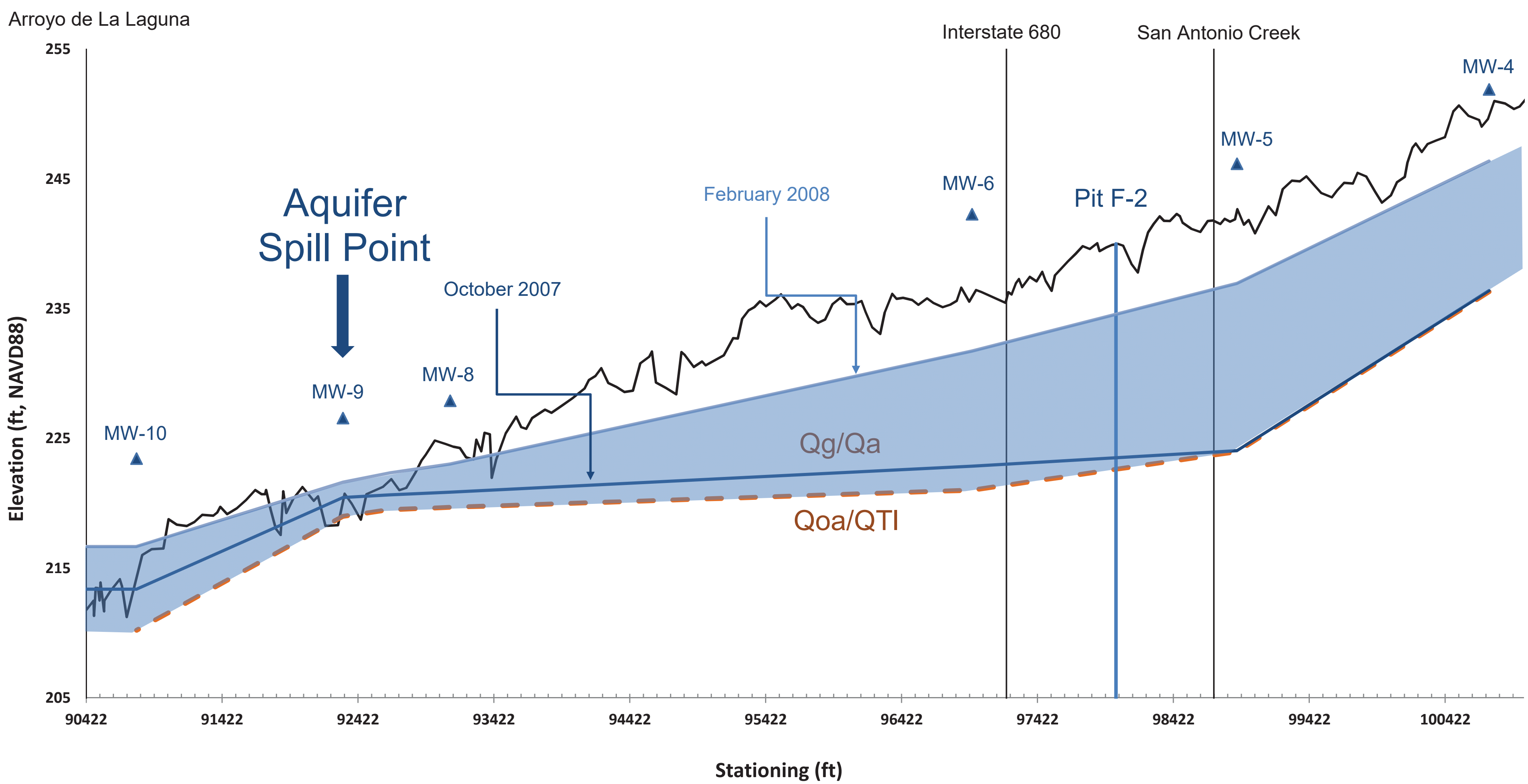


Figure 14
MW 10 Maximum Groundwater Elevation



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 15
Aquifer Spill Point - Groundwater Levels in February 2008 and October 2007

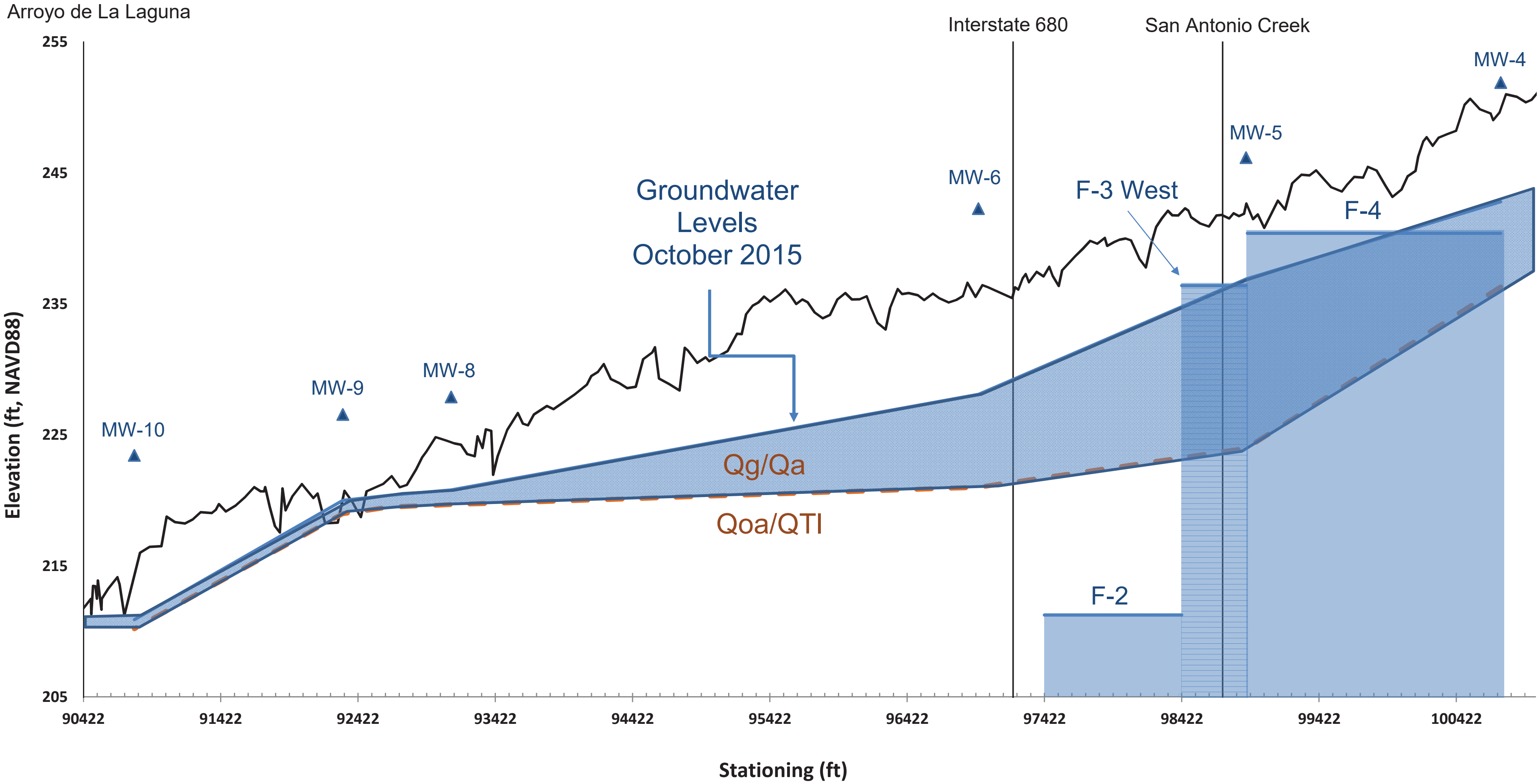
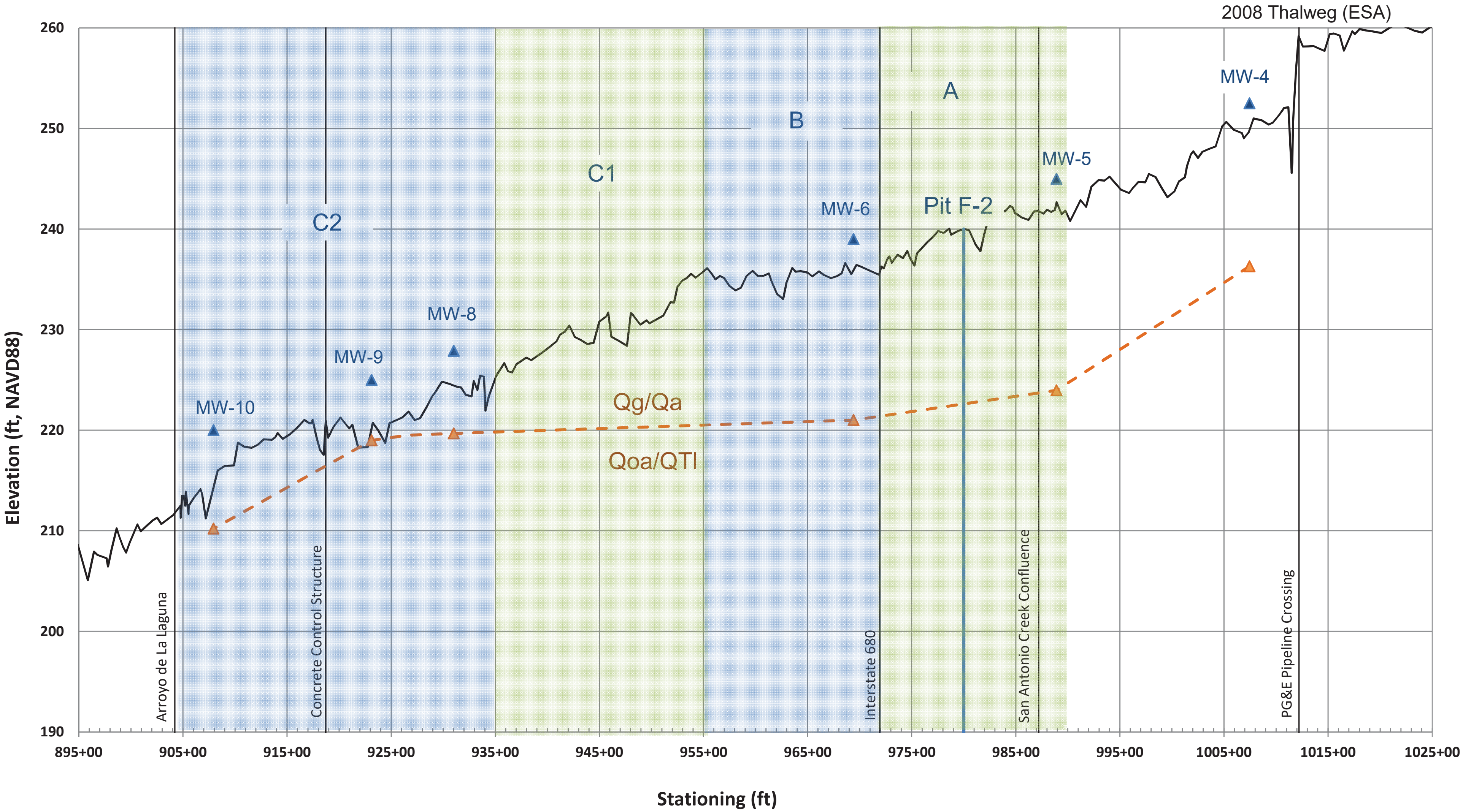
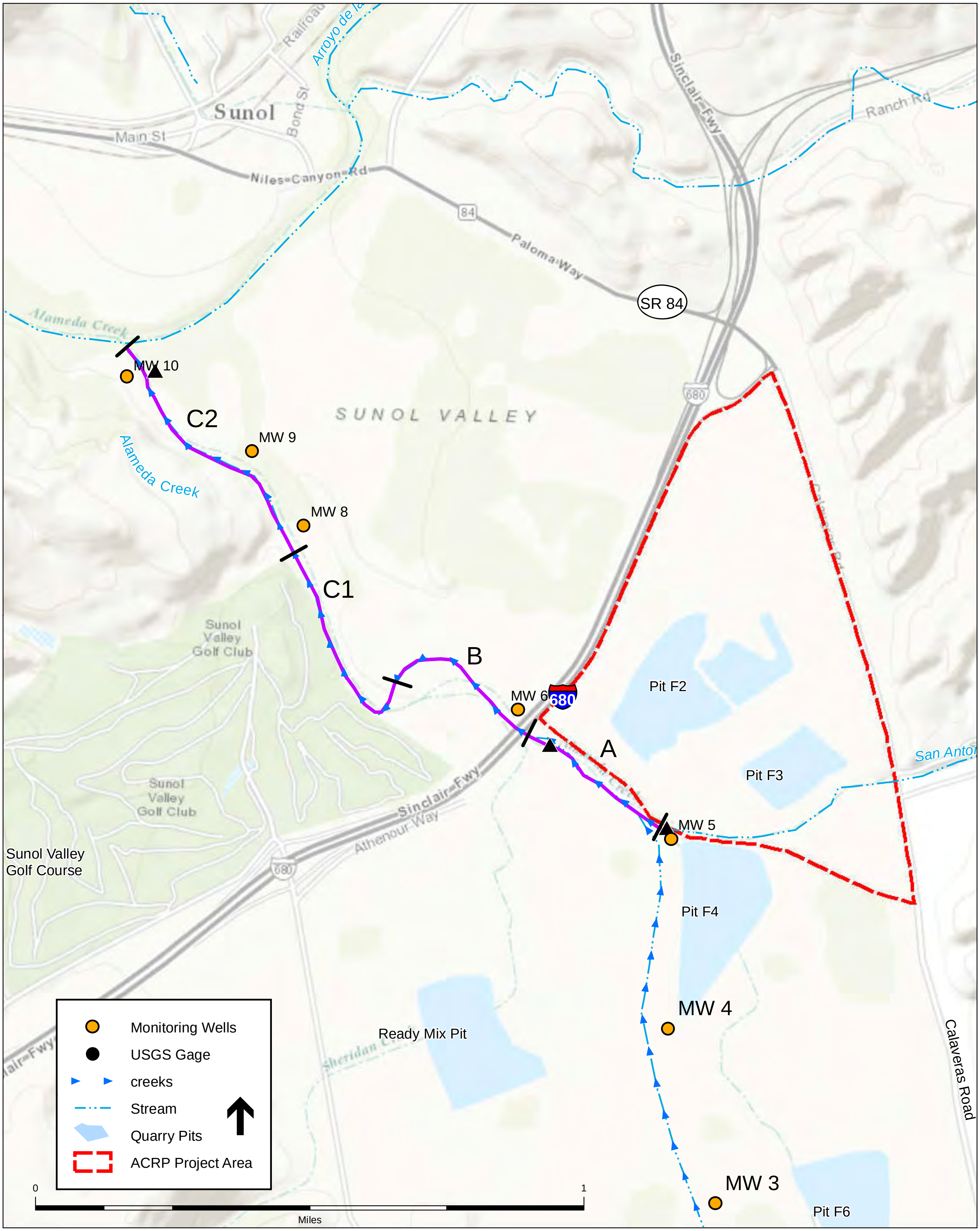


Figure 16
Gradient from Pits to Groundwater - October 2015



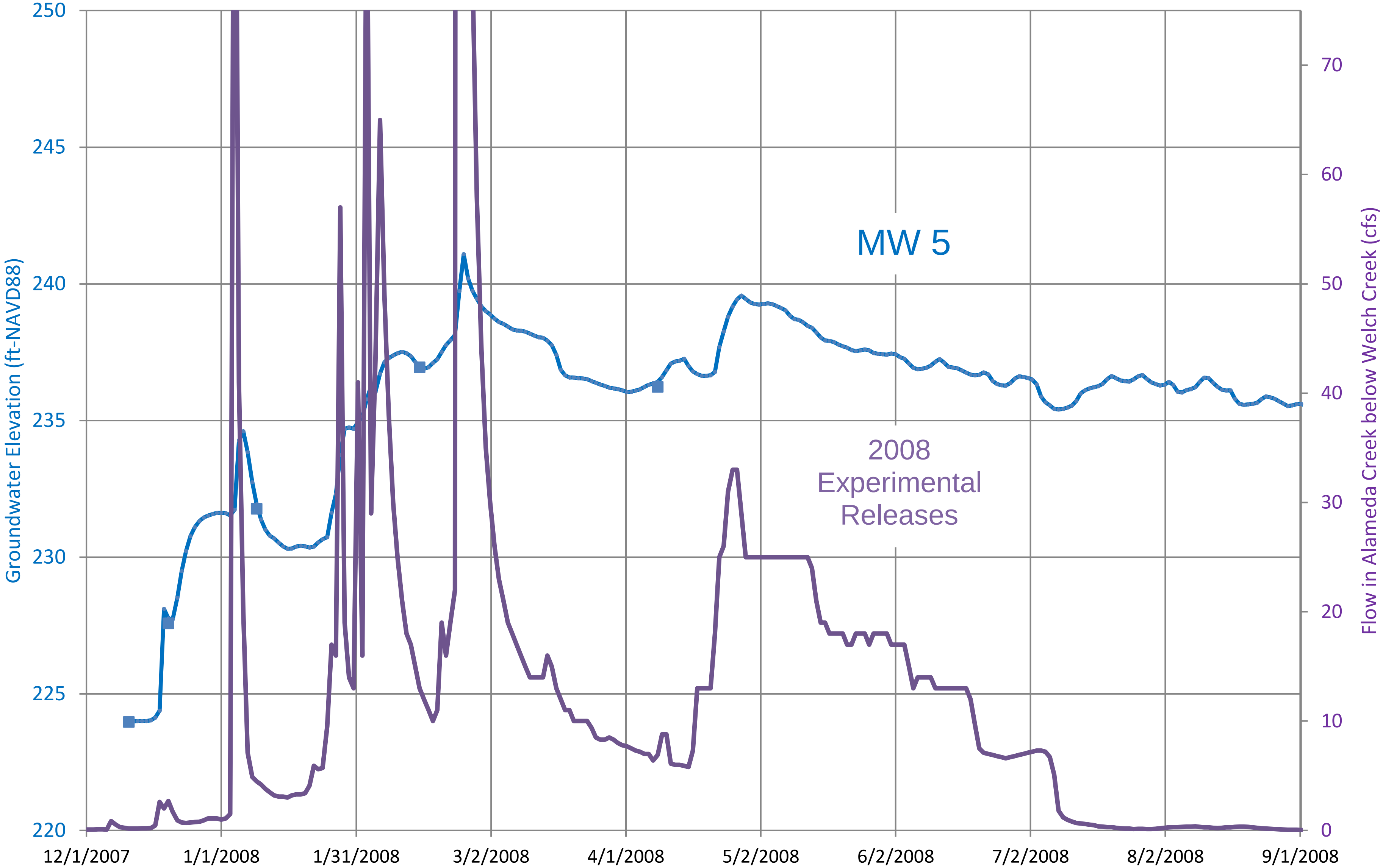
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 17
Subreaches for Impact Analysis Based on Aquifer Geometry



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 18
Study Area Subreaches



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 19
Groundwater Levels during Calaveras Experimental Releases

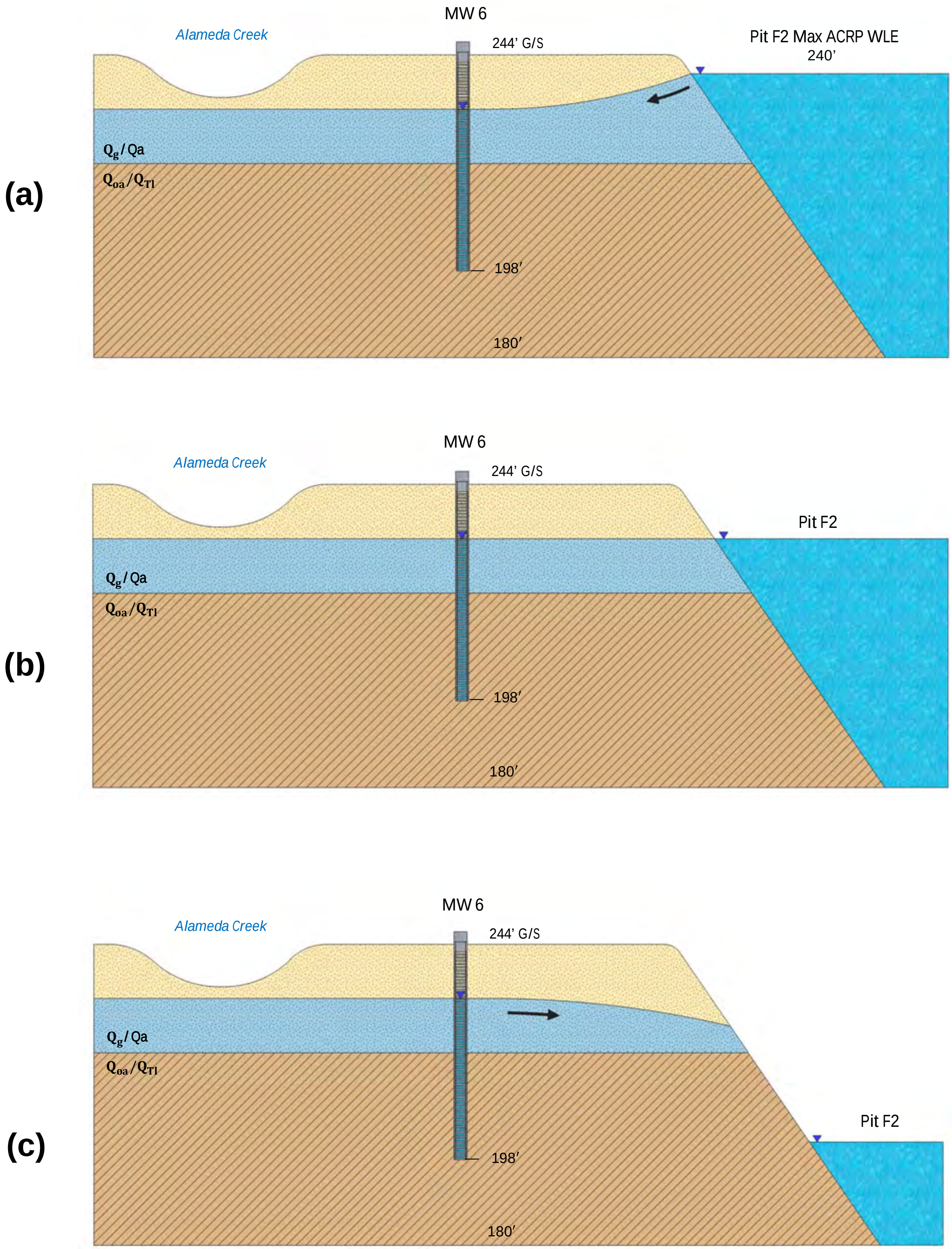


Figure 20
MW 6 With Maximum Storage (a), Storage Same as Groundwater (b) and Storage Disconnected (c)