OPERATIONS & MAINTENANCE MANUAL

SAN FRANCISQUITO CREEK FLOOD REDUCTION, ECOSYSTEM RESTORATION, AND RECREATION PROJECT

San Francisco Bay to Highway 101

April 4, 2016

DRAFT

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

HDR

Santa Clara Valley Water District

ACKNOWLEDGEMENTS

This manual was prepared through a collaboration of the San Francisquito Creek Joint Powers Authority (JPA). The members of the JPA are the Cities of East Palo Alto, Menlo Park and Palo Alto; the County of San Mateo; and the Santa Clara Valley Water District.

LIST OF COMMON ACRONYMS AND ABBREVIATIONS

District	Santa Clara Valley Water District
JPA	San Francisquito Creek Joint Powers Authority
LIS	Levee Inspection System
NAVD	North American Vertical Datum
O&M	Operation & Maintenance
RSP	Rock Slope Protection
SCVWD	Santa Clara Valley Water District
SFC	San Francisquito Creek
SMP	SCVWD Stream Maintenance Program
US 101	U.S. Highway 101
USACE	U.S. Army Corps of Engineers
YR	Year

GLOSSARY

bed	The bottom of a body of water, such as a stream, channel, or river.
bench	An area cut into a terrace for riparian zone restoration or for strengthening the design of a water channel.
Best Management Practices (BMPs)	Schedules of activities, use of erosion control measures, operation and maintenance procedures, and other practices to prevent or reduce the pollution of surface and ground water and prevent impacts to species of concern and their habitats.
brush	See woody brush
channel	A natural or human-made feature that conveys water. Channel erosion includes the processes of stream bank erosion, streambed scour, and degradation. Channel geometry is the structure of a waterway, including the force of water currents, the height and content of banks, and other features.
culvert	Any covered structure not classified as a bridge which conveys a waterway under a road or other paved area.
degradation	The lowering of the streambed by erosive processes such as scouring by flowing water, removal of channel bed materials, or downcutting of natural stream channels. Such erosion may initiate degradation of tributary channels, causing damage similar to that due to gully erosion and valley trenching.
downcutting	The erosive effect of water against the river channel and their protective features; incision.
erosion	The wearing away of land surface by running water including rainfall, surface runoff, drainage, or wind.
excessive vegetation	Vegetation growth whose pervasive presence obscures visibility and inhibits access.
flood	The temporary inundation of lands normally dry; any waters escaping from a creek or river.
floodwall	A wall constructed adjoining channel to prevent flooding of the surroundings areas.

freeboard	Vertical distance between the top of an embankment adjoining a channel and the water level in the channel.
levee	An embankment constructed to prevent a river or stream from flooding adjacent lands.
low-flow channel	The natural stream that carries the more frequent, periodic stream flows.
mitigation	An action taken to moderate, reduce, alleviate the impacts of a proposed activity by (a) avoiding the impact by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; (e) compensating for the impact by replacing or providing substitute resources or environments.
reach	The smallest subdivision of a drainage system consisting of a uniform length of channel or a discrete portion of a channel.
revetment	A facing of stones, sandbags, etc., to protect a wall, embankment, or earthworks
riparian	Pertaining to the banks of a river, stream, waterway, or other, typically, flowing body of water, as well as to plant and animal communities along such bodies of water.
rock slope protection	Loose rock or concrete of varying size, typically brought to a site. Used to protect channel banks and drainage outlets from scouring forces.
scour	The clearing and digging action of flowing water, especially the downward erosion caused by stream water in removing material (e.g., soil, rocks) from a channel bed or bank or around in-channel structures.
sediment	Solid material, both mineral and organic, that is carried by the water and settles to the bottom of channels, bypass culverts, drain pipes, or behind dams.
sedimentation	The process by which rock and organic materials settle out of water.
spalling	To break into pieces, esp. concrete.

station	A station is a standard channel location system used by the SCVWD that gives the distance from the downstream limit of jurisdiction (usually San Francisco Bay), or, for a tributary creek, from where it branches off of the main channel. Distance is measured in feet, with each "station" representing 100 feet for the Lower San Francisquito Creek Project levees. For example, station 26+00 would be a point 2,600 feet upstream from the mouth of the channel from San Francisco Bay along the left or right levee.
streambed	The part of a stream over which a column of water moves.
toe	The line of a natural or fill slope where it intersects the natural ground.
vegetation management	Removal or pruning of vegetation for any of a number of purposes including maintenance of infrastructure, fuel management, ecosystem modification or improvement, aesthetic, or purposes that provide desirable benefits in and adjacent to water channels to maintain their ability to function as flood protection facilities. In addition, vegetation is removed to meet local fire code requirements and to reduce combustible weeds and grasses on property adjacent to the streams within the Project. The control of invasive non-native vegetation is another purpose for which vegetation control is undertaken. Vegetation management is also required for maintaining visibility for inspection; ensuring access for maintenance work and flood fighting; and minimizing detrimental effects to levees, embankment, and bank protection. Vegetation management can be accomplished through mechanical or hand mowing, disking, hand clearing, or herbicide applications.
watershed	The area of a landscape from which surface runoff flows to a given point; a drainage basin. A ridge or drainage divide separates a watershed from adjacent watersheds.
woody brush	Thick, scrubby vegetation typically 6 feet in height or less. Brush is composed of shrubs and woody perennials usually growing in dense, impenetrable masses that can affect hydraulic conveyance in a channel.

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1 OVERVIEW AND ACCESS

1.1 Purpose of Manual

The manual provides a consolidation of data and requirements needed by the sponsor to perform operation and maintenance (O&M) activities at San Francisquito Creek. The San Francisquito Creek Joint Powers Authority (JPA) is responsible for project O&M. In its Resolution Number 14.11.20 (November 14, 2014), the JPA delegated responsibility for operation and maintenance of the Project to the City of East Palo Alto and the Santa Clara Valley Water District. This manual will govern the actions of both East Palo Alto and the Water District. The City of East Palo Alto (City) and the Santa Clara Valley Water District (District) will enter into an Agreement assigning roles and responsibilities to each agency. The Agreement will be attached to this Manual.

The manual has been developed as a "Living Document". It is expected that the sponsors will update it when changes to the project and O&M occur. Significant changes to the project or procedures that could potentially impact the operation of the project should be addressed by the JPA for review and approval (see Section 1.2).

Design criteria for flood risk reduction are the one-percent fluvial flow (9,400 cfs) and the one-percent tidal elevation plus sea level rise (11.30 ft). The one percent flow is that which has a one-percent statistical chance of occurring in any year; also known as the 100-year flow.

Sensitive species anticipated to be found within the Project area include the salt marsh harvest mouse, Ridgway's rail (formerly California clapper rail), steelhead, green sturgeon, and longfin smelt. Unobserved but potentially present may be the California red-legged frog, western pond turtle, and San Francisco garter snake. Avian species potentially present include the western burrowing owl, western snowy plover, California black rail, and California least tern.

Steelhead migration will be protected by installation of in-stream refugia of root wads and a rock resting structure. The low-flow channel will be retained and relocated where the channel has been widened.

1.2 Changes to the Project or the Manual

Proposed changes to the project/system and/or its O&M Manual should addressed by the JPA.

The current name and address is:
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

This manual will be reviewed and updated as necessary at a minimum of every five years to meet the strategies and actions necessary for potential impacts from global climate change and to incorporate lessons learned from previous operations and maintenance activities.

1.3 Project Vehicular Access

See Figures 1a and b for vehicular access locations to the San Francisquito Creek levees and floodwalls.

- For normal O&M, vehicular access points to the gravel and paved roads are located at East Bayshore Road, Verbena Drive, Daphne Way, Geng Road, and O'Connor Street. Access restrictors from public roadways, such as gates and bollards, are secured by locks.
- The Cities of Palo Alto and East Palo Alto and SCVWD shall have access to the Project areas as permitted under Table 2-1, below.
- Ramps providing direct channel access are located downstream from the Palo Alto Pump Station (L-Line STA 70+75) and near the overhead utility tower in the channel (L-Line STA 48+00). L-line is stationing in Santa Clara County.
- All access gates and bollards will remain locked when not in use.
- Access is available to pedestrians, bicyclists, and authorized cars and trucks.
- Access across Friendship Bridge and the Boardwalk is limited to pedestrians, and cars and light trucks. Vehicular carrying capacity of the boardwalk is 10,000 lb. Heavier equipment is not allowed.
- City of East Palo Alto has access to facilities within the City. Santa Clara Valley Water District has access to facilities within Santa Clara County. City of Palo Alto has access to facilities within the City.

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2 OPERATION

2.1 Introduction

In accordance with U.S. Army Corps of Engineers (USACE) technical guidance (*Levee Owner's Manual for Non-Federal Flood Control Works, the Rehabilitation and Inspection Program, Public Law 84-99*, March 2006), this section covers routine operations and maintenance details required for the proper care and efficient operation of the various project elements, including levee embankments, floodwalls, channels, interior drainage system, and pump stations. Maintenance records will be maintained and available for inspection in SCVWD Watershed Operations and Maintenance Division and East Palo Alto Public Works/Maintenance. For project design information, see Appendix A, Design Documentation Report and Appendix B, Project As-Built Drawings. Maintenance documents to be followed are in Appendix C, SCVWD Inspection Guidelines, Rating Guides and Checklists.

Some maintenance activities require regulatory permits and/or authorization to perform the work. The work activities for specific locations will need to be analyzed for determination of possible significant impacts through the appropriate environmental review and adoption process. O&M activities will be performed in accordance with SCVWD Maintenance Best Management Practices; however, separate permits will be obtained when maintenance, except for vegetation control, is required.

Owners and/or occupants of properties on which maintenance easements exist or which are adjacent to public agency-owned property on which work will be performed should be notified and/or approval obtained before work is commenced.

Table 2-1

Contact Information for Access

Location	Easement /Adjacent to Fee	Location Name	Contact Address	APN	Contact(s)
Santa Clara County	Easement	City of Palo Alto	Ranger Station 2500 Embarcadero Rd Palo Alto 94303	008-01-032 and 008-06-001	Richard Bicknell (650) 617-3156
Santa Clara County	Easement	United States Postal Service	2085 E. Bayshore Palo Alto, 94303	008-01-049	Dean Maeda, Postmaster (650) 321-1423
Santa Clara	Easement	International School of the	151 Laura Lane	008-01-050	François Guedenet (650)

County	and Fee	Peninsula	Palo Alto, 94303		251-8525
Santa Clara County	Fee	Yeaman Auto Body and Palo Alto Upholstery	2025 E. Bayshore and 2023 E. Bayshore Palo Alto, 94303	008-01-015	Scott Yeaman (650) 328-8169 and Mitch Johnson (650) 326-6414
Santa Clara County	Fee and Easement	Santa Clara Valley Water District	5750 Almaden Expressway, San Jose, 95118	Fee: 008-01-014 008-01-009 008-01-020 Easement: 008-06-001 008-02-032	Community Projects Review Unit (408) 630-2650
San Mateo County	Easement	Public Storage	1985 E. Bayshore East Palo Alto, 94303	063-571-060	(650) 999-0658
San Mateo County	Easement	City of East Palo Alto	1960 Tate Street East Palo Alto 94303	063-580-010	Kamal Fallaha (650) 853-3117
Faber Tract	Veg. Maint. Only during estab. period	Don Edwards San Francisco Bay National Wildlife Refuge	2 Marshlands Rd. Fremont 94555	063-580-090 (City of Palo Alto Property)	Cheryl Strong (510) 557-1271

2.2 Removal of Excess Sediment and Vegetation

The following sections identify the trigger points for the removal of sediment and/or vegetation so that the project complies with the as-built conditions.

Sediment Removal Triggers for Channel

Excess sediment in the channels affects the conveyance capacity of the improvements and impairs the ability of the Project to function as designed.

From Highway 101 to the San Francisco Bay, sediment deposition accumulated to a continuous elevation 8.0' (NAVD88) will reduce the levee/floodwall freeboard by 50% (1.5 feet) which will require sediment removal.

Sediment removal is also triggered when sediment deposition impedes fish migration, including within the footprint of in-stream refugia.

No sediment deposition is anticipated during normal conditions. Upstream bank failure could provide an amount of sediment that the channel could not accommodate, requiring a maintenance need as a result of an unpredictable event. In the event that tidal deposition reaches an equilibrium at a different elevation than designed, a berm or other means of recapturing freeboard will be installed.

In accordance with the District's 2013-2023 Stream Maintenance Program, sediment removal will not exceed 300 linear feet for an individual work project.

Vegetation Removal Triggers for Channel

Vegetation management refers to the removal of vegetation for the purposes of maintaining specific flood control objectives such as passage of flood flows and to maintain flood control access (project inspections, flood fighting, maintenance and repairs).

From Highway 101 to the San Francisco Bay, a maximum roughness coefficient of n=0.055 (similar to continuous thickets or rigid woody understory and brush) would result in a reduction of levee/floodwall freeboard of 33% (1.0 foot). This condition is based on brush or excessive vegetation (n-value = 0.055) being present on the terraced benches and levee side slope.

The system has been designed to a maximum roughness coefficient of n=0.038 (similar to grasses). Maintenance activities shall occur when woody understory or brush is encountered.

3. MAINTENANCE

3.1 Vegetation Maintenance

The Project site is habitat for the endangered species Salt Marsh Harvest Mouse (SMHM) and Ridgway's Rail (RR), formerly California Clapper Rail. All activities for the Project shall be in accordance with protection measures listed in Section 3.1.3 SMHM monitor shall be on site for duration of all work except irrigation and hand weeding. Herbicides are required to remove invasive species within mitigation plantings. Herbicide application shall be done with immediate oversight by a State-certified Qualified Applicator with the appropriate certification categories. Herbicide application shall be in accordance with QEMS Procedures Q751D02, Control and Oversight of Pesticide Use, and W751D01, Pesticide Products Approved for District Use and QEMS

Work Instruction WW75100, Vegetation Control Work Instructions (Appendix F, Pesticide Use and Vegetation Control).

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3.1.1 Mitigation Plantings during Establishment Period

3.1.1.1 Instream benches adjacent to levees and floodwalls to remove undesired and non-native vegetation

a. Hand weeding or hand mowing (weed whacker) every 2 weeks, summer and fall (two-day duration).

b. Herbicide application typically will be performed five days per year but this may be modified based on field conditions (see section 3.1.3.g below for details).

c. See the restrictions in Section 3.1 for all activities.

3.1.1.2 Faber Tract levees (See Figure 3)

a. Remove unwanted vegetation and control non-natives (hand methods) as needed.

b. Remove of diseased vegetation as needed.

c. Implement additional maintenance measures, as needed, to ensure that long term success criteria are met.

d. Note that Faber Tract levees are within the Don Edwards San Francisco Bay National Wildlife Refuge, and any maintenance requires specific conditions.

3.1.2 Erosion Control Plantings

a. Annual mowing of grasses (two-day duration) to 3 to 4 inches high on levee slopes from top of levee to levee toes in summer or fall for inspection of levee integrity, maintaining channel roughness, and fire risk reduction.

b. Hydroseed with erosion control seed mix on bare spots on levee faces due to fire or slope repairs in fall or early winter months to facilitate germination.

c. Monitor hydroseeded areas for success.

d. Repeat hydroseed application, as needed if first attempt was not successful.

e. See the restrictions in Section 3.1 for all activities.

3.1.3 Protection for Endangered Species

a. Note, all work will be in accordance with the United Sates Fish and Wildlife Service and National Marine Fisheries Service Biological Opinions (Appendix I). Any variance between those

conditions and others in this manual or appendices will be superseded by the conditions of the Biological Opinions

b. Within 7 days prior to work within the range of SMHM or RR, as depicted on the SCVWD's GIS layers, the proposed project area will be surveyed by a qualified biologist to identify specific habitat areas. Surveyed areas will include work locations and access routes. If the SCVWD's GIS information is revised, it will be provided to the USFWS for review.

c. To minimize or avoid the loss of individuals, activities within or adjacent to RR and SMHM habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above) when the marsh plain is inundated, because protective cover for those species is limited and activities could prevent them from reaching available cover.

d. Mowing will not occur at night.

e. Vegetation will be removed by hand from areas of cordgass (*Spartina* spp.), marsh gumplant (*Grindelia* spp.), pickleweed (*Sarcocornia pacifica*), alkali heath, (*Frankenia* sp.), and other high marsh vegetation, brackish marsh reaches of creek with heavy accumulations of bulrush thatch (old stands), and high water refugia habitat that may include annual grasses, and shrubs immediately adjacent to channels.

f. Prior to the initiation of work each day for all vegetation management work, ground or vegetation disturbance, operation of large equipment, grading, sediment removal, and bank stabilization work, and prior to expanding the work area, a qualified biologist will conduct a preconstruction survey of all habitat that may be directly or indirectly impacted by the day's activities (work area, access routes, staging areas).

    i. If during the initial daily survey or during work activities a RR is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until the RR leaves the work area.

    ii. If during the initial daily survey or during work activities a SMHM or similar rodent is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until a *Site Specific Species Protection Form* can be developed and implemented by a qualified biologist to protect the SMHM or similar rodent is developed and implemented by the qualified biologist. Acceptable plan activities may include one or more of the following activities: 1) establishment of a buffer zone at least 50 feet in radius from the rodent; 2) ongoing active monitoring, 3) delay of work activity until the qualified biologist can

provide CDFW and the USFWS a suggested course of action and seek concurrence.

g. If mowing with hand equipment will be performed within 50 feet of habitat areas, an on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. If SMHM are detected within the area to be mowed, no mowing will occur in that area at this time. If RR is detected within the area to be mown, the mowing will stop until the individual(s) have left the work area.

h. If visual observation cannot confirm RR left the work area then it is assumed that the individual(s) remains in the work area and the work will not resume until the area has been thoroughly surveyed (and absence confirmed) or the USFWS has been contacted for guidance.

i. Use of Herbicides

   i. Herbicides will be applied topically and not be broadcast (area spraying).

   ii. All herbicide applications will be performed under the planning and direction of a California-licensed Pest Control Advisor.

   iii. Herbicide applications within the banks of channels within 20 feet of any water present will take place only between July 1 and October 15, or until the first occurrence of any of the following conditions; whichever happens first:
      - local rainfall greater than 0.5 inches is forecast within a 24-hour period from planned application events; or
      - when steelhead begin upmigrating and spawning in San Francisquito Creek, as determined by a qualified biologist (typically in November/December),
        - A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). No surfactants will be used. Any modifications to these materials would require review and approval by NMFS and CDFW; and
        - A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning biological resources and

determine which BMPs would be instituted for work to proceed.

- In addition, herbicide application requirements are as follows:
  - no direct application into water;
  - herbicide application shall not occur when wind conditions may result in drift; and
  - herbicide solution shall be applied only until there is a “wet” appearance on the target plants in order to avoid runoff

iv. Approved herbicides and adjuvants may be applied in habitat areas for sensitive wildlife species (including those identified in the project area such as steelhead, California red-legged frog, and salt marsh harvest mouse); all applications will occur in accordance with federal and state regulations.

v. For sprayable or dust formulations: when the air is calm or moving away from sensitive wildlife habitat, applications will commence on the side nearest the habitat and proceed away from the habitat. When air currents are moving toward habitat, applications will not be made within 200 yards by air or 40 yards by ground upwind from occupied habitat. However, these distances may be modified for the control of invasive species on salmonid streams if the measures in Section iii, above, are implemented.

j. See Section 3.2.1.3 for additional restrictions.

k. Effects on native aquatic vertebrates will be avoided or minimized. If native aquatic vertebrates are present when in-stream work is proposed, an evaluation of the project site and species within will be conducted by a qualified biologist, who will consider:

i. Species at the site,

ii. Ability of the species to naturally recolonize the stream reach,

iii. The life stages of the species present,

iv. The flow, depth, topography, substrate, chemistry, and temperature of the stream reach,

v. The feasibility of relocating the species present, and

vi. The likelihood the stream reach will naturally dry up during the work season. Based on consideration of these factors, the qualified biologist will document in writing the reasons to relocate or not the species prior to in-channel work. Relocation will be based on the District’s Fish Relocation Guidelines.

3.1.4 Other Vegetation Removal

3.1.4.1 Removal of woody and non-woody invasive vegetation within project right-of-way for inspections at base of levee toes using herbicide application, mechanical mowing, hand mowing and trimming, or hand weeding.

a. Cut and remove woody growth (trees and saplings) within 15 feet of outboard levee toe.

3.1.4.2 Removal or pruning of all vegetation encroaching within project right-of-way using herbicide application, mechanical mowing, hand mowing and trimming, or hand weeding.

a. Remove ground cover that obscures visual inspections of levee and floodwall structures for damage and for flood fighting activities.

b. Cut, prune, or remove landscape ground covers, brush, and ornamentals from adjacent private property which encroach onto the right-of-way.

3.1.4.3 Removal of woody vegetation in channel

a. Cut and remove woody saplings, trees, invasives, and understory.

b. Follow up with appropriate herbicide treatment as necessary to prevent regrowth.

3.2 Flood Protection Structures

Maintenance measures are necessary to ensure serviceability of the levees and floodwalls to withstand flow events up to the design flood event. Limited vegetation is required to allow for visual inspection of the levee embankments. Vegetation other than shallow rooted grasses shall not be permitted on levee crowns, slopes, or within 15 feet of the outboard levee toe. This is necessary to prevent the development of deep roots within the body of the levee which can create seepage paths. A rodent abatement program shall be employed as soon as evidence of burrowing activity is found on the levee embankment or toe. Shallow scattered holes allow for runoff to infiltrate the levee and can result in seepage flow paths through the levee during flood events. See Figures 1 and 2 for maintenance activity locations.

3.2.1 Levee Maintenance

3.2.1.1 Levee repairs

a. Excavate, repair, and reconstruct levee embankments due to seepage, slumps, cracks (longitudinal or transverse), loss of grade, sloughs, slides, rodent burrows, scour, or erosion in order to maintain full levee section.

b. Reconstruct/raise levee crown due to sags, depressions, or groundwater subsidence.

c. The levee is to be repaired to original design specifications (See Appendix B, Project As-Built Drawings).

3.2.1.2 Repair of levee damage caused by flood events (erosion, scour, slumps, and sags)

a. Inspect and document cause of levee damage.

b. Plans for repairs will be prepared by the JPA.

c. Schedule and complete construction.

d. Levee fill material shall be placed in maximum uncompacted lifts of 8-inches and moisture conditioned to between 0 and +3% of the optimum moisture content. The fill shall be compacted to a minimum dry density of 92% of the maximum laboratory dry density determined by ASTM Method D1557. The upper 12 inches of levee embankment shall be compacted to a minimum dry density of 95% of the maximum laboratory dry density determined by ASTM Method D1557. Monitor repair site for performance.

3.2.1.3 Animal Control Program (baiting, trapping, and barriers)

a. Control of burrowing animals (gophers, ground squirrels, and similar rodents) with bait stations, fumigants, smoke bombs, rodenticides, and live trapping to prevent damage or colonization of levee embankments.

b. Control methods shall be evaluated to avoid harm to the SMHM and RR. No rodenticides will be used within 100 m (328 ft) of suitable marsh/brackish marsh habitat for these species.

c. Methods of rodent control within SMHM or RR habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any SMHM that inadvertently enter the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

d. Captured mammals that are predators shall be disposed of.

e. Displace or exclude animals constructing and using dens (burrows) in the levee embankments by mechanical means.

3.2.1.4 Repair animal damage on levee slopes and at levee toe

a. Excavate burrow locations and reconstruct levee embankment, or

b. Pressure-fill burrows with bentonite clay, cement grout slurry. Slurry to consist of two parts bentonite clay, one part cement grout and water, as specified by the Project designer, HDR, Inc., or

c. Mud packing method may be used to backfill burrows.

d. Additional information on the repair of animal burrows may be found in FEMA Publication 473, “Technical Manual for Dam Owners, Impacts of Animals on Earthen Dams,” September 2005.

3.3 Floodwall Maintenance

3.3.1 Repair of floodwall coating

a. The sheet pile floodwall has been protected from rust by a 15-millimeter thick phenalkamine coating on the floodwall surface.

b. This coating should be visually inspected during annual inspections to insure a complete coverage.

c. Any nicks or scrapes in the coating surface should be repaired immediately in accordance with the specifications in Appendix E.

3.3.2 Repair of floodwall damage caused by flood events

a. Inspect and document cause of floodwall damage.

b. Plans for repairs will be prepared by the JPA.

c. Schedule and complete repair.

d. Monitor repair site for performance.

3.4 Creek Channel Maintenance

3.4.1 Removal of downed trees in creek channel

a. Cut and remove downed trees within creek channel.

3.4.2 Sediment removal in low flow channel

a. Sediment removal in channels is necessary if sediment bar and vegetation blocks flow and reduces conveyance.

3.4.3 Fill and repair scour holes in channel

a. Scour hole repairs are required if conveyance, slope stability, or a utility is affected.

b. Drain ponded water and reconstruct channel embankment and/or invert.

c. Fill placed in 8-inch lifts, minimum 90% compaction. Sand Cone method to test relative compaction may be used.

3.4.4 Control of unwanted vegetation on benches to maintain conveyance

a. Mowing/trimming of herbaceous growth when it is 4 feet or higher.

b. Cut, remove, and treat trees in channels to control woody growth and maintain conveyance per Section 3.1.3.3.

3.4.5 Repair of rock slope protection

a. Inspect condition of rock slope protection after flood events.

b. Replace, repair, and restore rock slope protection to as-constructed conditions.

c. Remove woody vegetation (brush or trees) growing in rock slope protection. Cut trees or woody vegetation and treat stumps with appropriate herbicide.

3.4.6 Trash and debris removal in channels and at bridge piers/columns

a. Remove debris that creates blockages or reduces conveyance, as determined by engineering staff.

3.5 Maintenance Access Ramps and Maintenance Roads

3.5.1 Repair and maintenance of levee maintenance roads and access ramps

a. Levee maintenance roads accessed from O'Connor Street, Daphne Way, and Verbena Drive in East Palo Alto, and the channel maintenance access ramp at the PG & E electric tower in Palo Alto are surfaced with Caltrans Section 26 Class II aggregate base. Fill potholes or ruts with compacted Class 2 aggregate base per Caltrans Specifications.

b. The levee access road from Geng Road in Palo Alto is surfaced with Caltrans Section 39 asphalt concrete paving (AC). Repair damaged areas with AC per Caltrans specifications.

c. The channel maintenance access road adjacent to the Palo Alto Pump Station is paved with Portland cement concrete (PCC). Repair damaged areas with suitable PCC.

d. Apply herbicide on permeable levee crown surfaces to prevent unwanted vegetation.

e. Remove woody vegetation and overhanging growth which impairs or obstructs maintenance access along the base of levee roads and along the top of levees.

3.5.2 Repair and maintenance of floodwall maintenance roads and access ramps

a. Floodwall maintenance roads in East Palo and above L-line Sta 54+00 are surfaced with Caltrans Section 26 Class II aggregate base. Fill potholes or ruts with compacted Class 2 aggregate base per Caltrans Specifications.

b. The floodwall maintenance road in Palo Alto below L-line Sta 54+00 is surfaced with Caltrans Section 39 asphalt concrete paving (AC). Repair damaged areas with AC per Caltrans specifications.

c. Apply herbicide on permeable roadway surfaces to exclude unwanted vegetation.

d. Remove woody vegetation and overhanging growth which impairs or obstructs maintenance access.

3.6 Outfalls, Flap Gates, and Valves

Outfalls which penetrate the floodwall must be maintained and repaired as necessary to ensure that they continue to operate as intended and at full design capacity. Outfalls which have failed, including flap gates that are not operating properly, culverts that are operating below full capacity or positive closure valves that are inoperable, may create flooding.

3.6.1 Culvert flap gate service and repairs (during annual inspections)

a. Check for damage.

b. Check for rust.

c. Confirm proper seating and sealing of flap gate on culvert.

d. Service frame and lubricate pivots.

3.6.2 Pipe culvert inspection, repairs, and sediment removal (during annual inspections)

a. Evaluate culvert for sediment and/or blockages.

b. Check pipe interior.

3.6.3 Periodic video inspection of culvert joints and lining for buckling, spalling, corrosion, damage Interior Drainage System

a. Outfalls which penetrate the floodwall must be maintained and repaired as necessary to ensure that they continue to operate as intended and at full design capacity, or separation.

b. Remove sediment in culvert.

c. Replace damaged or degraded pipes and culvert sections.

3.6.4 Removal of sediment and woody vegetation at culverts and outfalls (during annual inspections)

a. Cut and remove vegetation that could affect flap gate or discharge.

b. Remove sediment that could affect flap gate or discharge.

3.6.5 Repair and maintenance of outfall slope protection (during annual inspections)

a. Remove any woody vegetation (brush or trees) in rock slope protection.

b. Repair or replace rock slope protection.

c. Repair foundation or apron of outfalls to prevent undermining, scour, and/or slope failures.

3.6.7 Positive closure valve (during annual inspections)

a. Positive closure valves located at the outboard side of the flood walls shall be tested to insure proper sealing.

b. Positive closure valves that do not seal properly shall be repaired or replaced to ensure protection from flooding backflow.

3.7 San Francisquito Creek Channel

Maintenance measures shall be performed to ensure serviceability of the creek to safely pass all flows up to the design flood event. Maintenance of the low flow creek channel and terraced benches shall consist of the removal of sediment deposition, debris accumulation and vegetative growth. The JPA will periodically re-assess facilities to evaluate conveyance to verify maintenance practices (see Section 3).

The channel shall be thoroughly inspected annually and immediately following each major high water period after water levels are reduced to the low flow.

3.7.1 Maintenance and repair of flood gate

a. Inspect and verify operation, identify and document any damage annually.

b. Grease, lubricate, and exercise mechanical appurtenances as needed based on inspection. Gates are removed and reinstalled or twice per year.

c. Determine if the condition is undesirable, or affects operations.

d. Prepare plans and complete repairs if necessary.

e. Monitor for performance.

3.7.2 Homeless encampment clean-up

a. Remove homeless encampments with assistance from local authorities.

b. Monitor, evaluate, and repair impacts from homeless encampments (brush clearance, tree trimming, creation of trails and paths, debris and wastes) as needed.

3.8 Miscellaneous Maintenance Activities

Maintenance on the following project elements is required to provide security in areas where access is not intended, and to ensure access at the proper locations for maintenance staff as needed, and to the general public for recreational use. Encroachments into the project ROW must be maintained when authorized, and removed when not authorized.

3.8.1 Miscellaneous Repairs and Maintenance

a. Repair fence sections and replace damaged fence gates and bollards.

b. Replace and install public signage for Project as necessary.

c. Paint defaced structures located in the channel (floodwalls, drop structures, etc.) as part of the neighborhood clean-up work.

3.8.2 Remove unauthorized encroachments on Project (stairs, landscaping, utilities, fences, irrigation, etc.)

a. Coordinate removal of unauthorized private encroachments with local jurisdictions (parks, police, public works, building departments).

b. Notify adjacent property owners to remove unauthorized encroachments if they are the responsible party.

c. Provide neighborhood notice if work is necessary to remove encroachments.

d. Coordinate removal of unauthorized encroachments or utility encroachments with owners.

3.8.3 Maintenance of authorized encroachments on Project (Vehicular and pedestrian trails, utilities, etc.)

a. Encroachment owner identifies needed repairs or modifications.

b. Repairs are identified and project is defined.

c. Owner applies for a permit from the appropriate governing entity to perform work.

d. Coordinate with local jurisdictions (city, parks, or private party).

e. Owner sends neighborhood notices to the surrounding property owners/community.

f. Complete repairs.

g. Monitor for performance.

3.9 Friendship Bridge and Boardwalk

3.9.1 Vehicular carrying capacity of the Boardwalk is 10,000 lb. (ten thousand pounds).

3.9.2 Maintenance Activities at Boardwalk

a. Cut and remove vegetation or debris that may accumulate at boardwalk piers.

b. Inspect for scour and erosion at boardwalk piers and abutments.

c. Reconstruct channel sags, depressions, or ground subsidence to original design specifications (See Appendix B – Project As-Constructed Drawings).

3.9.3 Maintenance Activities at Friendship Bridge

a. Inspect for scour and erosion at bridge abutments.

b. Remove debris at bridge abutments and Friendship Island.

3.10 Storm Water Pump Stations

There are two municipal storm water pump stations located within the project limits: the O'Connor Street Pump Station located near R-Line Station 30+00 and the Palo Alto Pump Station located near L-Line Station 71+00. Neither pump station was constructed as part of the flood control works. The pump stations were operational prior to the construction of the levees and floodwalls. The Cities of East Palo Alto and Palo Alto are responsible for their operation and maintenance, including the Palo Alto Pump Station channel and the O'Connor Street Pump Station outfalls.

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4 INSPECTION AND REPORTS

4.1 Introduction

This section details the inspection required for proper care and efficient operation of the various project elements. Completed projects must be adequately maintained if they are to function as intended. The JPA is responsible for preserving maintenance and inspection records for its area of responsibility and making them available for government inspection. Government inspections will be performed in consultation with JPA. The inspection requirements included herein apply to all items constructed by and necessary for the operation of the Federal Project.

4.2 Inspection and Reporting Frequency

Semiannual inspections performed by JPA shall occur by May 1 and November 1.

In addition to the semiannual inspection cycle, the following events require immediate inspection.

a. Immediately following each major flood,
b. Immediately following each earthquake based upon the following criteria:
    i. Earthquakes measuring less than 5.0 on the Richter scale, inspection shall be performed when the epicenter is within 3 miles of the project,
    ii. Earthquakes measuring 5.0 to 6.0 on the Richter scale, inspections shall be performed when the epicenter is less than 30 miles from the project,
    iii. For earthquakes measuring 6.0 or higher on the Richter scale, inspections shall be performed when the epicenter is less than 50 miles from the project,
    iv. Inspections shall also be performed after any earthquakes in which specific reports of damage to the project are received.

4.3 JPA Inspections of Project Elements

These reports are to inform Field Operations staff of creek conditions that may impact system performance. Reports in paragraphs f and g also serve to comply with permit conditions.

a. Channels checked for sediment, scour, fallen trees, debris and other blockages.
b. In-stream refugia structures checked for stability and scour.
c. Levee embankments.
d. Interior drainage (culverts, flap gates, isolation gates, valves).
e. Levee penetrations are visually inspected annually, and by video or walkthrough every 5 years. Frequency will be increased if deficiencies are noted.
f. Annual reports documenting project conditions.

g. Levee elevations on both sides will be inspected by survey two years after completion of construction and four years after completion of construction to verify forecast elevations following settlement. Beginning after the fourth-year inspection, levee subsidence surveys will be conducted at 5-year intervals. If settlement exceeds predictions, repair options will be evaluated and implemented.

4.4 Check Lists and Instructions

The SCVWD check lists and instructions shown in Appendix C are to be explicitly followed in each inspection to ensure that no features of the protective system are overlooked. A copy of the inspector's original field notes as recorded on the check list shall be transmitted to the District Engineer as an enclosure to the annual report. Completed inspection check lists are located at the direction of the JPA. The following documents are included in "Appendix C - Levee Inspection Guidelines and Forms":

- SCVWD WW 75161 Field Operations Levee Inspection Guidelines
- SCVWD WF 75161 Levee Field Inspection Rating Guide
- SCVWD WW 75165 Field Operations Inspection Guidelines
- SCVWD WF 75165 Field Inspection Checklist
- SCVWD WF 75166 Facilities Inspection Rating Guide

4.5 JPA Project Inspections

The JPA completes annual inspections of the Project by November of each year. During these inspections the Project elements (levees, channels, maintenance roads, culverts, revetment, etc.) are evaluated and rated following the SCVWD guidelines for inspections. Evaluations will identify and document any deficiency (e.g., erosion, scour, sediment, rodent control problems, animal damage, in-stream vegetation, levee maintenance, trash build up, homeless encampments, large woody debris blockages, etc.) on the Project.

4.5.1 JPA Evaluation of Project Elements

The SCVWD has developed specific Inspection Guidelines for watershed facilities and levees throughout the county. These Guidelines identify the inspection category (routine or event driven) and frequency of inspection (annual, event, or semiannual) for each project and system. The Guidelines contain information on the inspection and work flow so that deficiencies identified during the inspections are corrected.

4.5.2 JPA Rating of Project Elements and Deficiencies

During inspections, project elements are assigned a rating (A=New, B=Good, C=Monitor, D=Corrective Action, E=Immediate Action). Deficiencies or items of concern found during the inspections are documented by the JPA.

Based on the severity of the deficiency, available budget, right-of-way, and existing permits, the JPA then schedules corrective maintenance to remedy the problem. If it is determined that

maintenance is required, a project plan is prepared, the repairs are scheduled, and funds are budgeted as necessary.

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San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project
San Francisco Bay to Highway 101

Design Documentation Report
Draft 100% Design Submittal

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

July 2014

Prepared by:

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1.0 Background

The HDR Project team is under contract with the San Francisquito Creek Joint Powers Authority (JPA) to provide consulting services in support of plans, specifications and estimates (PS&E) preparation for flood protection improvements along San Francisquito Creek between the San Francisco Bay (SF Bay) and Highway 101. Scoped tasks include: project management; public outreach assistance; design concept, model, and base map/survey review; utility mapping; design criteria development; geotechnical investigations and associated reporting and recommendations; PS&E at the 30%, 90%, 95% Draft 100%, and 100% levels. Optional services include bid and construction support.

This Technical Memorandum (TM) details the design analysis to this Draft 100% stage. This TM is a living document and will be continuously updated with new design calculations and criteria as the design progresses.

The following sections describe the Draft 100% submittal design elements, the status of the current design, significant changes, and specific considerations that have shaped the progress of the design. Figure 1 depicts the project design features as they are currently planned.

2.0 Alternatives Analysis

In July 2009, Philip Williams & Associates (PWA) completed the San Francisquito Creek Flood Reduction Alternatives Analysis. PWA divided the project into three reaches; the upper reach extends from East Bayshore Road / Highway 101 Bridge to the Palo Alto Municipal Golf Course, the middle reach extends from the golf course to Friendship Bridge and the lower reach extends from Friendship Bridge to the San Francisco Bay. The JPA selected PWA's Alternative 2 model for the design of the downstream portion of San Francisquito Creek. Alternative 2 consisted of setback floodwalls in the upper reach, levee setbacks in the middle reach, an overflow terrace near Friendship Bridge, and the removal of the levee between the Baylands Preserve (also known as the Faber Tract) and the north side of the creek. PWA's Alternative 2 diagram is shown in Figure 2.

HDR has worked within the design constraints laid out by the JPA to minimize impacts to existing features and structures, minimize increases to the design water surface elevation at Highway 101 / East Bayshore Road, and preserve opportunities for habitat within the creek as much as possible. The levee and floodwall layout proposed in the PWA Model has been reconfigured to fit within existing structures, utilities, and recreational facilities in coordination with the JPA right of way acquisition efforts.

3.0 Flood Protection Design Elements

3.1 Floodwalls

A geotechnical evaluation was performed by GEI Consultants and are summarized in a memorandum tilted, "San Francisquito Creek Flood Protection Project, Geotechnical Evaluation Report" dated May 2012.

Both interlocking steel sheet pile cantilever walls and T-type concrete walls were considered for flood wall design. During the subsurface exploration program, shallow, pervious soil units and soft Bay deposits were encountered below relatively thin blankets of low permeability soils along the proposed floodwall alignments. The results of seepage analyses indicate that flood walls should include a cut off to intercept the pervious foundation soils in order to meet the minimum acceptance criteria for underseepage gradients. In addition, flood wall cut offs should fully penetrate into the soft bay deposits and terminate in competent material.

Shallow supported concrete T-type walls would likely have a wide foundation embedded 3 to 5 feet below the ground surface, and include a cutoff at the heel. Construction of this type of floodwall would require significant excavation, and a large construction footprint.

Sheet pile walls are constructed in a more limited construction zone with fewer disturbances to adjacent areas and can intercept the pervious foundation soils present within the project footprint. Based on these considerations, a floodwall consisting of interlocking sheet piles that fully penetrate soft bay deposits and terminate in competent material is recommend for flood control within the upper reach of this project.

3.1.1 Floodwall Depth

GEI's evaluation of sheet pile depth required that the floodwall be embedded to the maximum tip elevations shown in Table 1 (i.e. no shallower than the elevations shown).

Table 1. GEI Floodwall Depths

FLOODWALL DEPTHS	
LEVEE – STATION	ELEVATION
R-LINE 54+00 TO 67+50	-15
L-LINE – 67+00 TO 76+00	-10
L-LINE – 49+00 TO 67+00	-15

These maximum tip evaluations are based on providing cutoff for seepage and a minimum embedment of 8 feet below the estimated bottom of young Bay Mud.

The floodwall materials were identified and embedment depths were refined during the structural design of these walls. This design is in conformance with USACE EM 1110-2-2504. A summary of the structural calculations for this project are located in Appendix A. The final sheet pile floodwall depths are summarized in Table 2 and can be found within the construction documents on Sheet S-1.

Table 2. Final Floodwall Depths and Types

FLOODWALL DEPTHS AND TYPES		
LEVEE – STATION	SHEET PILE TYPE	ELEVATION
R-LINE 29+53.75 TO 31+57.64	AZ 24-700	-15.0
R-LINE 54+00 TO 61+00	AZ 19-700	-15.0
R-LINE 61+00 TO 70+00	AZ 24-700	-15.0
R-LINE 70+00 TO 75+00	AZ 36-700	-17.0
R-LINE 75+00 TO 75+54.13	AZ 50	-22.0
L-LINE 49+00 TO 62+00	AZ 19-700	-15.0
L-LINE 62+00 TO 71+05	AZ 24-700	-15.0
L-LINE 71+80 TO 75+00	AZ 24-700	-15.0
L-LINE 75+00 TO 76+29.42	AZ 36-700	-17.0

3.1.2 Floodwall – Levee Transition

To mitigate for the potential for differential settlement at the transition between the floodwall and the new levee fill, the floodwall section should be extended into the new levee fill section with an overlap of at least 150 feet. This overlap will provide additional protection against levee through seepage if differential settlement and cracking of the levee fill should occur. There are four transitions that occur between floodwall and levee. The transitions occur at R-Line 28+03.00 to 29+53.73, R-Line 31+57.64 to 33+07.00, R-Line 52+50.00 to 54+00.00, and L-Line 47+50.00 to 49+00.00.

3.2 Levees

Levees are the preferred flood protection element downstream of the project floodwalls. For conformance with USACE EM 1110-2-1913, the levee geometry includes:

- A 16 foot crown width.
- A 3 horizontal to 1 vertical (3H:1V) water side levee slope.
- A 2H:1V landside levee slope.

- Top of Levee elevation includes three feet of freeboard above the 100 year design water surface elevation.
- Top of Levee elevation includes four feet of freeboard above the 100 year design water surface elevation 100 feet upstream and downstream of bridge structures (Highway 101 and Friendship Bridge).

See **Figure 3** for the typical levee section layout.

Geotechnical stability analyses indicate that this geometry will provide factors of safety as required by USACE guidelines. Seepage analyses indicate that no seepage berms or cutoff walls are required for the levee portion of this project.

3.3 Access Road

To provide the appropriate level of flood protection, the proposed flood wall will be significantly higher than the existing ground, on the order of 10 feet in some sections. In order to maintain visibility of the creek for pedestrians and bicyclists, the access roadway located behind the flood wall will be raised when necessary (see **Figure 4**). The access roadway will typically be 16 ft. wide and will slope away from the flood wall at a 2% slope.

In the area of the International School of the Peninsula (ISTP), the creek is particularly narrow, and maximizing the width of the floodway is hydraulically beneficial. However, it is also beneficial to mitigate for any encroachment that this floodway widening will impose on the school playground. In order to minimize encroachment within the playground area behind the ISTP, the access roadway will be reduced to a width of 12 ft. and a retaining wall will be constructed on the outboard side of the access road in order to eliminate the 2H:1V landside slope that typically occurs at the raised access way (see **Figure 5**).

3.4 Appurtenant Structures and Tie-Ins

Several details were produced with the Draft 100% plan set; these include but are not limited to: the sheet pile wall connection to concrete structures, sheet pile wall utility penetrations, concrete cap, and flood wall details.

3.5 Friendship Bridge

Per direction of the JPA, its member agencies and stakeholders, the existing friendship bridge will not be removed from its current location. Because of significant floodway widening that will occur at this bridge, the existing left bank levee will be transformed to an in-creek island at the Friendship Bridge north abutment. A new boardwalk will also be constructed from the new in-creek island to the new setback levee (see **Figure 6**).

4.0 Alignment and Layout Considerations

4.1 Project Extent

For the left levee, the downstream project extent will occur at the tie-in point between the new and existing levees downstream of Friendship Bridge. The extent of the project along the right levee alignment will occur at the eastern end of the bay levee degrade near the San Francisco Bay. These extents are shown on the attached **Figure 1**. HDR understands that subsequent local or Shoreline Study project(s) will address levee inadequacies in the creek upstream of Highway 101. It is expected that such future projects will tie in to the flood protection elements of this project, to create a comprehensive flood protection system that protects from riverine and tidal flooding.

4.2 Hydraulics

Due to the complexity of the hydraulic design required for this project, a separate TM was prepared by HDR to address the hydraulic design features. This TM is titled Hydraulic Review Technical Memorandum, San Francisquito Creek Flood Protection Capital Project, Floodwater Conveyance Improvements from East Bayshore Road to San Francisco Bay, dated July 2014.

4.3 Geotechnical Design

A geotechnical report was completed by GEI Consultants and is titled, "San Francisquito Creek Flood Protection Project, Geotechnical Evaluations Report" and dated May 2012. Topics within this report include:

- Field exploration and laboratory testing.
- Subsurface conditions.
- Engineering analyses for proposed levees and floodwalls including seepage, stability, and settlement evaluations.
- Geotechnical recommendations and design criteria.

Results of this report were used to develop the floodwall and levee design criteria listed previously in this report.

4.4 Utilities

There are several utility structures that cross the proposed levee/flood wall alignment. A summary of these encroachments is listed within **Table 3** and are shown in **Figure 7**:

Table 3. Utility Encroachments

UTILITY ENCROACHMENTS			
LEVEE – STATION	TYPE OF UTILITY	SIZE	MATERIAL
L-Line – 14+20 TO 26+50	SANITARY SEWER	24”	Concrete
L-Line – 27+00	STORM DRAIN	6”	Plastic
L-Line – 28+50	JOINT TRENCH	Unknown	Unknown
L-Line – 30+50	WATER	Unknown	Unknown
R-Line – 31+50 TO 32+50	SANITARY SEWER	24”	Concrete
R-Line – 30+20	PUMP STATION	NA	Concrete
R-Line – 31+00	WATER	2”	Copper
R-Line – 31+00 TO 34+40	SANITARY SEWER	14”	RCP
R-Line 34+50	SANITARY SEWER	12”	Wooden (Abandoned)
R-Line - 44+50 TO 50+55	GAS	20"	Steel
R-Line – 68+90	STORM DRAIN	10”	CMP
R-Line – 73+50	STORM DRAIN	30”	CMP
L-Line - 68+00 TO 70+00	WATER	2.5"	Unknown
L-Line 67+00 TO 70+00	GAS	2”	Unknown
L-Line - 67+60	STORM DRAIN	12"	NA
R-Line - 72+50 TO 74+50	WATER	6"	Unknown
L-Line - 75+20	STORM DRAIN	96"	
R-Line - 42+80	ELECTRICAL TOWER	Unknown	Steel Lattice
L-Line - 46+80	ELECTRICAL TOWER	Unknown	Steel Lattice
L-Line - 52+50	ELECTRICAL POLE	Unknown	Unknown

4.4.1 USACE

HDR conducted a meeting on January 20, 2012 with Paul Schimelfenyg and Brian Hubel of the USACE to discuss the existing utility encroachments and proposed utility relocations. The following is a list of proposed actions agreed upon for each utility:

A. Sanitary Sewer – There is an existing Sanitary Sewer line that crosses under San Francisquito Creek. HDR recommended protecting the existing line in place during construction. Paul expressed interest in determining the condition of the existing pipe. HDR indicated that the interior of the existing pipe will be lined by the East Palo Alto Sanitary District to improve function.

B. Brian expressed concern with settlement that would occur if a new levee were built over the existing sewer line. The existing soil consists of Bay Mud which can experience significant consolidation.

C. After discussion it was agreed that HDR should consider re-routing the existing sewer line to cross the levee at a point where the existing levee is not being relocated. This will eliminate settling because the soil underneath the existing levee is already consolidated. The manhole at the Friendship Bridge abutment will be raised and fitted with a watertight cover. The design will address erosion protection around the manhole.

D. Gas - There is an existing 20” gas line that crosses the levee twice. HDR should work with PG&E to insure that the gas line is relocated over the levee per EM 1110-2-1913. Settlement should be considered. If possible, the gas line should be installed after settlement of the levee is complete due to the bay mud which is prevalent within the project footprint.

E. Storm Drain – There is an existing storm drain inlet behind the International School of the Peninsula (ISTP) that drains the water from the blacktop area behind the school. Another drain inlet that currently discharges to the creek is located behind the adjacent storage facility and drains runoff from the roofs and blacktop area. These storm drain inlets release to 12-inch diameter pipes that discharge to the creek. Paul did not see a concern with protecting these lines in place. However, the 12-inch diameter pipes will be replace with 30-inch diameter pipes a fitted with flap gate outlets and landside positive closure valves to prevent the backflow of water into the pipe.

F. Private Water Line – There is an existing 6” private water line near US 101. The line does not cross the proposed flood wall but does lie beneath the proposed access way. Paul suggested relocating the line if possible; however the line occurs in a densely populated area. Paul was okay with leaving the line if relocation is not feasible.

G. Abandoned Utilities – Abandoned utilities will be removed and backfilled where possible. Abandoned pipes left in place under the creek will be grouted.

H. Electrical Towers – The design needs to include 15 feet of easement around the towers to provide for inspection. PG&E will need to consider seepage and stability issues at

their towers, including settlement and lateral loads. The design will address the impact to the WSEL of leaving these towers in the floodway.

I. Power Poles – There is an existing power pole that is located within the proposed floodway. HDR will work with PG&E to relocate this pole outside the proposed levees and O&M corridors. The new pole will be constructed at sufficient height to provide vertical clearance required by USACE guidelines.

4.4.2 EPASD

HDR conducted a meeting with East Palo Alto Sanitary District (EPASD) on February 21, 2012. At this meeting, options for the existing 24 inch diameter sanitary sewer creek crossing were discussed. EPASD has not finalized a design for this crossing but are considering replacing the existing 24 inch diameter sanitary sewer siphon with a new 24 or 30 inch diameter siphon that would span the new, wider, creek width.

Previously HDR had proposed to keep the existing siphon and raise the existing manhole that was located within the new floodway to an elevation above the 100-yr flood elevation. EPASD did not approve of this design approach because it limited access to the manhole within the floodway.

HDR will coordinate with EPASD to ensure that the proposed crossing meets the required USACE guidelines for utilities crossing a levee.

4.4.3 PG&E

HDR met with PG&E on March 28, 2012 to discuss the electrical and gas crossings. PG&E said that they had plans to raise the height of the electrical towers located along the north levee by 15 feet.

After some discussion and coordination with PG&E, HDR determined that it would be in the project's best interest to require that the contractor cut the sheet piles that will occur beneath the electrical crossings and install them one half at a time to eliminate the need for an excessively tall electrical line at the levee. A weld will join the two halves of sheet pile wall to obstruct any seepage through the wall.

Heights required for the electrical crossing were sent by HDR to PG&E in an email on March 29, 2012. A copy of this email and its attachment can be found within Appendix B.

During the March 28th meeting, PG&E also agreed to relocate the existing Gas line that is located beneath the existing levee. The new relocated line will be of sufficient depth to comply with USACE guidelines.

4.5 Caltrans Design Coordination

Caltrans has provided preliminary drawings for the proposed bridge/culvert replacement under Highway 101 that is planned to occur before this project goes to construction. The proposed

bridge will consist of a box culvert consisting of 3 cells that are 30.9 ft. wide and one cell that is 27.3 ft. wide for a total width of 120 ft. The current project floodwall alignment is aligned to match the outer cell wall of the proposed Caltrans bridge structure.

At the July 21, 2010 Caltrans coordination meeting, Caltrans disclosed that they will design no permanent wing walls, only temporary sheet pile wing walls aligned to conform to existing contours. The wing walls on the south side of the creek will close off the 4th bridge cell until the upstream and downstream projects are complete in this area.

There is currently a 96-inch diameter storm drain outfall that is located approximately 50 feet downstream of the Highway 101 Bridge. Caltrans will coordinate the relocation of the existing 96-inch diameter storm drain outfall so that the future outfall will be located beneath Highway 101. This will be of benefit because the exiting 96-inch diameter outfall conflicts with the location of the new floodwall.

During review of the Caltrans drawings, HDR determined that the concrete barrier located at the downstream face of the bridge is lower than the proposed adjacent flood wall. As such, the Caltrans Barrier does not provide the 4 ft of freeboard required by FEMA guidelines. On May 28, 2014 SCVWD met with Caltrans to discuss the Highway Bridge Replacement. HDR joined the conference via teleconference. The barrier was discussed and HDR requested that Caltrans consider raising the barrier to provide the typical 4 ft freeboard required by FEMA. Caltrans replied that the barrier was standard for the approach speed and that a substitution was not feasible.

4.6 Right-of-Way

The layout has been purposely set such that a minimal property take is required, specifically in the residential area of East Palo Alto. It is advisable to avoid property takes for public relations and cost impact purposes; in addition, the minimal backyard takes that are possible in East Palo Alto would provide little hydraulic benefit to offset the resulting impacts. The majority of the ROW infringements and changes in use will be considered on the Santa Clara County side of the creek.

The current right-of-way limit provides a 15’ Operations and Maintenance (O&M) easement at the waterside and landside toe of each levee for inspection and flood fighting purposed. This easement is narrowed to 10 ft easements within areas that have limited access due to existing structures.

The levee right-of-way line adjacent to the Right Bank Floodwall from station 57+00 to 69+00 is located along the existing fence line of the subdivision within that area.

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Figure 1. Project Design Features

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Figure 2. PWA Alternative 2 Conceptual Layout

Figure reproduced from PWA's July 2009 San Francisquito Creek Flood Reduction Alternatives Analysis.

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Figure 3. Typical Levee Cross Section

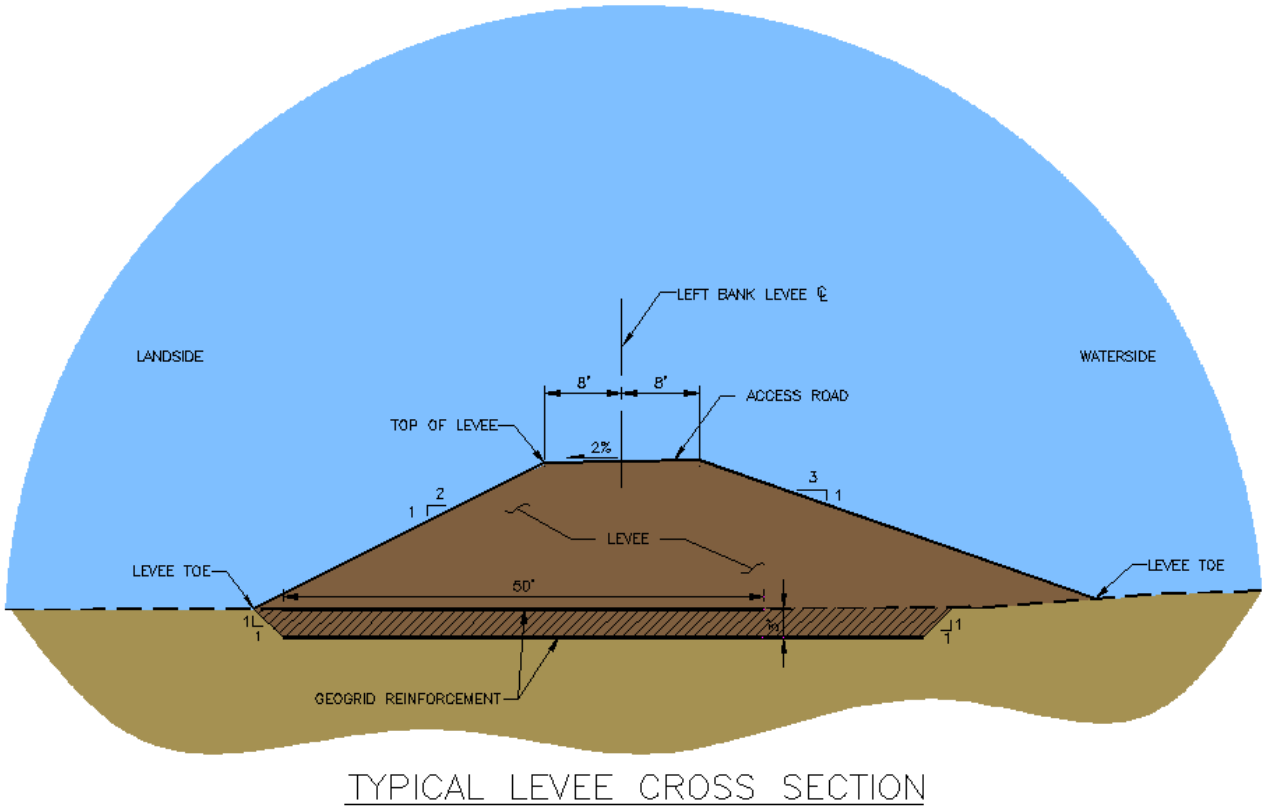

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Figure 4. Typical Raised Access Way

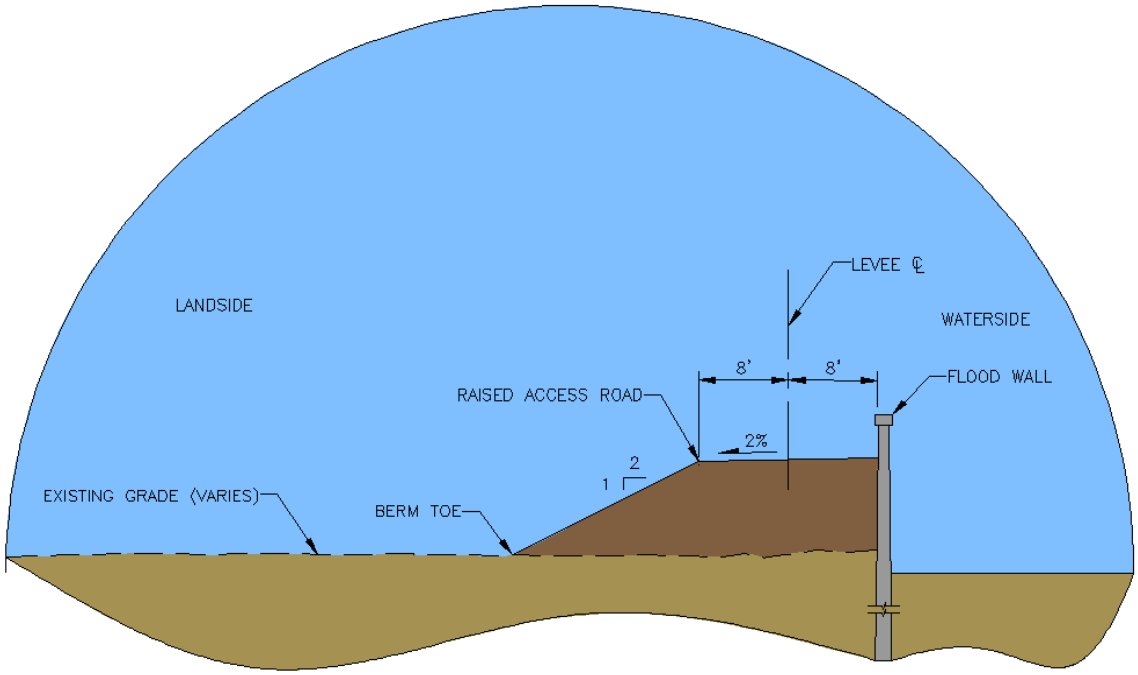

Figure 5. Raised Access way Behind ISTP

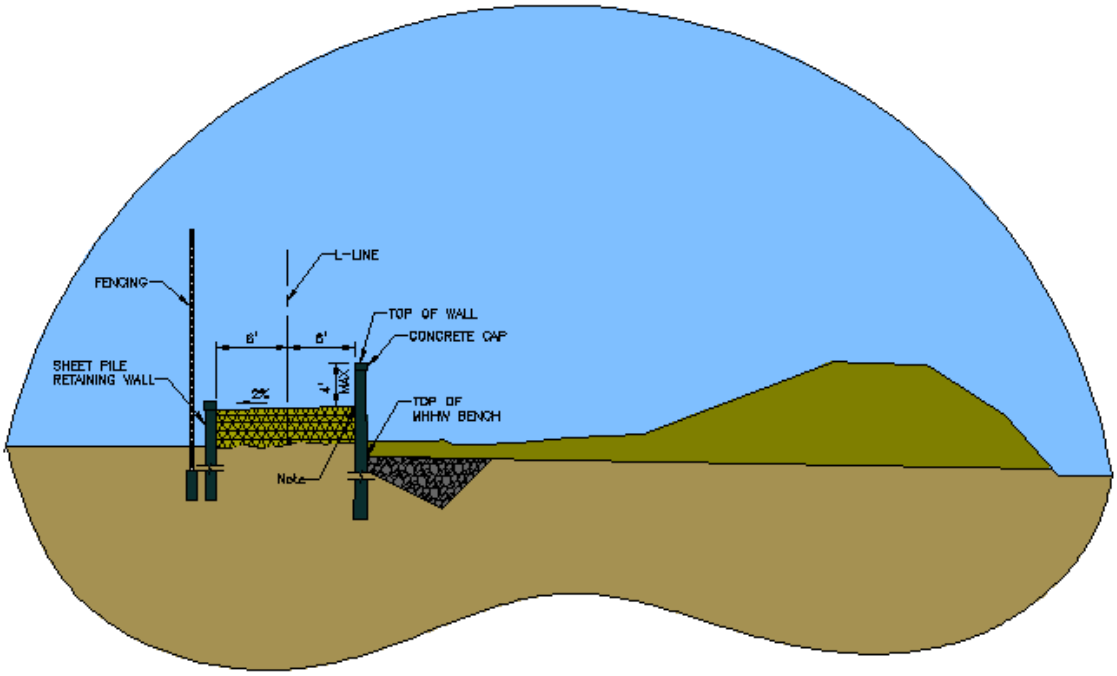

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Figure 6. New Boardwalk Structure

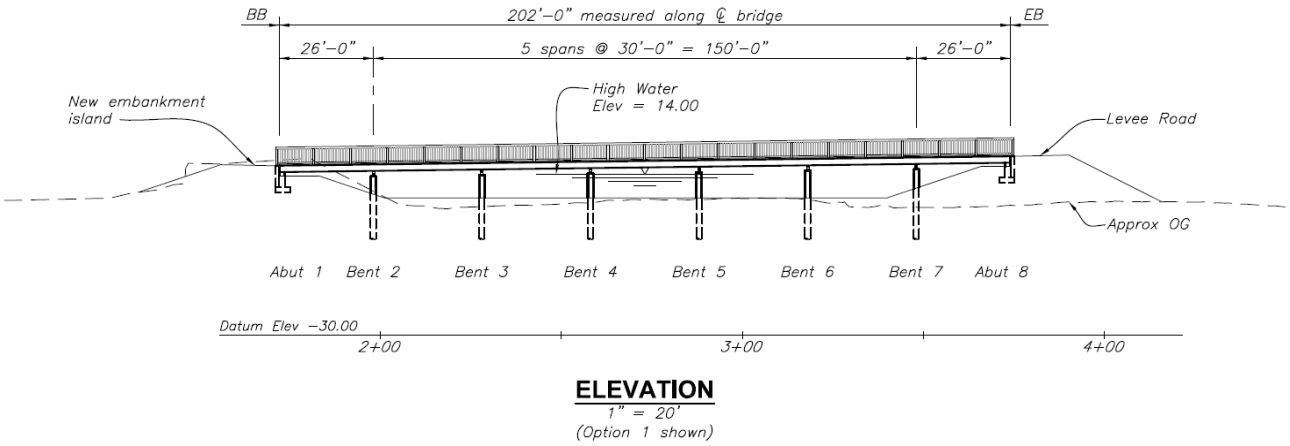

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Figure 7. Existing Utilities

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APPENDIX A – Flood Wall Calculations

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HDR

SFCJPA

San Francisquito Creek Flood Wall Supplemental Structure Design Calcs

REGISTERED PROFESSIONAL ENGINEER
SHARIQ PERVAIZ
C67068
EXP. 9/30/14
CIVIL
STATE OF CALIFORNIA

Prepared For
San Francisquito Creek
Joint Powers Authority

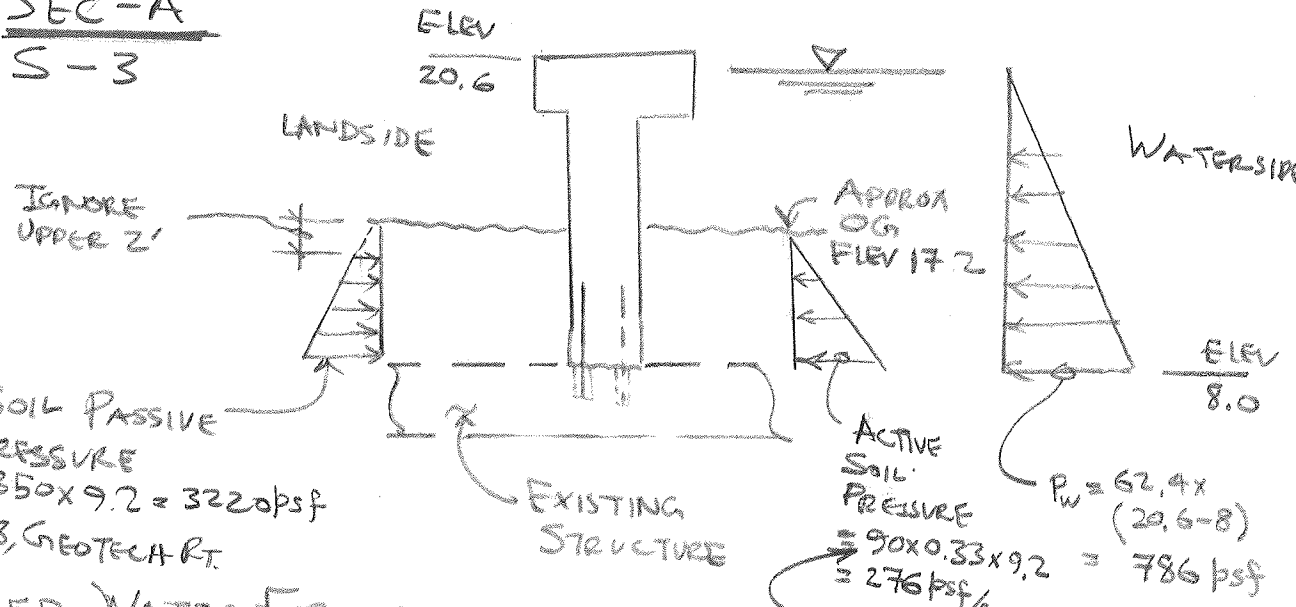
February 2013
HDR # 130806

Project: SAN FRANCISQUITO CREEK WALL	Computed: SP	Date: 2/4/13	
Subject:	Checked:	Date:	
Task:	Page: 1	of: 3	
Job #: 130806	No:		

HDR | ONE COMPANY *Many Solutions*℠

⇒ NEW WALL CONNECTION DETAIL TO EXISTING CONC. STRUCTURE:

* SEC-A
S-3



- APPLIED WATER FORCES:

$P_w = \frac{1}{2} \times 786 \times 12.6' = 4952$ lb/ft

$M_w = \frac{1}{3} \times 12.6' \times 4952 \times 1/1000 = \underline{20.8}$ k-ft

- ACTIVE SOIL PRESSURE; $P_s = \frac{1}{2} \times 276 \times 9.2 = 1268^{\#}$; $M_s = \frac{1268}{1000} \times \frac{9.2}{3} = \underline{3.9}$ k-ft

- SOIL PASSIVE RESISTANCE:

$H_t = 17.2 - 8 - 2 = 7.2'$ ← IGNORE COVER SOIL

$P_p = \frac{1}{2} \times (2 \times 350 + 3220) \times 7.2'$

$= 14{,}112$ #/ft

$M_p = 14112 \times 2.68' \times 1/1000 = \underline{37.7}$ k-ft/ft

- NET MOMENT TO BE RESISTED BY DRILL & BOND DOWELS;

$M_u = 1.5 \times (20.8 + 3.9) - 37.7 = -0.7$ k-ft

CONCLUSION: DOWELS WILL SEE NONE TO NEGLIGIBE FORCES
* PROVIDE #4 @ 12 IN 6" DEEP HOLES

HDR ONE COMPANY *Many Solutions*℠	Project: SAN FRANCISQUITO	Computed: SP	Date: 2/4/13		
	Subject:	Checked:	Date:		
	Task:	Page: 2	of: 3		
	Job #: 130806	No:			

PARAPET WALL CONNECTION TO EXIST STRUCTURE

$P_w = \frac{1}{2} \times 219 \times 3.5$

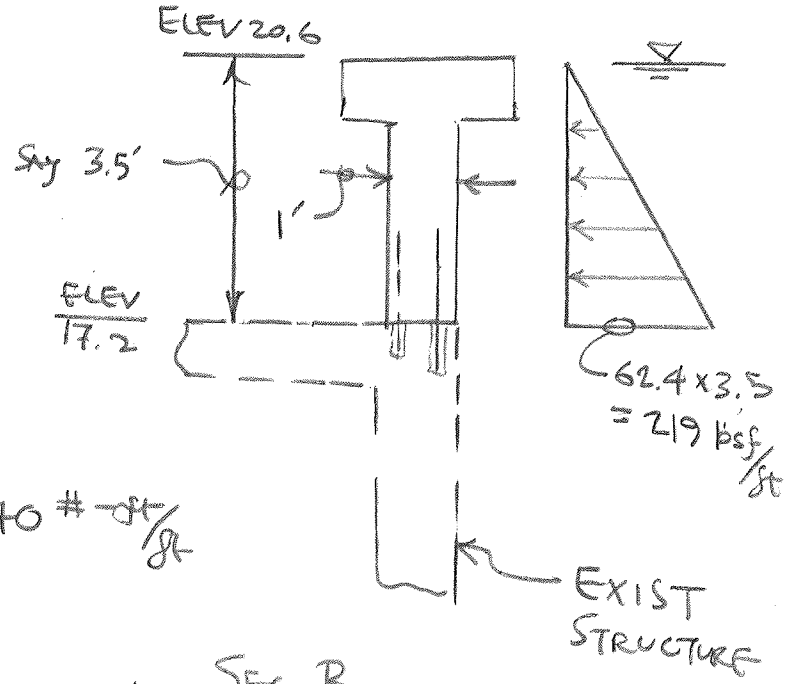
$= \underline{383 \text{ lb/ft}}$

$M_w = 383 \times 3.5/3$

$= 447 \text{ \#-ft/ft}$

$M_u = 1.5 \times 447 = 670 \text{ \#-ft/ft}$

PER AASHTO LRFD



CAPACITY OF #4 DOWELS @ 12"

SEC B
S-3

* ASSUME SHEAR RESISTED BY COMPRESSION SIDE DOWEL.

$\Rightarrow T = 8.4^k$ (SEE NEXT PG)

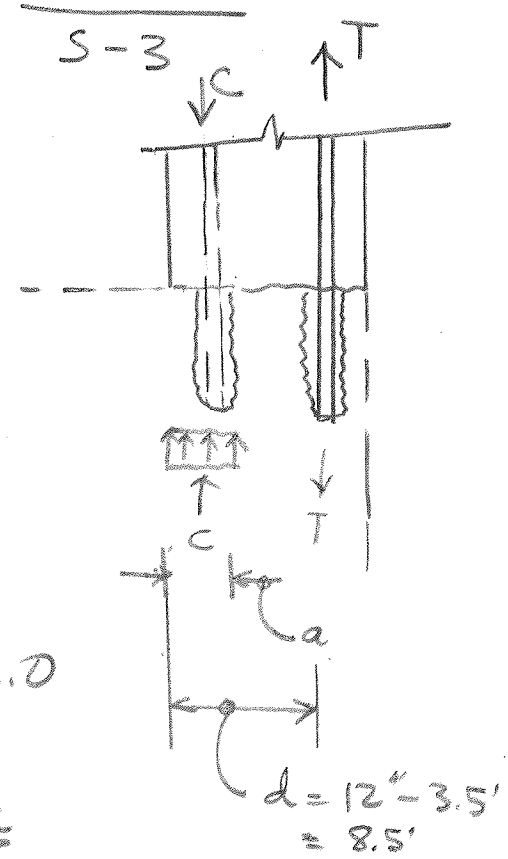
$\Rightarrow a = \frac{8.4}{0.85 \times 12 \times 3 \text{ ksi}} = 0.28''$

$M_R = 0.9 \times 8.4 \left(8.5 - 0.28/2\right) \times \frac{1000}{12}$

$M_R = 5267 \text{ lb-ft/ft}$

$\Rightarrow D/C = \frac{670}{5267} = 0.13 \ll 1.0$

OK



3/3

- For drill and bond dowels, when the edge distance is less than $10d_b$:

$$V = 1.4\pi\sqrt{f_c'}\,d_e^2 \leq [\,\phi^* (0.55 * \text{yield strength of anchor})]$$

$$\phi = 0.8$$

For drill and grout dowels, V is calculated using the same equation above, but the value of d_e cannot exceed $8d_b$. Tables 3.2.2-1 and 3.2.2-2 have been developed for $f_c' = 4000$ psi.

In the shear strength equation based on edge distance shown above, V is in pounds (lb), the edge distance d_e is in inches (in.) and the concrete strength f_c' is in psi. A factor of 0.7 is incorporated into this equation.

c) Edge distance that is smaller than the minimum edge distance shown in Tables 3.2.2-1 and 3.2.2-2 is not permitted.

d) When an anchor is subjected to combined tension and shear loading, the following equation should be satisfied:

$$\frac{\textit{Factored shear load}}{\textit{Factored shear resistance}} + \frac{\textit{Factored tensile load}}{\textit{Factored tensile resistance}} \leq 1$$

Table 3.2.2-1 Factored Resistance (Design Strength) for ASTM A 706 Rebars (Grade 60)

Rebar Size	Minimum Edge Distance-d_e (inches)	Minimum Embedment Depth-l_e (inches)	Hole Diameter (inches)		Design Strength for Minimum d_e and l_e (kips)			Design Shear Strength (kips) ($d_e \geq 10\ d_b$)
					Tension		Shear	
			Grout	Bond	Grout	Bond	Grout and Bond	Grout and Bond
#5	3	5	7/8	1 1/8	3.1	10.5	2.5	8.2
#6	4	6	1	1 1/4	4.4	14.8	4.5	11.6
#7	4	7	1 1/8	1 3/8	6.0	20.3	4.5	15.8
#8	5	8	1 1/4	1 1/2	7.9	26.7	7.0	20.9

TENSION FOR #4 = $10.5 \times \frac{4}{5} = 8.4^k < 0.75 \times 0.2 \times 60 = 9$

USE TENSION STRENGTH OF 8.4^k ✓ OK

HDR

CALCULATION COVERSHEET

Client: SFJCPA

Project Name / Number: San Francisquito Creek Flood Improvement / Project # 241-130806

Deliverable Name / Number: Floodgate Foundation

Deliverable Type: Structural Calculations

Office: Sacramento – Gateway Oaks

Prepared by & Date	Reviewed by & Date	Approved by & Date	Rev No.	Pages Revised & Description (attach additional page if necessary)
Casey Nickols, S.E. 6/11/14	Keith De Lapp, P.E. 6/12/14	Casey Nickols, S.E. 6/12/14		

HDR Engineering, Inc.
Hydropower Services

Seal:

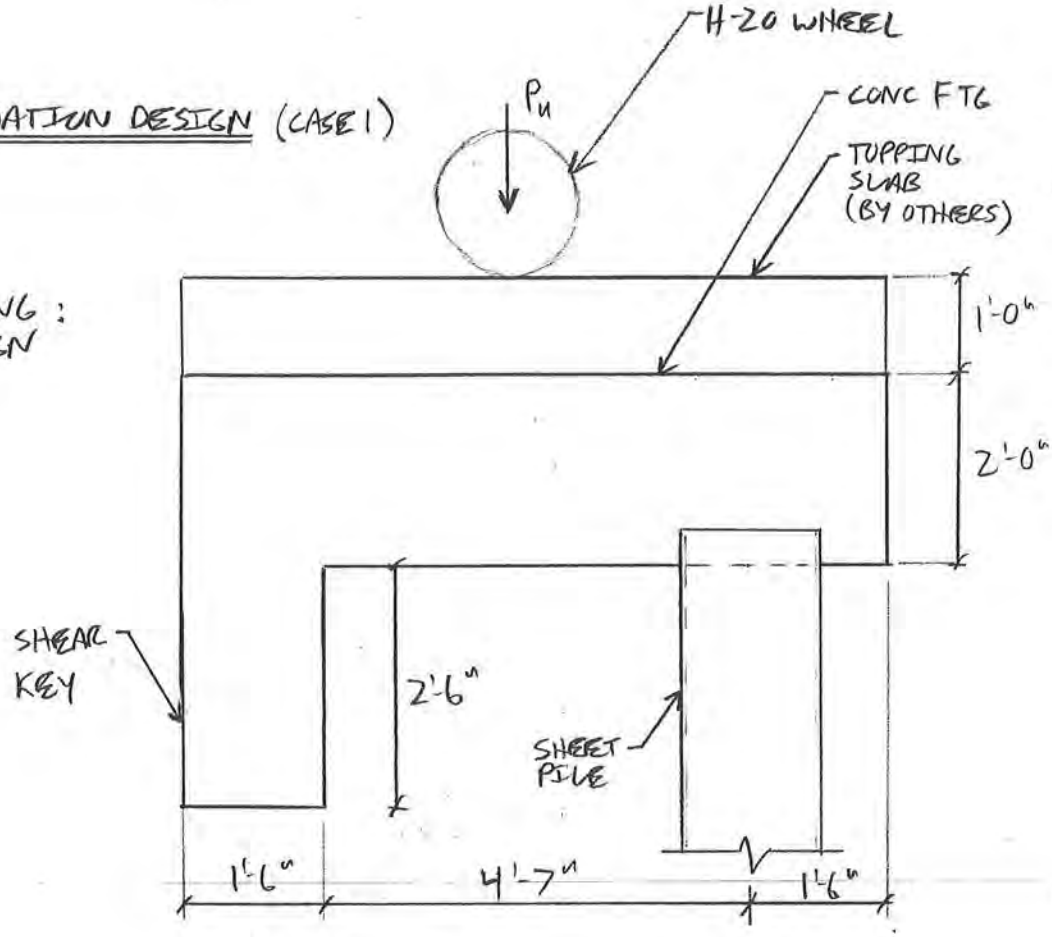
REGISTERED PROFESSIONAL ENGINEER
Casey Ryan Nickols
No. S5570
EXP. 12-31-14
Structural Engineer
STATE OF CALIFORNIA

NARRATIVE

HDR HAS BEEN AUTHORIZED TO PROCEED ON THE DESIGN OF THE FOUNDATION FOR A (N) FLOOD GATE TO BE INSTALLED NEAR SAN FRANCISQUITO CREEK. THE FLOOD GATE IS A PROPRIETARY SYSTEM DESIGNED BY OTHERS. A BORING SAMPLE HAS BEEN PREVIOUSLY TAKEN NEAR THE FLOODGATE LOCATION. A GEOTECHNICAL EVALUATION REPORT HAS BEEN PROVIDED BY GEI CONSULTANTS, INC, DATED MAY 2012. RELEVANT GEOTECHNICAL PARAMETERS WERE PROVIDED FOR SHEET PILE DESIGN, HOWEVER SHALLOW FOUNDATION RECOMMENDATIONS WERE NOT PROVIDED IN THIS REPORT. THE FOUNDATION IS TO BE DESIGNED FOR THE FOLLOWING TWO CASES: 1. FLOOD GATE DOWN W/ H-20 WHEEL LOADING, 2. FLOOD GATE UP W/ MAX WATER LOADING

FOUNDATION DESIGN (CASE 1)

FOOTING DESIGN:



$$P = \underbrace{\left(32k/_{AXLE}\right)\left(1\,AXLE/_{2\,WHEELS}\right)}_{H\text{-}20\ LOAD} = 16k/_{WHEEL}$$

$$P_u = \underbrace{(1.3)}_{IMPACT}(1.7)(16k) = 35.4k$$

⇒ ASSUME A WHEEL CONTACT AREA OF $\underbrace{10"}_{TIRE\ LENGTH} \times \underbrace{20"}_{TIRE\ WIDTH}$ & ∴ 4' FTG WIDTH IS EFFECTIVE

⇒ ASSUME ALL BEARING HANDLED BY SOIL BELOW (i.e. SHEET PILE NEGLECTED)

⇒ ASSUME 3000 psf ALLOWABLE BEARING PRESSURE

∴ PER FOLLOWING ENERCALC OUTPUT, FOUNDATION OK FOR H-20 DEMANDS

KDL 6/12/14
3 of 16

General Footing

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ENERCALC, INC. 1983-2013, Build:6.13.8.20, Ver:6.13.8.20

Lic. # : KW-06000410 Licensee : hdr engineering inc

Description : Case 1: Footing Check for Wheel Load @ Midspan

Code References

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05
Load Combinations Used : ASCE 7-10

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	3.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allowable pressure increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when maximum length or width is greater	=	ft

Dimensions

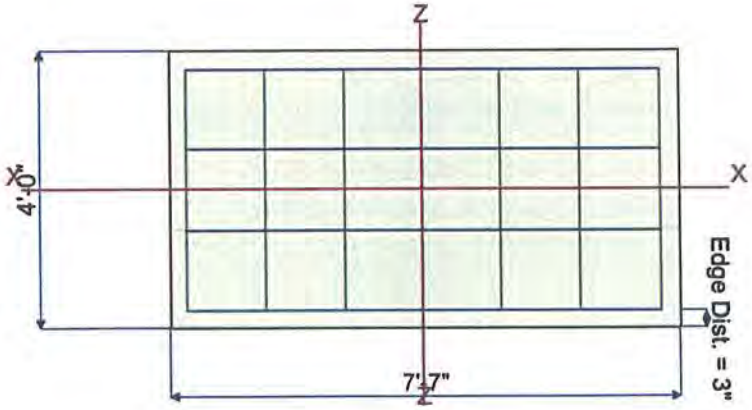
Width parallel to X-X Axis	=	7.583 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thicknes	=	24.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	4.0 in



Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 7
Bars parallel to Z-Z Axis		
Number of Bars	=	7.0
Reinforcing Bar Size	=	# 7

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	Z-Z Axis
# Bars required within zone	69.1 %
# Bars required on each side of zone	30.9 %

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=			16.0					k
OB : Overburden	=	0.150							ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

KDL 6/12/14

4 OF 16

General Footing

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ENERCALC, INC. 1983-2013, Build:6.13.8.20, Ver:6.13.8.20

Lic. # : KW-06000410 Licensee : hdr engineering inc

Description : Case 1: Footing Check for Wheel Load @ Midspan

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.3225	Soil Bearing	0.9675 ksf	3.0 ksf	+D+L+H about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1635	Z Flexure (+X)	8.568 k-ft	52.412 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1635	Z Flexure (-X)	8.568 k-ft	52.412 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.04916	X Flexure (+Z)	2.384 k-ft	48.495 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.04916	X Flexure (-Z)	2.384 k-ft	48.495 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1299	1-way Shear (+X)	10.671 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1299	1-way Shear (-X)	10.671 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02015	1-way Shear (+Z)	1.656 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02015	1-way Shear (-Z)	1.656 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1242	2-way Punching	20.40 psi	164.317 psi	+1.20D+0.50Lr+1.60L+1.60H

IMPACT FACTOR

$$DCR_{MAX} = (.1635)(1.3)(1.7/1.6)$$

CONVERT TO 1.7 LL FACTOR

$$DCR_{MAX} = .23 < 1.0$$

OK

KDL 6/12/14
5 OF 16

General Footing

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ENERCALC, INC. 1983-2013, Build:6.13.8.20, Ver:6.13.8.20
Lic. # : KW-06000410 Licensee : hdr engineering inc

Description : Case 1: Footing Check for Wheel Load @ End

Code References

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05
Load Combinations Used : ASCE 7-10

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	3.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth
Footing base depth below soil surface = ft
Allowable pressure increase per foot of depth = ksf
when footing base is below = ft

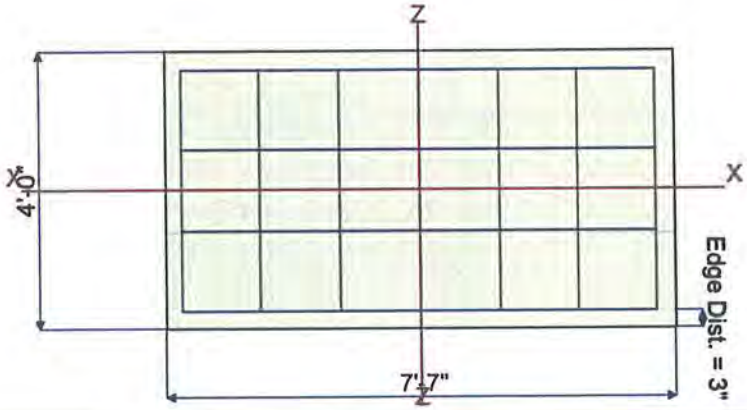
Increases based on footing plan dimension
Allowable pressure increase per foot of depth = ksf
when maximum length or width is greater = ft

Dimensions

Width parallel to X-X Axis	=	7.583 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thicknes	=	24.0 in

Load location offset from footing center...
ex : Prll to X-X Axis = 45 in

Pedestal dimensions...
px : parallel to X-X Axis = in
pz : parallel to Z-Z Axis = in
Height in
Rebar Centerline to Edge of Concrete..
at Bottom of footing = 4.0 in



Reinforcing

Bars parallel to X-X Axis
Number of Bars = 4.0
Reinforcing Bar Size = # 7

Bars parallel to Z-Z Axis
Number of Bars = 7.0
Reinforcing Bar Size = # 7

Bandwidth Distribution Check (ACI 15.4.4.2)
Direction Requiring Closer Separationg Z-Z Axis
Bars required within zone 69.1 %
Bars required on each side of zone 30.9 %

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=			16.0					k
OB : Overburden	=	0.150							ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

KDL 6/12/14
6 OF 16

General Footing

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ENERCALC, INC. 1983-2013, Build:6.13.8.20, Ver:6.13.8.20

Lic. # : KW-06000410 | Licensee : hdr engineering inc

Description : Case 1: Footing Check for Wheel Load @ End

DESIGN SUMMARY

Design OK

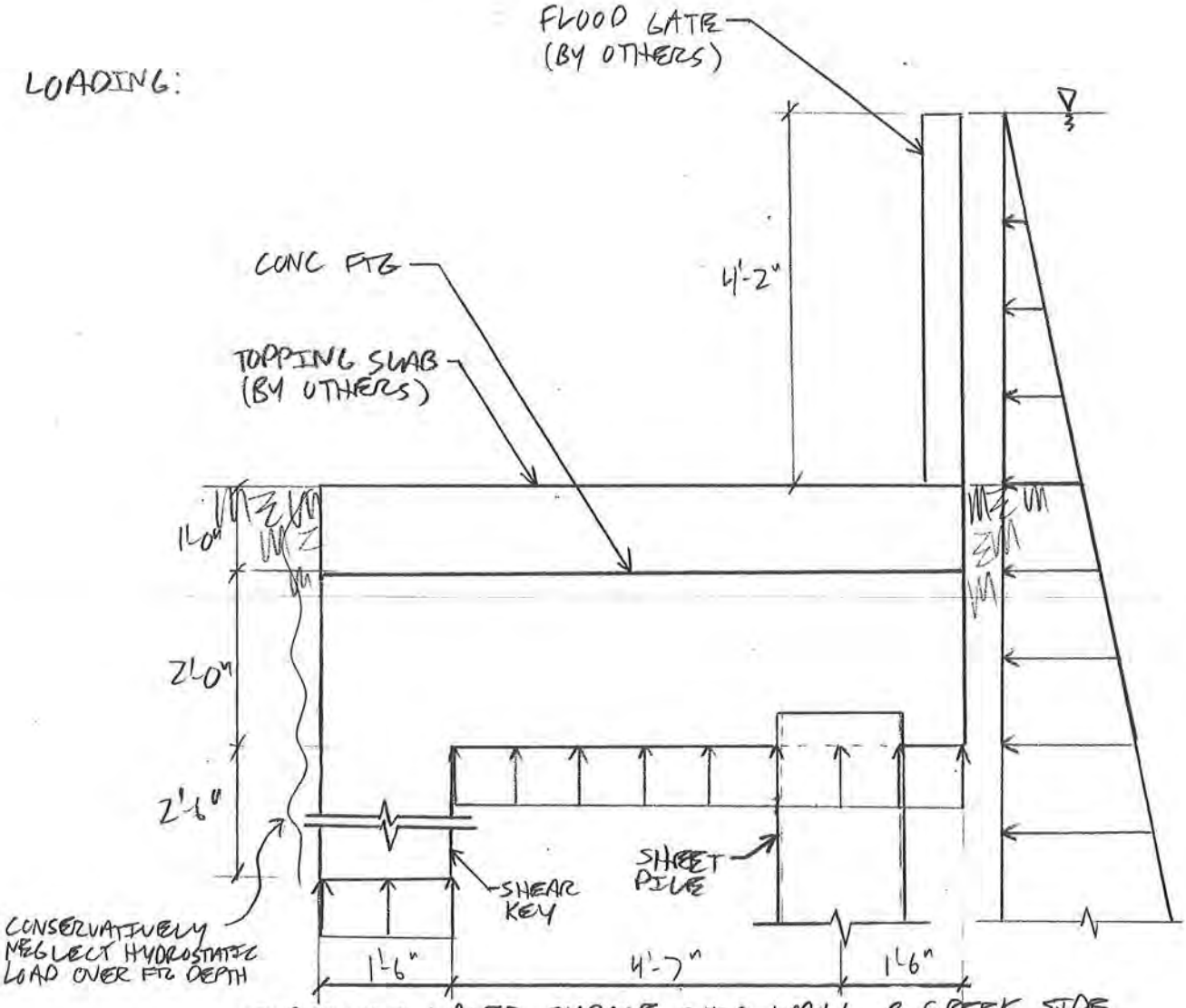
	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9220	Soil Bearing	2.766 ksf	3.0 ksf	+D+L+H about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.0	Z Flexure (+X)	0.0 k-ft	0.0 k-ft	No Moment
PASS	0.2203	Z Flexure (-X)	11.545 k-ft	52.412 k-ft	+1.40D+1.60H
PASS	0.04916	X Flexure (+Z)	2.384 k-ft	48.495 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.04916	X Flexure (-Z)	2.384 k-ft	48.495 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	0.3514	1-way Shear (-X)	28.873 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02015	1-way Shear (+Z)	1.656 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02015	1-way Shear (-Z)	1.656 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1341	2-way Punching	22.036 psi	164.317 psi	+1.20D+0.50Lr+1.60L+1.60H

$$DCR_{MAX} = (.3514)\underbrace{(1.3)}_{\text{IMPACT FACTOR}}\underbrace{(1.7/1.6)}_{\text{CONVERT TO 1.7 LL FACTOR}}$$

$$DCR_{MAX} = .49 < 1.0 \quad \underline{\underline{OK}}$$

FOUNDATION DESIGN (CASE 2)

LOADING:



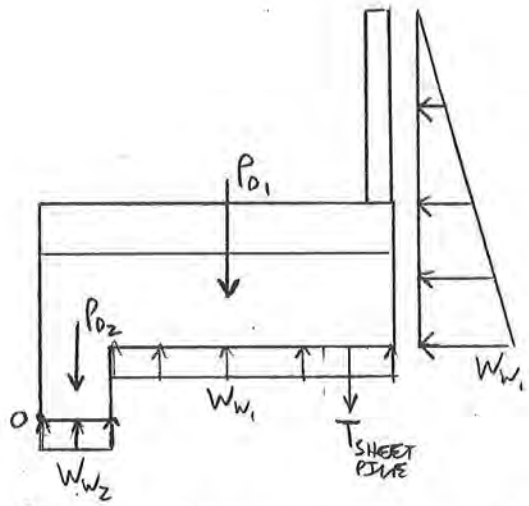
⇒ ASSUME WATER SURFACE @ T.O. WALL @ CREEK SIDE

⇒ ASSUME BUOYANT DEMANDS DUE TO HEAD FROM WSE

⇒ ASSUME SOIL LOADING ON BOTH SIDES OF FTG BALANCES EACH OTHER OUT

FOUNDATION DESIGN (CASE 2)

SHEET PILE DESIGN



$P_{D_1} = (150\,pcf)(1'+2')(7.58') = 3411\ \#/'$

$P_{D_2} = (150\,pcf)(1.5')(2.5') = 563\ \#/'$

$W_{W_2} = (62.4\,pcf)(7.17') = 448\ plf/'$

$W_{W_2} = (62.4\,pcf)(8.67') = 541\ plf/'$

$\Rightarrow$ ASSUME F.S. = 1.5 FOR OVERTURNING

$\Sigma M_O : \Sigma M_R / F.S. \geq \Sigma M_{OT}$

$$\left((3411\#/')(7.58'/2) + (563\#/')(1.5'/2) + T_{SHEET\ PILE}(7.58'-1.5')\right)/1.5$$
$$= \tfrac{1}{2}(448\,plf/')(7.17')(7.17'/3 + 1.5')$$
$$+ (448\,plf/')(7.58'-1.5')\left(1.5' + (7.58'-1.5')/2\right)$$
$$+ (541\,plf/')(1.5')^2/2$$

$T_{SHEET\ PILE} = 2547\#/'$, $\Sigma M_{OT} = 19223\ \#\cdot ft/'$

FOUNDATION DESIGN (CASE 2)

SHEET PILE DESIGN (CONT.): ⇒ TRY AZ 19-700 HOT ROLLED SHEET PILE

$f_a = .5 f_y$ (EM 2504, SECTION 6-3)

$f_y = 39$ ksi (ASSUME A328)

$A = 6.88 \text{ in}^2/\text{ft}$ (SEE FOLLOWING PRODUCT INFO SHEETS)

$T_{ALLOW} = .5 f_y A = .5(39000 \text{ psi})(6.88 \text{ in}^2/\text{ft})$

$T_{ALLOW} = 134160 \text{ \#/ft} > T_{SHEET\ PILE} = 2547 \text{ \#/ft}$

∴ AZ 19-700 SHEET PILE OK

SHEET PILE EMBEDMENT: ⇒ DETERMINE MIN. EMBEDMENT OF SHEET PILE SUCH THAT TENSION DEMAND RESISTED THROUGH SOIL/STEEL INTERFACE VIA FRICTION. USACE EM 1110-2-2503 PROCEDURE OUTLINED IN SECTION 4-14 TO BE USED

$FS = Q_u / Q_p$, $Q_p = 2547 \text{ \#/ft}$ @ F.S. = 1.5

2 SIDES OF SHEET PILE

$Q_u = \frac{1}{2} K_a \gamma_e D^2 \tan\delta \, (2)$

FOR: $\alpha = 0°, \beta = 0°$, $\phi = 30°, \phi_w = 14°$ (ASSUMED): $K_a = \frac{\cos^2\phi}{\cos\phi_w\left[1+\sqrt{\frac{\sin(\phi+\phi_w)\sin\phi}{\cos\phi_w}}\right]} = \frac{\cos^2(30°)}{\cos(14°)\left[1+\sqrt{\frac{\sin(30°+14°)\sin(30°)}{\cos(14°)}}\right]} = .303$

$\gamma_e = \underbrace{120 \text{ pcf}}_{\gamma_s \text{ ASSUMED}} - \underbrace{62.4 \text{ pcf}}_{\gamma_w} = 57.6 \text{ pcf}$

$\tan\delta = .25$ (ASSUMED PER TABLE 4-3)

$\frac{1}{2}(.303)(57.6 \text{ pcf}) D_{MIN}^2 (.25)(2) = 2547 \text{ \#/ft}$

$D_{MIN} = 24.2'$

∴ PROVIDE 25' MIN OF SHEET PILE EMBED

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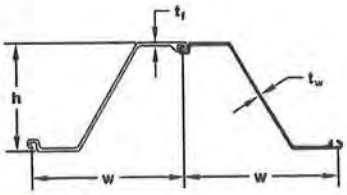
AZ

KDL 6/12/14

AZ Hot Rolled Steel Sheet Pile



SECTION	Width (w) in (mm)	Height (h) in (mm)	THICKNESS Flange (t_f) in (mm)	THICKNESS Web (t_w) in (mm)	Cross Sectional Area in²/ft (cm²/m)	WEIGHT Pile lb/ft (kg/m)	WEIGHT Wall lb/ft² (kg/m²)	SECTION MODULUS Elastic in³/ft (cm³/m)	SECTION MODULUS Plastic in³/ft (cm³/m)	Moment of Inertia in⁴/ft (cm⁴/m)	COATING AREA Both Sides ft²/ft of single (m²/m)	COATING AREA Wall Surface ft²/ft² (m²/m²)
AZ 12-700	27.56 700	12.36 314	0.335 8.5	0.335 8.5	5.82 123.2	45.49 67.7	19.81 96.7	22.4 1205	26.3 1415	138.3 18880	5.61 1.71	1.22 1.22
AZ 13-700	27.56 700	12.40 315	0.375 9.5	0.375 9.5	6.36 134.7	49.72 74.0	21.65 105.7	24.3 1305	28.6 1540	150.4 20540	5.61 1.71	1.22 1.22
AZ 13-700-10/10	27.56 700	12.42 316	0.394 10.0	0.394 10.0	6.63 140.4	51.85 77.2	22.58 110.2	25.2 1355	29.8 1600	156.5 21370	5.61 1.71	1.22 1.22
AZ 14-700	27.56 700	12.44 316	0.413 10.5	0.413 10.5	6.90 146.1	53.96 80.3	23.50 114.7	26.1 1405	31.0 1665	162.5 22190	5.61 1.71	1.22 1.22
AZ 12-770	30.31 770	13.52 343.5	0.335 8.50	0.335 8.50	5.67 120.1	48.78 72.60	19.31 94.30	23.2 1245	27.5 1480	156.9 21430	6.10 1.86	1.20 1.20
AZ 13-770	30.31 770	13.54 344.0	0.354 9.00	0.354 9.00	5.94 125.8	51.14 76.10	20.24 98.80	24.2 1300	28.8 1546	163.7 22360	6.10 1.86	1.20 1.20
AZ 14-770	30.31 770	13.56 344.5	0.375 9.50	0.375 9.50	6.21 131.5	53.42 79.50	21.14 103.20	25.2 1355	30.0 1611	170.6 23300	6.10 1.86	1.20 1.20
AZ 14-770-10/10	30.31 770	13.58 345	0.394 10.0	0.394 10.0	6.48 137.2	55.71 82.9	22.06 107.7	26.1 1405	31.2 1677	177.5 24240	6.07 1.85	1.20 1.20
AZ 18	24.80 630	14.96 380.0	0.375 9.50	0.375 9.50	7.11 150.4	49.99 74.40	24.19 118.10	33.5 1800	39.1 2104	250.4 34200	5.64 1.72	1.35 1.35
AZ 17-700	27.56 700	16.52 419.5	0.335 8.50	0.335 8.50	6.28 133.0	49.12 73.10	21.38 104.40	32.2 1730	37.7 2027	265.3 36230	6.10 1.86	1.33 1.33
AZ 18-700	27.56 700	16.54 420.0	0.354 9.00	0.354 9.00	6.58 139.2	51.41 76.50	22.39 109.30	33.5 1800	39.4 2116	276.8 37800	6.10 1.86	1.33 1.33
AZ 19-700	27.56 700	16.56 420.5	0.375 9.50	0.375 9.50	6.88 145.6	53.76 80.00	23.41 114.30	34.8 1870	41.0 2205	288.4 39380	6.10 1.86	1.33 1.33
AZ 20-700	27.56 700	16.58 421	0.394 10.0	0.394 10.0	7.18 152.0	56.11 83.5	24.43 119.3	36.2 1945	42.7 2296	299.9 40960	6.10 1.86	1.33 1.33
AZ 26	24.80 630	16.81 427.0	0.512 13.00	0.480 12.20	9.35 198.0	65.72 97.80	31.79 155.20	48.4 2600	56.9 3059	406.5 55510	5.91 1.80	1.41 1.41
AZ 24-700	27.56 700	18.07 459.0	0.441 11.20	0.441 11.20	8.23 174.1	64.30 95.70	28.00 136.70	45.2 2430	53.5 2867	408.8 55820	6.33 1.93	1.38 1.38
AZ 26-700	27.56 700	18.11 460.0	0.480 12.20	0.480 12.20	8.84 187.2	69.12 102.90	30.10 146.90	48.4 2600	57.1 3070	437.3 59720	6.33 1.93	1.38 1.38
AZ 28-700	27.56 700	18.15 461.0	0.520 13.20	0.520 13.20	9.46 200.2	73.93 110.00	32.19 157.20	51.3 2760	60.9 3273	465.9 63620	6.33 1.93	1.38 1.38
AZ 24-700N	27.56 700	18.07 459.0	0.492 12.5	0.354 9.0	7.71 163.3	60.28 89.7	26.26 128.2	45.3 2435	52.3 2810	409.3 55890	6.30 1.92	1.37 1.37
AZ 26-700N	27.56 700	18.11 460	0.531 13.5	0.394 10.0	8.33 176.4	65.11 96.9	28.37 138.5	48.4 2600	56.1 3015	437.8 59790	6.30 1.92	1.37 1.37
AZ 28-700N	27.56 700	18.15 461	0.571 14.5	0.433 11.0	8.95 189.5	69.95 104.1	30.46 148.7	51.4 2765	59.9 3220	466.5 63700	6.30 1.92	1.37 1.37
AZ 36-700N	27.56 700	19.65 499.0	0.591 15.00	0.441 11.20	10.20 216.0	79.70 118.60	34.61 169.00	66.8 3590	76.5 4110	656.2 89610	6.76 2.06	1.47 1.47
AZ 38-700N	27.56 700	19.69 500.0	0.630 16.00	0.480 12.20	10.87 230.0	84.94 126.40	37.07 181.00	70.6 3795	81.1 4360	694.5 94840	6.76 2.06	1.47 1.47
AZ 40-700N	27.56 700	19.72 501.0	0.669 17.00	0.520 13.20	11.53 244.0	90.18 134.20	39.32 192.00	74.3 3995	85.7 4605	732.9 100080	6.76 2.06	1.47 1.47
AZ 42-700N	27.56 700	19.65 499.0	0.709 18.00	0.551 14.00	12.22 259.0	95.49 142.1	41.57 203.00	78.2 4205	90.3 4855	766.0 104930	6.76 2.06	1.47 1.47
AZ 44-700N	27.56 700	19.69 500.0	0.748 19.00	0.591 15.00	12.89 273.0	100.73 149.9	43.83 214.00	81.9 4405	94.9 5105	804.1 110150	6.76 2.06	1.47 1.47
AZ 46-700N	27.56 700	19.72 501.0	0.787 20.00	0.630 16.00	13.55 287.0	105.97 157.7	46.08 225.00	85.7 4605	99.5 5350	842.2 115370	6.76 2.06	1.47 1.47
AZ 46	22.83 580	18.94 481.0	0.709 18.00	0.551 14.00	13.76 291.2	89.10 132.60	46.82 228.60	85.5 4595	98.5 5295	808.8 110450	6.23 1.90	1.63 1.63
AZ 48	22.83 580	18.98 482.0	0.748 19.00	0.591 15.00	14.48 306.5	93.81 139.60	49.28 240.60	89.3 4800	103.3 5553	847.1 115670	6.23 1.90	1.63 1.63
AZ 50	22.83 580	19.02 483.0	0.787 20.00	0.630 16.00	15.22 322.2	98.58 146.70	51.80 252.9	93.3 5015	108.2 5816	886.5 121060	6.23 1.90	1.63 1.63

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AZ

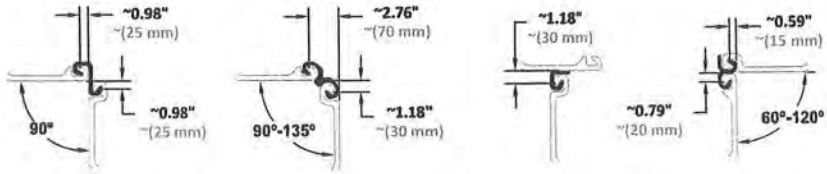
AZ Hot Rolled Steel Sheet Pile

KDL 6/12/14

Available Steel Grades											
AMERICAN			CANADIAN			EUROPEAN			AMLoCor***		
ASTM	YIELD STRENGTH		CSA G40.21	YIELD STRENGTH		EN 10248	YIELD STRENGTH			YIELD STRENGTH	
	(ksi)	(MPa)		(ksi)	(MPa)		(ksi)	(MPa)		(ksi)	(MPa)
A 328	39	270	Grade 260 W	38	260	S 240 GP	35	240	Blue 320	46	320
A 572 Gr. 42	42	290	Grade 300 W	43	300	S 270 GP	39	270	Blue 355	51	355
A 572 Gr. 50	50	345	Grade 350 W	51	355	S 320 GP	46	320	Blue 390	57	390
A 572 Gr. 55	55	380	Grade 400 W	58	400	S 355 GP	51	355			
A 572 Gr. 60	60	415				S 390 GP	57	390			
A 572 Gr. 65	65	450				S 430 GP	62	430			
A 690	50	345				S 460 AP	67	460			
A 690*	57	390									

*Not available for AZ 36-700N and larger. ** Corrosion resistant steel, check for availability

Corner Piles



C 14
Grade: S 355 GP
Weight: 9.68 lb/ft
(14.4 kg/m)

Omega 18
Grade: S 430 GP
Weight: 12.10 lb/ft
(18.0 kg/m)

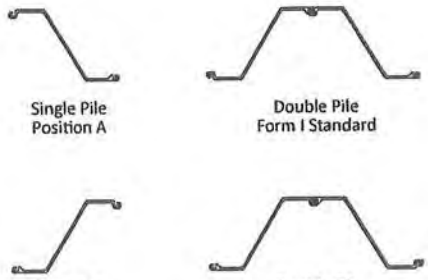
E 22
Grade: S 355 GP
Weight: 6.87 lb/ft
(10.2 kg/m)

Delta 13
Grade: S 355 GP
Weight: 8.73 lb/ft
(13.0 kg/m)

Delivery Conditions & Tolerances

	ASTM A 6		EN 10248	
Mass	± 2.5%		± 5%	
Length	+ 5 inches	− 0 inches	± 200 mm	
Height			± 7 mm	
Thickness			≤ 8.5 mm	± 0.5 mm
			> 8.5 mm	± 6%
Width			± 2%	
Double Pile Width			± 3%	
Straightness			0.2% of the length	
Ends out of Square			2% of the width	

Delivery Forms



Maximum Rolled Lengths*

AZ	101.7 feet	(31.0 m)
E 22	59.1 feet	(18.0 m)
C 14	59.1 feet	(18.0 m)
Delta 13	55.8 feet	(17.0 m)
Omega 18	52.0 feet	(16.0 m)

* Longer lengths may be possible upon request.

FOUNDATION DESIGN (CASE 2)

SHEET PILE CAP PL DESIGN: ⇒ USE .9D + (1.3)1.7H COMBO

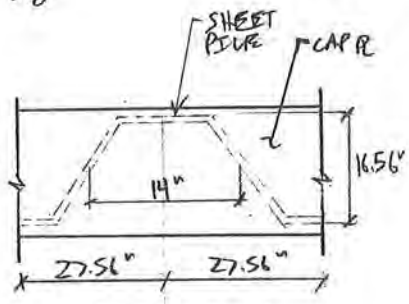
$$.9\left((3411\,\#/_1)(7.58'/2) + T_{u_{\substack{SHEET\\PILE}}}(7.58'-1.5')\right)$$
$$= (1.3)(1.7)\left[\tfrac{1}{2}(448\,pif_1)(7.17')(7.17'/3 + 1.5') + (448\,pif_1)(7.58'-1.5')(1.5' + (7.58'-1.5')/2) + (541\,pif_1)(1.5')^2/2\right]$$

$$T_{u_{\substack{SHEET\\PILE}}} = 5638\,\#/_1$$

⇒ ASSUME PL SPANS 14"

$$M_{u_{PL}} = (5.638\,k/_1)(1'/12")(14")^2/8$$
$$M_{u_{PL}} = 12\,k\cdot in$$
$$\phi M_n \geq M_{u_{PL}}$$
$$(.9)(36\,ksi)(16.56")\,t_{PL}^2/4 = 12\,k\cdot in$$
$$t_{PL_{REQ}} = .3"$$

∴ USE ½" CAP PL

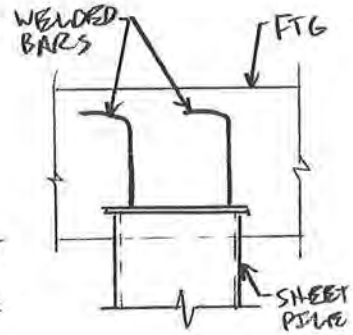


PLAN VIEW

WELDED BAR DESIGN: ⇒ TRY 2-#7 @ 24" OC

$$T_{u_{BARS}} = (5638\,\#/_1)(2') = 11.3k$$
$$\phi T_{n_{BARS}} = (.9)(60\,ksi)(2 \times .6\,in^2)$$
$$\phi T_{n_{BARS}} = 64.8k > T_{u_{BARS}} = 11.3k \quad \underline{OK}$$

∴ USE 2-#7 @ 24" OC



FOUNDATION DESIGN (CASE 2)

BEARING CHECK:

$\Sigma P = P_{D1} + P_{D2}$ ⇒ CONSERVATIVELY NEGLECT BUOYANT LOAD

$\Sigma P = 3411\#/' + 338\#/' = 3749\#/'$

ASSUME CONC DL CENTERED ON FTG ℄

$\Sigma M_{ABOUT ℄} = \frac{1}{2}(448 plf/')(7.17')(7.17'/3 + 1.5')$

$\Sigma M_{ABOUT ℄} = 6248 \#\cdot ft/'$

$A = 7.58\ ft^2/'$

$S = (7.58 ft)^2/6 = 9.58\ ft^3/'$

$\sigma_{MAX} = P/A + M/S = 3749\#/' / 7.58 ft^2/' + 6248 \#\cdot ft/' / 9.58 ft^3/'$

$\sigma_{MAX} = 1147\ psf < \sigma_{ALLOW}/F.S. = \underbrace{3000\ psf}_{\text{ASSUMED}} / \underbrace{2.0}_{\text{PER EM 2502 TABLE 4-2}} = 1500\ psf$ OK

∴ BEARING PRESSURE OK

SLIDING CHECK:

⇒ ASSUME LATERAL LOADING RESISTED THROUGH PASSIVE BEARING @ THE LAND SIDE OF THE FOOTING & THE TOP 5' OF THE SHEET PILE

⇒ NEGLECT THE PASSIVE BEARING CONTRIBUTION FROM THE 1' TOPPING SLAB

$\Sigma V = \frac{1}{2}(448 plf)(7.17') = 1604\#/'$

$q_{BRG} = \Sigma V / \Sigma A_{BRG} = 1604\#/' / (3' + 5')$

$q_{BRG} = 201\ psf < q_{ALLOW}/F.S. = \underbrace{300\ psf}_{\text{ASSUMED}} / \underbrace{1.33}_{\text{PER EM 2502, TABLE 4-2}} = 226\ psf$ OK

∴ SLIDING OK

FOUNDATION DESIGN (CASE 2)

SHEET PILE CHECK: ⇒ CHECK SHEET PILE FOR BENDING DUE TO ASSUMED 5' PASSIVE BEARING DEPTH @ T.O. SHEET PILE

$$M_{MAX} = (\underbrace{201 plf}_{q_{BRG}}/ft)(5')^2/2\,(12''/1')$$

$$M_{MAX} = 30.2\ k\cdot in/ft$$

$$S_{MIN} = M_{MAX}/.5f_y = 30.2\ k\cdot in/ft \,/\, (.5)(39\ ksi)$$

$$S_{MIN} = 1.55\ in^3/ft$$

∴ AZ 19-700 SHEET PILE OK ($S = \underbrace{34.8\ in^3/ft}_{\text{PER PREVIOUS CALC}}$)

FOOTING DESIGN: ⇒ CHECK FOOTING IN ENERCALC W/ DEAD LOAD & MOMENT APPLIED

⇒ SLIDING CHECK NOT PERFORMED (SHEAR KEY & SHEET PILE NEGLECTED)

⇒ BUOYANT LOAD NEGLECTED

∴ PER FOLLOWING ENERCALC OUTPUT, FOOTING OK FOR MAX HYDROSTATIC DEMANDS

KDL 6/12/14
15 OF 16

General Footing

File = C:\Users\cnickols\Desktop\SANFRA~1\Calcs\Enercalc\SANFRA~1.EC6
ENERCALC, INC. 1983-2013, Build:6.13.8.20, Ver:6.13.8.20
Licensee : hdr engineering inc

Lic. # : KW-06000410

Description : Case 2: Footing Check for Max Hydrostatic Loading

Code References

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05
Load Combinations Used : ASCE 7-10

3ksf / 2 = 1.5 ksf F.S.

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	0.0 ft
Allowable pressure increase per foot of deptl	=	0.0 ksf
when footing base is below	=	0.0 ft

Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0 ksf
when maximum length or width is greater	=	0.0 ft

Dimensions

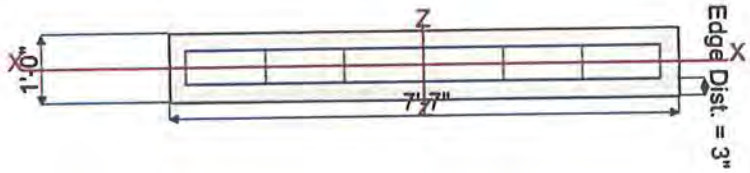
Width parallel to X-X Axis	=	7.583 ft
Length parallel to Z-Z Axis	=	1.0 ft
Footing Thicknes	=	24.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	0.0 in
pz : parallel to Z-Z Axis	=	0.0 in
Height	=	0.0 in

Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	4.0 in



Reinforcing

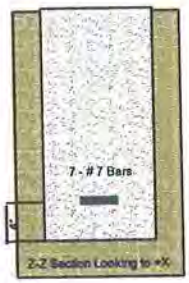
Bars parallel to X-X Axis

Number of Bars	=	2
Reinforcing Bar Size	=	# 5

EQUIVALENT TO 1-#7

Bars parallel to Z-Z Axis

Number of Bars	=	7.0
Reinforcing Bar Size	=	# 7



Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation: Z-Z Axis

# Bars required within zone	23.3 %
# Bars required on each side of zone	76.7 %

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
OB : Overburden	=	0.150	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0	6.248 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k

KDL 6/12/14
16 OF 16

General Footing

File = C:\Users\cnickols\Desktop\SANFRA~1\Calcs\Enercalc\SANFRA~1.EC6
ENERCALC, INC. 1983-2013, Build:6.13.8.20, Ver:6.13.8.20
Licensee : hdr engineering inc

Lic. # : KW-06000410

Description : Case 2: Footing Check for Max Hydrostatic Loading

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7640	Soil Bearing	1.146 ksf	1.50 ksf	+D+0.750L+0.750S+0.5250E+H about Z-
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	2.025	Overturning - Z-Z	6.248 k-ft	12.650 k-ft	D+H
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1608	Z Flexure (+X)	8.70 k-ft	54.104 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02477	Z Flexure (-X)	1.409 k-ft	56.894 k-ft	+1.40D+1.60H
PASS	0.001047	X Flexure (+Z)	0.05075 k-ft	48.495 k-ft	+1.40D+1.60H
PASS	0.001047	X Flexure (-Z)	0.05075 k-ft	48.495 k-ft	+1.40D+1.60H
PASS	0.04424	1-way Shear (+X)	3.634 psi	82.158 psi	+1.40D+1.60H
PASS	0.04424	1-way Shear (-X)	3.634 psi	82.158 psi	+1.40D+1.60H
PASS	n/a	1-way Shear (+Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	82.158 psi	n/a
PASS	0.008978	2-way Punching	1.475 psi	164.317 psi	+1.40D+1.60H

H_f PER PAGE 3-2 OF FEM 2104

$DCR_{MAX} = (.1608)(1.3)(1.7/1.6)$

LOAD FACTOR CONVERSION

$DCR_{MAX} = .22 < 1.0$

OK

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APPENDIX B – PG&E Coordination (Email and Figure)

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Jones, Lance

From: Jones, Lance
Sent: Friday, April 20, 2012 1:40 PM
To: 'Lightstone, Michael'
Cc: Johnson, Blake W.; Kevin Murray; 'Bill Springer'; 'Len Materman'; Jimenez, Sergio; 'Fannin, Scott R (GE&O)'; 'Sanchez, Patricia'; 'Lodwick, Rick'; Gilleran, Amy; Quintrall, Anthony; Speese, Debbie L
Subject: RE: ET follow up questions from our meeting on 3/29/12
Attachments: C-207.pdf

Mr. Lightstone,

HDR has re-evaluated the elevations required for the LDS pole relocations at San Francisquito Creek.
This re-evaluation was conducted because PG&E has indicated, via telephone call, that the previously submitted elevations would incur additional construction fees upwards of $300,000 to reach these elevations.
In order to reduce the required construction clearance, HDR will design a spliced sheet pile and will require use of either a Geeken Silent Piler, or an excavator mounted rig to install sheet piles for a short portion of the flood wall at each electrical crossing.
Use of this technology will reduce the required clearance at each crossing by 28 to 31 feet.

Listed below, and on the attached map, please find the elevation of the proposed construction equipment at each location.
PG&E should add clearance above the indicated equipment elevation to meet OSHA standards and to ensure safety of the conductors during construction.

- Right Bank Levee STA 56+75 – Elevation 42
- Left Bank Levee STA 52+00 – Elevation 33
- Left Bank Levee STA 54+30 – Elevation 36

LANCE M JONES
PE
QSD
LEED AP

HDR Engineering
Federal, Energy and Resource Management
Project Engineer

2365 Iron Point Road | Folsom, CA 95630
916.817.4746
Lance.Jones@hdrinc.com| hdrinc.com

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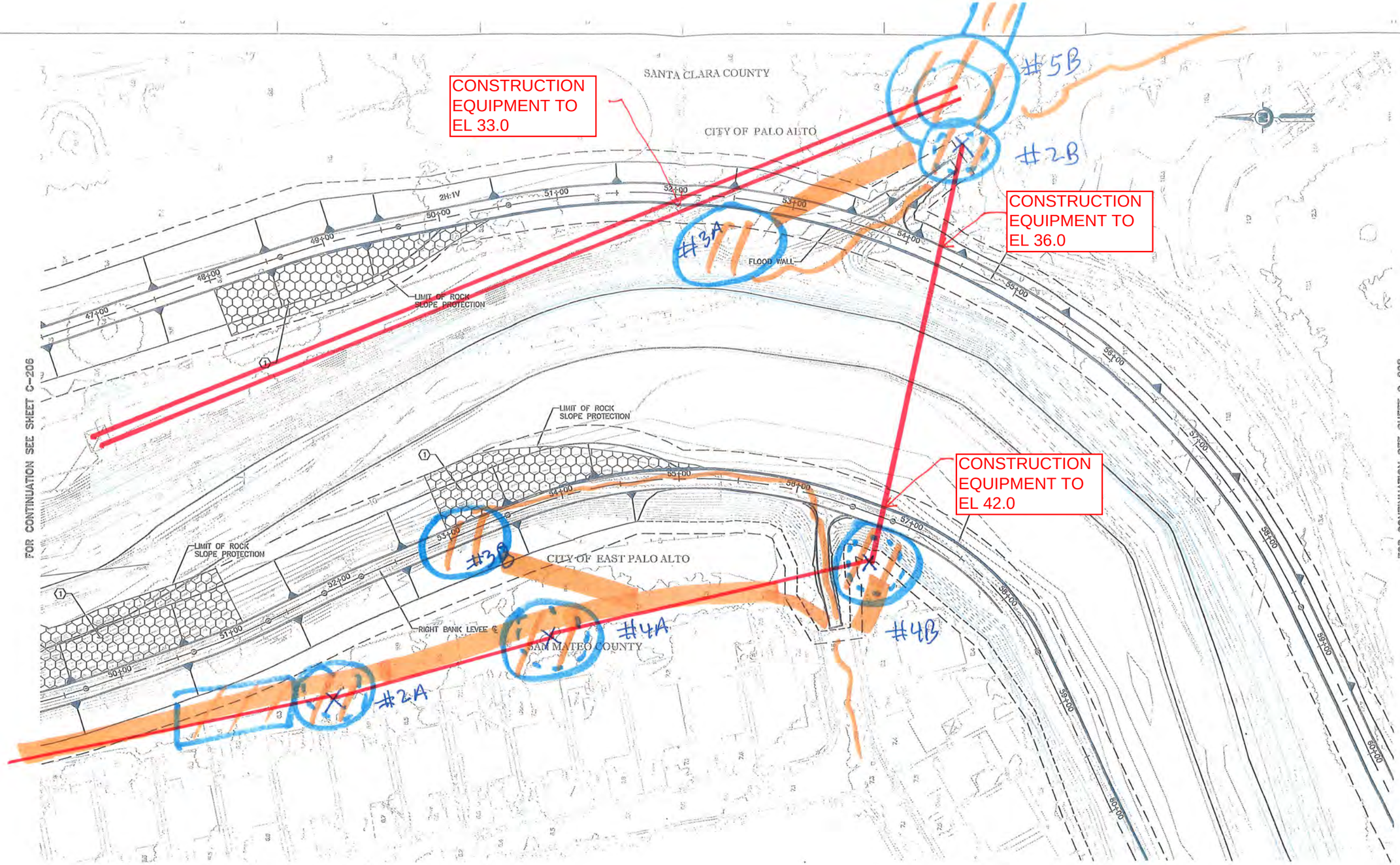


SHEET NOTES:

1. SEE SHEETS C-107 AND C-108 FOR RIGHT BANK LEVEE PLAN AND PROFILE. SEE SHEETS C-112, C-113 AND C-114 FOR LEFT BANK LEVEE PLAN AND PROFILE.
2. SEE SHEETS C-306, C-307 AND C-308 FOR RIGHT BANK LEVEE CROSS SECTIONS. SEE SHEETS C-314 AND C-315 FOR LEFT BANK LEVEE CROSS SECTIONS.

KEY NOTE:

1. PLACE ROCK SLOPE PROTECTION PER 3/C-502

SCALE: 1"=40'

REV	DESCRIPTION	DATE	APPR.
	PRELIMINARY 60% 03-02-2012		

HDR Engineering, Inc.

DATE 03-02-12
DESIGN S. JIMENEZ
DRAWN H. SUAREZ
CHECKED B. JOHNSON

ENGINEERING CERTIFICATION: REGISTERED PROFESSIONAL ENGINEER SERGIO E. JIMENEZ C 43343 EXP. 6-30-12 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY

ACCEPTED BY DISTRICT

PROJECT ENGINEER DATE

PROJECT NAME AND SHEET DESCRIPTION:
SAN FRANCISQUITO CREEK
FLOOD PROTECTION CAPITAL PROJECT
EAST BAYSHORE RD. TO S.F. BAY
SCOUR COUNTERMEASURE PLAN
(6 OF 8)

SCALE: AS SHOWN
VERIFY SCALES: 0 — 1" BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PROJECT NUMBER: 130806
SHEET CODE: C-207
SHEET NUMBER: 54 OF 103

DOCUMENT NUMBER:SFC_LP-C-1028-XXXXXXX

USERNAME: BillShaw Tue 08 Jul 2008 09:32am
FILENAME: C:\pwworking\sac\d0171341\C-207.dwg

C:\pwworking\sac\d0171341\C-207.dwg, 3/1/2012 11:52:14 PM, hsuarez

1. PURPOSE AND SCOPE:

Adequate levee inspection and maintenance is essential for providing a reliable flood protection system, reducing the risk of flooding and loss of life and property, and maintaining compliance with state and federal regulations for funding and flood insurance requirements. Adequate levee maintenance also ensures accessibility and serviceability during flood events and emergency work.

This document describes general procedures and guidelines for field operations levee inspection and record-keeping.

2. REFERENCE DOCUMENTS:

External References:

U.S. Army Corps of Engineers levee technical guidance documents
U.S. Army Corps of Engineers O&M manuals for certain SCVWD flood protection projects

Internal References:

Q751D02	Control and Oversight of Pesticide Use
WQ75101	Field Operations Work Order Process
WQ75115	Engineering Field Instructions
WF75118	Ordinance Violation Form
WF75161	Levee Field Inspection Rating Guide
WF75165	Field Inspection Checklist
	Levee Inventory List (watershed specific)
	Levee Safety Technical Guidance Manual (W:\Watershed Mgmt\Levee Safety Manuals\TechManualComplete)
	Annual Levee Inspection Report
	Event Levee Inspection Report
	Facility Maintenance Guidelines/Agreements
	As-Built Plans
	SMP Binder (BMP Manual/Permits and Supporting Material)
	FC 441 (03-21-89)
	Land Surveying and Mapping Request for Services (FC 136)

3. DEFINITIONS:

Levee – A raised embankment to prevent a watercourse from flooding beyond its expected course. The "levee" as defined here refers to all elements of the flood protection system. This includes the embankment itself and any stability or seepage berms, toe drains, flood walls, relief wells, and any waterside erosion protection system. It also includes other ancillary structures, facilities and appurtenances encroaching on the levee.

Net grade – The as-built elevation of a levee.

Event-driven inspection –
An inspection that should take place during or immediately after a natural hazard such as flood, earthquake, storm and other events having the potential of damaging the flood protection system.

4. ROLES AND RESPONSIBILITIES:

None

5. REQUIREMENTS:

5.1. ISO 9001 - 7.5.1 Control of Production and Service Provision

5.2. ISO 14001 - 4.4.6 Operational Control

5.3. Other Requirements

Q751D02 Control and Oversight of Pesticide Use
SMP Permits & CEQA documents

6. MONITORING AND MEASUREMENT:

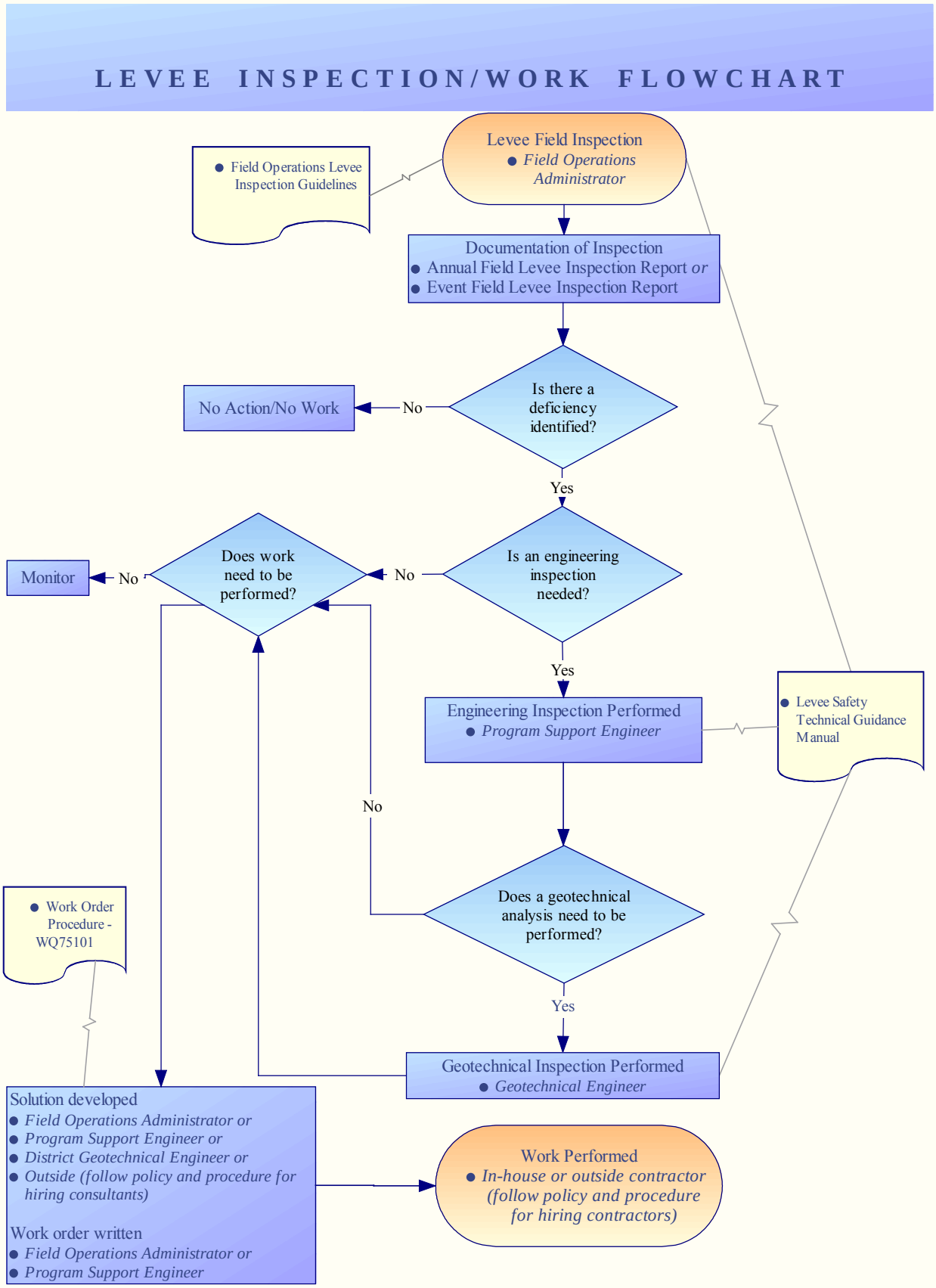
None

7. PROCEDURE:

7.1. Field Operations Levee/Work Inspection Flow Chart

The following flowchart represents typical critical paths from initial levee inspection to final work initiation. Although this flowchart cannot be used for every levee inspection/work scenario, it is shown here to represent a basis for most typical situations.

Downloaded or printed copies are for reference only. Verify this is the current version prior to use. See the District website for released version



7.2. Field Operations Levee Inspection Procedure

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
(1) Plan inspections (Field Operations Administrator (FOA))	• **Routine Field Levee Inspections** are conducted by the Field Operations Administrator to assess the condition of levees. This assessment can help identify deficiencies including those that may threaten the integrity of the levees within the watershed. • Inspection frequency should be governed by government minimum requirements, facility maintenance guidelines/agreements, and the perceived needs for inspections. In the absence of documented mandated inspection frequencies, levees should be routinely inspected at least annually, so that any necessary repairs can be designed and constructed prior to the next rainy season. • Identify all District levees within each Watershed using the levee inventory list. The Levee Inventory List is compiled, maintained, and kept by FOA. • Prepare a schedule of levee inspections	Levee Inventory List
(2) Inspect Levees (Field Operations Administrator (FOA))	• The annual inspection involves walking the levees and noting any observable distress. All relevant aspects are noted in section 10, ADDENDA: Levee Inspection Guidelines. • The Field Inspection Checklist shall be used to capture all field gathered data. Field-gathered data including location, description of findings, and photo documentation are transferred into the Oracle online photo archive database and then compiled into an Annual Levee Inspection Report. • The results from the levee field inspections are categorized in inspection reports providing site-specific information for on-going monitoring and prioritizing deficiencies. The report is also used to identify and prioritize other minor routine maintenance in levees. • A report of inspection will be prepared by the Field Operations Administrator for permanent record, reference, and as a basis for needed remedial work for all periodic inspections. This report should be based on a systematic field inspection of each facility and its individual components regarding its safety, stability, and operational adequacy.	Field Inspection Checklist Levee Inspection Report
(3) Event-driven Inspections	• **Event-driven inspections** should also take place during or immediately after a natural hazard such as flood, earthquake, storm, and other events having the potential for damaging the flood protection system. • A record of emergency investigation containing all pertinent information is prepared and filed as part of the flood	

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)

(Field Operations Administrator (FOA))	protection system record.
	• Make additional inspections after significant events such as floods and earthquakes. The emphasis of these inspections will depend on the event triggering the inspection.
	  o Specific items to be checked should include: waterside erosion protection and encroachments, evidences of seepage, levee settlement, slumps, lateral spreading, cracking, evidence of liquefaction (boils and cracking), and slope failures.
	  o Other items to be observed and reported should include any mechanical equipment and facilities such as pipes, gates and valves, inlet and outlet structures, and bridge abutments.
	• An earthquake inspection is particularly urgent if the earthquake occurs just before or during the rainy season.
	• During flood periods, frequent patrols of the levee are made to locate flood-related deficiencies in levees, floodwalls, and other flood protection structures and facilities. The specific frequency of these patrols will depend on the flood level, and may vary from daily to essentially continuously.
	• A report of an event-driven inspection is prepared by the FOA for permanent record, reference, and as a basis for needed remedial work for all periodic inspections. Field-gathered data including location, description of findings and photo documentation are transferred into the Oracle online photo archive database and then compiled into an Event Levee Inspection Report.
		Event Levee Inspection Report

(4) Deficiency Correction (Field Operations Administrator (FOA))	• If a deficiency revealed during the course of the field levee inspection requires correction, a solution is developed by the FOA and implemented. • FOA will document any work required in accordance with WQ75101 Field Operations Work Order Process. • If the FOA determines that a deficiency revealed during the course of the field levee inspection requires engineering analysis, a Watershed Program Support Engineer shall be consulted and if necessary, a solution developed. The Watershed Program Support engineer will develop a solution in accordance with WQ75115 Engineering Field Instructions. • If the Watershed Program Support Engineer determines that a geotechnical inspection is necessary, a *geotechnical engineer* or *outside consultant* will be consulted, and if necessary, a solution developed.	

8. QUALITY RECORDS:

QUALITY RECORD	LOCATION KEPT	FILING ORDER	RECORDS RETENTION SCHEDULE SERIES NO.	COMMENTS
Levee Field Inspection Checklist	FOA's office and Network	facility name, number and date	RS-1015	
Annual Levee Inspection Report	FOA's office and Network	facility name, and date	RS-1015	
Event Levee Inspection Report	FOA's office and Network	facility name and date	RS-1015	
Levee Inventory List	FOA's office and Network	facility name and date	RS-1015	

9. CHANGE HISTORY:

Date	Revision	Comments
12/19/06	R1	New release
07/29/09	R2	Clean up of Quality Records. New template. Change of Process Owner from Gary Nagaoka to Carol Fredrickson. Added link to Levee Safety Technical Guidance Manual (29 April 2002)
03/15/10	R3	Change of process owner from Carol Fredrickson to Roger Narsim, revision number, and effective date due to 02/01/10 reorg.
02/15/11	R4	Changed Template and minor text and formatting changes made to Sections 1, 2, 3, 5, 7, and 10.

10. ADDENDA:

Levee Inspection Guidelines

More detailed information can be in the Levee Safety Technical Guidance Manual

The guidelines listed below were derived from the Levee Safety Technical Guidance Manual (29 April 2002) and are intended to provide a general basis for conducting field operations levee inspections. All aspects of the guidelines will not apply to every levee and must be applied on a case-by-case basis as appropriate.

Flood Protection Levees

Levee Geometry

Inspection should identify any apparent deviations from the as-built geometry of the levee. Levee embankments should be maintained to not less than the net grade and section by replacing any loss of material from the crest, slopes, or any bench/berm. Ruts, washes, slides and areas of subsidence should be noted and promptly repaired and the entire embankment maintained sufficiently smooth for power mowing. Levee crests should be graded as necessary to drain freely and prevent impoundment of rain water. When the crest of the levee is used as maintenance road, and unless the crest road is paved in accordance with standard roadway pavement and traffic criteria, the levee crest should be covered by at least 6 inches of a gravel/aggregate base overlying a filter fabric.

Cracking

During the levee inspection, any observed cracks along the crest or the side slopes should be recorded for further assessment of impact to levee integrity. Longitudinal cracks with down scarps toward the levee slope may be an indication of incipient slope instability. Generally these surface cracks will exacerbate potential sloughing or sliding during wet and prolonged rainy seasons. As the water infiltrates the cracks, it adds lateral hydrostatic pressures on the walls of the cracks and hence promotes potential slips. Random cracks that do not show any sign of down slope movements are generally caused by high shrink-swell levee material, such as high-plasticity clay or organic rich material. The long term cycles of shrink-swell may cause the levee material to deteriorate and weaken. It is recommended that these cracks be repaired as soon as reported.

Erosion and Condition of Slope Protection

Erosion or scour of levees and banks commonly occurs along non-protected levee and bank slopes. The amount and extent of erosion depend typically on the flow velocity, material-type irregularities and contacts between hard and soft material. Silty and sandy unconsolidated alluvium are highly susceptible to erosion and scour. Even levees and banks equipped with erosion protection can experience scour during high river stages. Usually these occurrences take place in areas where the erosion protection system has not been well maintained and has deteriorated with time, or in areas where the erosion protection system was under-designed for the damaging flood. Erosion protection comes in various forms; from concrete surfacing and rock protection to more environmentally friendly solutions such as bio-engineered slope protection, to non-protection by design to allow the river to meander and run its natural course. The latter usually is associated with a system of set-back levees.

When slope erosion protection is provided, observations during the levee inspection should ascertain that the erosion protection is maintained in accordance with the intent of the design; that the levee maintains its uniformity and its integrity; that no irregularities are developing that may become points of weakness. If

such events are observed, repairs should be undertaken immediately to bring the protection system to its original design.

Erosion and scour are probably the leading cause of levee failures during flood events. Levee material, rock, plastic sheeting (Visqueen), and filter fabric should be stockpiled near the flood protection system in locations where they are quickly and efficiently accessible for emergency repairs.

Levee Settlement and Subsidence

The levee crest may be lowered over time due to settlement or subsidence.

Settlement is a lowering due to consolidation of soils under loads. Typically settlements under the self-weight of the levee are estimated prior to construction, and the levee is overbuilt by an appropriate amount. However, there may be other factors causing later levee settlements. There may be compressible layers or lenses that were not adequately recognized in design. There may have been later nearby construction that applied additional loads on the soils under the levee. There may have been loss of ground from under the levee due to internal erosion or due to adjacent excavations. There may have been slumping of the entire levee due to overstressing of foundation soils.

Levee settlements and differential settlements, and their observation, are particularly important for levees constructed on compressible soils, as is typically the case for levees built near the Bay.

Subsidence is a lowering of the levee crest over some length of the levee, due to deep-seated compression of soil layers caused by extraction of water, gas or oil, The lowering of the levee crest might compromise the flood protection of the subject levee. Levee inspections should include looking for signs of crest lowering over short stretches of the levee crest. Any such evidence should be noted and followed promptly by a topographic survey of the levee crest. Levee crest lowering over some length (say, hundreds of feet) can probably only be identified by an elevation survey. Such surveys are advisable at regular intervals (e.g., 5-year intervals).

Landside Seeps and Boils

Seepage is prevalent along flood protection levees. Because of the condition of the levees and foundation, seepage is often observed during flood events. Both seepage through the levee and underseepage are common. Pervious layers within the levees or in the foundation have caused seeps to occur on the side slopes of the levees and seeps and boils near the levees' landside toe. Emergency response during a flood event typically involves the construction of sandbag rings around boils to slow the migration of fines out of the foundation soils by allowing a hydrostatic head to build up inside the sandbag rings.

When observed, seeps and boils should be recorded in the field noting location, size, and amount of soil ejected with the flow of water. A note should also be made as to whether the boils are stable or growing in size. If the seeps and boils are evolving and give indication of potential deteriorating conditions, an evaluation should be made to assess the criticality of the situation and develop prompt remedial measures.

Prevention of Encroachment

Inspection should verify that the levees are not encroached upon. Buildings, structures, and storage of miscellaneous materials or equipment should not be permitted on the levee. Refuse dumps are an item of

frequent concern and should not be permitted. Following each high water season, any drift which has been deposited on the channel and levee slopes should be removed promptly.

River Channel

The river channels and overflow banks are natural areas of planned and unplanned riparian vegetation. Unplanned growth, if abundant, can restrict channel hydraulic capacity, particularly at constricted locations such as at bridge overpasses, culverts and other river crossings. It is recognized that most of the vegetation and trees within the river channel and banks foster and restore riparian corridors and shaded riverine canopy that are critical for terrestrial and aquatic life. Habitat is highly regulated by State and Federal agencies. If serious obstructions due to vegetation growth threaten the flood protection system, these observations should be noted, reported, and acted upon accordingly.

Sediments tend to deposit in areas of reduced channel slope, drop structures, and diversion facilities. The inspection should note and report the degree of silting that is occurring along these facilities, and make recommendations for cleaning and de-silting the obstructed facilities.

Floodwalls and Retaining Walls

As part of the periodic inspections, floodwalls and retaining walls in levees should be inspected for any distress including: cracking, undermining (scour, erosion at the wall footing), settlement, misalignment, and any other signs that could potentially affect the structural integrity of the walls. The levee inspector should look for and record with photographs and drawings, indicating exact locations with respect to levee miles and offset distances from the levee centerline, any signs of:

- Wall cracks, fissures, chipping, and breaks or spalls
- Settlement and offsets
- Out of plumb and misaligned sections of walls
- Seepage, boils, and saturated areas
- Scour holes and erosion
- Roots that may undermine the wall footing
- Accumulation of trash, debris or any undesirable rubbish
- Unauthorized encroachment such as: boats against or tied up to the floodwall.

Structures, Facilities and Appurtenances

Various facilities and appurtenances encroach on the levees. During inspections, care should be taken to verify that these facilities are operating in satisfactory conditions. Because these facilities generally create a hard contact with the levee/bank material, inspection for scour and undermining at these localities is important. Inspections should verify that:

- Pipes, gates, and valves are in good working conditions and that no erosion is occurring around pipes and drainage structures.
- Grade control and energy dissipating structures are not undermined and exposed or silted up.
- Drainage ditches and channels are open and clear from overgrowth and any undesirable rubbish that may impact the normal flow and proper discharge. Note abnormal occurrence of silt and sand mounds within the drainage ditches.
- Drainage inlet structures are inspected and kept free from debris and accumulation that may cause clogging.
- Flap gates on storm drainage discharge pipe outlets are kept clean from accumulated debris between the gates and the pipes which could impede the normal function of the gates.

- Bridge and culvert abutments should be checked for structural distress and erosion effects.
- Pumps are well maintained and in good working condition.

Miscellaneous Levee Facilities and Appurtenances

Miscellaneous levee facilities (e.g., relief wells, check valves, slide gates) that are constructed on, over or through the levee should be maintained in a good state of repair and/or in good operating condition. The condition of these facilities should be inspected at least annually, and those items that are operative only during high river stages should be checked carefully and repaired as necessary immediately prior to the high water season. Relief wells should be checked during periods of high water. Wells that do not flow for an extended period of time may have to be tested by pumping to determine the extent of deterioration. Where wells are found to be critically deteriorated, they should be rehabilitated by cleaning, surging, and pumping. Check valves should be inspected to ensure that they open freely and that the gaskets are in good condition.

Periodic Elevation Surveys

Periodic surveys of the elevation of the levee crest are advisable to monitor any potential deviation from the design levee profile. Specific facility maintenance guidelines and/or agreements may dictate survey requirements.

Levee Field Inspection Rating Guide

Rating Guide

A - As-built/New **B -** Good **C -** Requires FOA Evaluation or Monitoring

D - Requires Corrective Action (ie Work Order, Violation, Engineer Review, Notification, etc.)

E - Requires Immediate Action

Item	Rating Guide	Guidance
1. Depressions	B	Minimal depressions or potholes; proper drainage.
	C-D	Some depressions that will not pond water.
	E	Depressions 6" vertical or greater which endangers the integrity of the levee.
2. Erosion	B	No erosions observed.
	C-D	Levees: Erosion of levee crown or slopes that will not interrupt inspection or maintenance access. OTHER: Erosion gullies less than 6 inches deep or deviation of 1 foot from designed grade or section.
	E	Levee: Erosion of levee crown or slopes that has interrupted inspection or maintenance access. OTHER: Erosion gullies greater than 6 inches or deviation of 1 foot or more from designed grade or section.
3. Slope stability	B	No slides present, or erosion of slopes more than 4 inches deep.
	C-D	Minor superficial sliding that with deferred repair does not pose an immediate threat to levee integrity. No displacement or bulges.
	E	Evidence of deep seated sliding (2 foot vertical or greater) requiring repairs to re-establish levee integrity.
4. Cracking	B	No cracks in transverse or longitudinal direction observed in the levee.
	C-D	Longitudinal cracks are no longer than the levee height. No displacement and bulging. No transverse cracks observed.
	E	Longitudinal cracks are greater than levee height with some bulging observed. Transverse cracks are evident.
5. Animal burrows	B	Continuous animal burrow control program that eliminates any active burrowing in a short period of time.
	C-D	Animal burrows present that will not result in seepage or slope stability problems.
	E	Animal burrows present that would result in possible seepage or slope stability problems.

Rating Guide

A - As-built/New **B -** Good **C -** Requires FOA Evaluation or Monitoring

D - Requires Corrective Action (ie Work Order, Violation, Engineer Review, Notification, etc.)

E - Requires Immediate Action

Item	Rating Guide	Guidance
6. Unwanted levee growth	B	No large brush or trees exist in the levee. Grass cover well maintained. CHANNELS: Channel capacity for design flows is not affected.
	C-D	Minimal tree (2" diameter or smaller) and brush cover present that will not threaten levee integrity. (NOTE: Trees that have been cut and removed from levees should have their roots excavated and the cavity filled and compacted with impervious material.)
	E	Tree, weed, and brush cover exists in the levee requiring removal to re-establish or ascertain levee integrity. (NOTE: If significant growth on levees exists, prohibit rating of other levee inspection items, then the inspection should be ended until this item is corrected.) CHANNEL: Channel obstructions have impaired the floodway capacity and hydraulic effectiveness.
7. Encroachments	B	No trash, debris, excavations, structures, or other obstructions present.
	C-D	Trash, debris, excavations, structures, or other obstructions present or inappropriate activities occurring that will not inhibit operations and maintenance performance.
	E	Trash, debris, excavations, structures, or other obstructions present or inappropriate activities that would inhibit operations and maintenance performance.
8. Riprap/Revetment	B	Existing protection works which is properly maintained and undamaged.
	C-D	No scouring activity that could undercut banks, erode embankments, or restrict desired channel flow.
	E	Meandering and/or scour activity that is undercutting banks, eroding, embankments (such as levees), or impairs channel flows by causing turbulence, meandering, or shoaling.
9. Stability of Concrete Structures	B	Tilting, sliding, or settling of structures that has been secured which preserves the integrity or performance.
	C-D	Uncorrected sliding or settlement of structures of a magnitude that doesn't affect performance.
	E	Tilting or settlement of structures that has resulted with a threat to the structure's integrity and performance.

Rating Guide

A - As-built/New **B -** Good **C -** Requires FOA Evaluation or Monitoring

D - Requires Corrective Action (ie Work Order, Violation, Engineer Review, Notification, etc.)

E - Requires Immediate Action

Item	Rating Guide	Guidance
10. Concrete surfaces	B	Negligible spalling or scaling. No cracks present that are not controlled by reinforcing steel or that cause integrity deterioration or result in inadequate structure performance.
	C-D	Spalling, scaling, and cracking present but immediate integrity of structure not threatened.
	E	Surface deterioration or deep, controlled cracks present that result in an unreliable structure.
11. Structural foundations	B	No scouring or undermining near the structure.
	C-D	Scouring near the footing of the structure but not close enough to impact structure stability during the next flood event.
	E	Scouring or undermining at the foundation which has impacted structure integrity.
12. Culverts	B	[a] No breaks, holes, cracks in the culvert that would result in any significant water leakage. No surface distress that could result in permanent damage. [b] Negligible debris or silt blocking culvert section. None or minimal debris or sediment present which has negligible effect on the operations of the culvert.
	C-D	[a] Culvert integrity not threatened by spalls, scales, or surface rusting. Cracks are present but resulting leakage is not impacting the structure. [b] Debris or sediment present, which is proposed to be removed prior to the next flood event, that minimally affects the operations of the culvert.
	E	[a] Culvert has deterioration such as surface distress and/or has significant leakage in quantity or degree to threaten integrity. [b] Accumulated debris or settlement which has not been annually removed and severely affects the operation of the culvert.
13. Gates	B	Gates open easily and close to a tight seal. Materials do not have permanent corrosion damage and appear to historically been maintained adequately.
	C-D	Gates operate but leak when closed, however, leakage quantity is not a threat to performance. All appurtenances of the facility are in satisfactory condition.
	E	Gates leak significantly when closed or don't operate. Gates and appurtenances have damages which threaten integrity and/or appear not to have been maintained adequately.

Rating Guide

A - As-built/New **B -** Good **C -** Requires FOA Evaluation or Monitoring

D - Requires Corrective Action (ie Work Order, Violation, Engineer Review, Notification, etc.)

E - Requires Immediate Action

Item	Rating Guide	Guidance
14. Closure structures	B	Closure structure in good repair. Placing equipment readily available at all times.
	E	Closure structure in poor condition. parts missing. Placing equipment may not be available within normal warning time.
15. Pumps and motors	B	All pumps and motors are operational. Preventative maintenance is occurring and system is periodically subject to performance testing.
	C-D	All pumps are operational and minor discrepancies are such that pumps could be expected to perform through the next projected period of usage.
	E	Pumps are not operational, or noted discrepancies have not been corrected.
16. Power	B	Adequate, reliable, and enough capacity to meet demands.
	E	Power source not considered reliable to sustain operations during a flood condition.
17. Pump Control System	B	Operational and maintained free of damage, corrosion, or other debris.
	C-D	Operational with minor discrepancies.
	E	Not operational or uncorrected noted discrepancies.
18. Metallic items	B	All metal parts in a plant/building protected from permanent damage from corrosion. Trash racks free from damage/debris and are capable of being cleared, if required, during operation. Gates operable.
	C-D	Corrosion on metal parts appears maintainable. Trash racks free from damage and minimum debris present, and capable of being cleared before next flood event or during operation. Gates operable.
	E	Metal parts need replacement. Trash racks damaged, have accumulated debris that have not been cleared annually, or cannot be cleared during operation.
19. Sumps	B	Clear of debris and obstructions, and mechanisms are in place to maintain this condition during operation.
	C-D	Clear of large debris and minor obstructions present and mechanisms are in place to deter further accumulations during operation.
	E	Large debris or major obstructions present in sump or no mechanism exists to prevent debris accumulation during operation.

1. PURPOSE AND SCOPE:

The purpose of this document is to provide guidelines for inspections of District Watershed facilities. This includes routine and emergency inspections for detecting various problems before they threaten the integrity of facilities against the possibility of flooding and property damage. Inspections are conducted to identify conditions that may jeopardize the quality and integrity of the watershed facilities. The conditions are documented by measuring and recording the condition for corrective action or future monitoring. Inspections record the type, size, and location of any conditions requiring either correction or monitoring. Conditions identified as those to be monitored are to be re-evaluated during the next inspection cycle until the condition is corrected.

2. REFERENCE DOCUMENTS:

External References:

USACE Operation and Maintenance (O&M) Manuals

Internal References:

WQ75101	Field Operations Work Order Process
WQ75115	Develop Engineering Field Instructions
WW75100	Vegetation Control Work Instructions
WW75121	Work Project Planning Tool
WW75401	Flood Control Maintenance on Private Property
WW75167	Chipping of Woody Debris Stockpiles
WF75118	Ordinance Violation Form
WF75121	SMP Project Prioritization Matrix
WF75161	Levee Field Inspection Rating Guide
WF75165	Field Operations Inspection Sheet
WF75166	Facilities Inspection Rating Guide
	SMP Binder (BMP Manual/Permits and Supporting Material)
	Facilities Maintenance Guidelines
	Levee Inventory List (watershed specific)

3. DEFINITIONS:

Access: A location to enter the District -right--of-way from either a public street or private property with agreed-upon right-of-way.

Creek bank: The side slope of a creek

Creek channel:
The depression in the land surface the water in the creek flows in.

Creek Name and **Creek Number:**
Referenced in the Maximo designations for the facilities inspected.

Easement: Property where there is a limited District responsibility and is most often a “flood control easement”. This would invoke the responsibility of maintaining the creek to

meet District Flood Control guidelines. Ingress/egress, flowage, or other forms of easement require much less maintenance responsibilities. Easements are indicated in yellow on District maps.

Fee Title: Property where the deed lists the Santa Clara Valley Water District as the property owner. Fee titles are indicated in green on District maps.

GIS: Geographic Information System. A geographic database of layers of information. Primarily used by Watershed Field staff for right-of-way and location information.

Inspection: The evaluation of the watershed facilities to identify and record corrective action or monitoring of any condition that could jeopardize the quality of the facility (creeks, levees, property and habitat) in the watersheds.

Major facilities:
Major tributaries with the greatest potential for catastrophic flooding and property damage. Generally have high water flows and are historically problematic.

Minor facilities:
Feed into major tributaries and have a potential for localized flooding and limited property damage. Generally have low flows and historically have low occurrence of problems.

NRCS facilities:
Facilities where flood protection projects were constructed cooperatively with the Natural Resources Conservation Service (NRCS).

Orientation: The right and left bank orientation is determined by facing upstream.

Right-of-Way:
Property the District has some form of responsibility recorded by legal deed. This includes **Easement** and/or **Fee Title**.

Stationing: A geometric/geographic measurement that starts at the furthest most downstream point of the creek. It is referenced by the starting point of 0+00 (hundreds of feet) = 0 feet measuring upstream from the mouth of the creek.

USACE facilities:
Facilities where flood protection projects were constructed cooperatively with the **U.S. Army Corps of Engineers (USACE)**. This cooperative relationship requires semi-annual inspections and annual reports to USACE.

4. ROLES AND RESPONSIBILITIES:

None

5. REQUIREMENTS:

5.1. ISO 9001 - 7.5.1 Control of Production and Service Provision

5.2. ISO 14001 - 4.4.6 Operational Control

5.3. Other Requirements
SMP Permits & CEQA documents

6. MONITORING AND MEASUREMENT:

Creek inspection reports will be completed annually and reviewed with Management.

7. PROCEDURE:

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)

(1)
 	
Plan Inspections
 	
(Field Operations
	• Routine inspection of Watershed facilities are conducted by the Field Operations Administrator to inventory conditions.
	
	• Inspection cycle:
	  • USACE facilities will be inspected at least twice a year.
	  • NRCS facilities will be inspected annually.
	  • Major facilities will be inspected once a year.
	  • Minor facilities may be inspected once every two years.
	  • Storage Yards will be inspected annually.
	
	• Routine inspection frequency should be determined by permits, facility maintenance guidelines, facility maintenance agreements, and the perceived need for inspections.
	
	• FOA will identify all Watershed facilities on facilities hierarchy (list of facilities). This listing is compiled, maintained, and kept by the FOA. Each inspection will be scheduled by the FOA.
	
	• Only Watershed facilities on District right-of-way (including easement and fee title obligations) will be inspected unless authorized by WW75401 Flood Control Maintenance on Private Property. Use GIS and stationing to verify District right-of-way for inspection area.
	
	• Review maintenance guidelines, past inspection notes, and annual creek inspection reports for facilities being inspected.
	
	• All inspections will have a work order in accordance with WQ75101 Field Operations Work Order Process.
	
	• Obtain any special equipment and/or materials required for inspection including a camera, probe, waders, and safety
		Inspection Notes

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
Administrator (FOA))	equipment. • Notify and coordinate with any others involved in the inspection (confined space team, etc.), if applicable.	

(2)
 	
Inspect Facilities
 	
(Field Operations Administrator (FOA) and Engineering Technician)
	• Inspection criteria to be used for each facility will come from Maintenance Guidelines for that facility, where applicable. Watershed Program Support Units will develop and maintain guidelines. FOA is provided hard copies of guidelines as they are developed.
	
	• Routine inspections involve a complete visual review of the facilities and noting any observable condition that might need correction or future monitoring. Conditions are documented by measuring and recording the condition for corrective action or future monitoring.
	
	• District materials storage yards will be inspected annually and woody debris stockpiles will be evaluated.
	  • If the woody debris is not set aside for use in erosion repair and the volume of the woody debris has accumulated for more than 2 years or 500 CY, the woody debris should be ground into chips in accordance with WW75167 Chipping of Woody Debris Stockpiles. FOA will document any work required in accordance with WQ75101 Field Operations Work Order Process.
	
	• Inspections are conducted using the Watershed Field Inspection Sheet (WF75165) to record conditions observed. Field-gathered data includes location, description of conditions, and photo documentation. Condition codes used on WF75165 are:
	  • **A**= Asbuilt / New. No action required.
	  • **B**= Good. No action required.
	  • **C**= Requires FOA evaluation and/or monitoring. FOA will re-inspect this in the next inspection cycle.
	  • **D**= Requires corrective action (i.e., Violation, Engineer Review, notification, etc.). Initiate a work order for routine processing.
	  • **E**= Requires immediate corrective action. Initiate a work order for expedited processing.
	
	• During the routine inspections, sediment bars are measured and noted. Following the winter creek flows, these sediment bars might be inspected again. The sediment inspection list is given to Program Support for review.
	
	• To provide accurate sediment quantity estimates for major sediment removal projects where channel conditions are moderately or highly uncertain (as determined by the Program Support Engineer), cross-section surveys will be performed. Survey results will be incorporated into the work plan and budget development process.
		WF75165 Watershed Field Inspection Sheet
		
		Photo documentation
		
		Sediment Inspection List
		
		USACE facility inspection report
		
		Annual Inspection Report

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
	• Inspection data is gathered on USACE facilities and compiled in the annual inspection report sent to USACE. • Inspection data gathered in the field will be compiled into the Annual Inspection report given to management during the first quarter of a calendar year.	
(3) **Perform Event-driven Inspections** (Field Operations Administrator (FOA) and Engineering Technician)	• Event-driven inspections should also take place after a natural hazard such as flood, storm and other events having the potential of damaging the flood control system and hazards for public safety. For USACE facilities, refer to the appropriate O&M manual for specific requirements related to event-driven inspections. • Inspections should identify any disruption of flows, erosion sites, and any other sites that need further monitoring. • Inspections will be documented using photos.Photos should be identified by facility and reach, month and date, and photo sequence. • A report of emergency inspection will be prepared by the FOA as a basis for needed remedial work for all periodic inspections. Remedial work will be performed in accordance with WQ75101 Field Operations Work Order Process.	Photos from inspection
(4) **Corrective Action** (Field Operations Administrator (FOA))	• If the FOA recorded a condition of C during the inspections, then another inspection should be scheduled for the next season. FOA will document any work required in accordance with WQ75101 Field Operations Work Order Process. • If the FOA recorded a condition of D during the inspections, then a solution will be developed by the FOA and implemented. FOA will document any work required in accordance with WQ75101 Field Operations Work Order Process. • If the FOA recorded a condition of E during the inspections, then a solution will be developed immediately by the FOA and implemented. FOA will document any work required in accordance with WQ75101 Field Operations Work Order Process. • If the FOA determines that a deficiency revealed during the course of the inspection requires engineering analysis, the Watershed Program Support Engineer shall be consulted and if necessary, a solution developed. Deficiencies will be prioritized by the Field Operations and Watershed Program Support Units in accordance with WW75121 (Work Project Planning Tool) and WF75121 (SMP Project Prioritization Matrix) as necessary. The Watershed Program Support Engineer will develop a solution in accordance with WQ75115 Develop Engineering Field Instructions.	WF75165 Watershed Field Inspection Sheet Work Order

8. QUALITY RECORDS:

QUALITY RECORD	LOCATION KEPT	FILING ORDER	RECORDS RETENTION SCHEDULE SERIES NO.	COMMENTS
Inspection Notes	Field Operations Unit Files	Facility Number & Date	RS-1015	
Field Inspection Sheet	With Work Order	Facility Number & Date	RS-1015	
Work Order	SOS	Facility Number & Date	RS-0172	
Photos from inspection	District IT Network	Facility & Reach	RS-1015	
Army Corps of Engineers facility inspection report	Central Files	Date	RS-1015	

9. CHANGE HISTORY:

Date	Revision	Comments
12/19/06	R1	New Release
01/29/07	R2	Added reference document of Fac. Maint. Guidelines and misc corrections.
03/26/08	R3	Added bullet in step 2 in response to CPAR 191 – estimating sediment.
03/15/10	R4	Change of process owner to Roger Narsim
04/09/10	R5	Added inspection of District materials storage yards (cpar 211) & reference to WW75167 Chipping of Woody Debris Stockpiles
02/15/11	R6	Change of template and minor text and formatting changes made to Sections 1, 2, 3, 6, 7, and 10.

10. ADDENDA:

SCVWD Creek and Levee Inspection Key

CONDITION CODES
A = Asbuilt/New
B = Good
C = Requires FOA Evaluation or Monitoring
D = Requires Corrective Action (ie Work Order, Violation, Engineer Review, Notification, etc.)
E = Requires Immediate Action

FACILITY TYPES	
Bridge Abutment (BAB)	Miscellaneous (MSC)
Bridge Footing (BFG)	Overflow Channel (OFC)
Culvert (BOX)	Outfall (OTF)
Bridge Pier (BPR)	Pipe (PIP)
Bridge (BRG)	Pond (PND)
Concrete Channel (CCH)	Perc Pond (PRC)
Cellular Concrete Mat (CCM)	Access Road (RAC)
Concrete-lined Channel (CLC)	Reinforced Concrete Pipe (RCP)
Corrugated Metal Pipe (CMP)	Recreational (REC)
CPRU Code Enforcement Violation (CPR)	Recreation Trail (RET)
Drop Structure (DST)	Riparian (RIP)
Earth Channel (ECH)	Riprap (RIR)
Fence / Gate (FAG)	Levee Road (RLR)
Flood Walls (FDW)	Access Road - Lower (RLW)
Fence (FEN)	Revegetation Site (RVS)
Flap Gate (FGT)	Structure - Concrete (SCN)
Fish (FIS)	Sediment Debris Basin (SDB)
Flood Plain (FLP)	Stream Gage (SGG)
Fish Ladder (FSH)	Sign (SGN)
Gabion (GAB)	Slide Gate (SLG)
Gate (GAT)	Slope Protection (SLP)
Levee (LEV)	Structure - Steel (SST)
Landscaping (LSC)	Trash Rack (THK)
Levee Crown (LVC)	Valve (VLV)
Levee Landside (LVL)	Weir (WER)
Levee Waterside (LVW)	Wetland (WTL)

CATEGORIES (Maximo Job Plan & Other)	
Emergency Debris Removal (EMR	Misc. Property Maintenance (MSC)
Erosion (ERO)	Pier Nose/Trash Rack/Flapgate Cleaning (PTF)
Fence/Gate Work (FEN)	Sediment (SED)
Fish Structure Maintenance (FSH)	Sign Work (SGN)
Good Neighbor Maintenance (GNM)	Tree (TRE)
Graffiti Removal (GRF)	Trash and Debris (TRS)
Ground Squirrel/Rodent Control (GSC)	Overhanging Growth (VWG)
Hazardous Materials (HAZ)	Typical (TYP)
In Stream Vegetation (ISV)	Violation (VIO)
Levee Maint./Restoration (LEV)*	*reference criteria in WW75161
Motor Grading (MGR)	
Direction of Photo - Upstream (U/S), Downstream (D/S) or At Location (AT)	

Santa Clara Valley Water District

Field Inspection Checklist

WF75165; R2 (06/29/12)

Page ___ of ___

SCVWD Inspection Sheet

Date Inspected: _____ Inspectors: _____

Creek Name: _____ Maximo Reach #: _____ W.O.#: _____

Facility Type	Category	Photo #	Dir. of Photo	D/S Station	U/S Station	Position (facing U/S) & Condition Code			Fee, Esmt, None	Qty (Unit)	Nearest Cross Street	Description
						Left	Middle	Right				

* Key on back side of sheet

SCVWD Creek and Levee Inspection Key

CONDITION CODES
A = Asbuilt/New
B = Good
C = Requires FOA Evaluation or Monitoring
D = Requires Corrective Action (ie Work Order, Violation, Engineer Review, Notification, etc.)
E = Requires Immediate Action

FACILITY TYPES	
Levee Landside (Outboard)	Bridge
Levee Waterside (Inboard)	Cellular Concrete Mat
Levee Crown or Road	Outfall
Earth Channel	Slide Gate
Concrete Lined Channel	Flap Gate
Overflow Channel	Culvert (Box, RCP, CMP,etc.)
Access Road	Fish Structure
Fence	Landscaping
Gate	Recreational Trail
Riprap (Rock or Sack)	Revegetation Site
Gabions	Miscellaneous

CATEGORIES (Maximo Job Plan & Other)	
Emergency Debris Removal (EMR	Misc. Property Maintenance (MSC)
Erosion (ERO)	Pier Nose/Trash Rack/Flapgate Cleaning (PTF)
Fence/Gate Work (FEN)	Sediment (SED)
Fish Structure Maintenance (FSH)	Sign Work (SGN)
Good Neighbor Maintenance (GNM)	Tree (TRE)
Graffiti Removal (GRF)	Trash and Debris (TRS)
Ground Squirrel/Rodent Control (GSC)	Overhanging Growth (VWG)
Hazardous Materials (HAZ)	Typical (TYP)
In Stream Vegetation (ISV)	Violation (VIO)
Levee Maint./Restoration (LEV)*	*reference criteria in WW75161
Motor Grading (MGR)	
Direction of Photo - Upstream (U/S), Downstream (D/S) or At Location (AT)	

Facilities Inspection Rating Guide

WF75166; R3 (06/29/12)

Criteria used to inspect District facilities are obtained from maintenance guidelines for the specific facility. Reference to each facilities criteria guides the inspection to correctly reflect the level of maintenance required. Some facilities do not have maintenance guidelines or the guidelines are under development. If no specific guidelines exist for a facility, a general reference of criteria is needed to determine if the facility meets any right-of-way or other documented obligations.

The general criteria used in facilities inspection are listed by a specific feature or category of element of the facility. The criteria are listed by specific categories and conditions. These are captured on the SCVWD Facilities Inspection Sheet.

The following are the general criteria are to be used when specific Maintenance Guidelines for a facility do not exist.

Categories	Conditions	Description
Access Roads	A B C D E	New All Weather level minor ruts/surfacing ok moderate ruts surfacing sparse road width <10' surface gone road impassible
Burrowing Animals - including Gophers & Ground Squirrels	A B C D E	None occasional holes/1000' occasional holes/500' noticeable activity/250' extensive infestation/100'
Concrete Structures	A B C D E	New good condition minor distortion wear and cracks moderate distortion wear and cracks failed
Concrete Walls	A B C D E	New good condition minor distortion wear and cracks moderate distortion wear and cracks failed
Debris	A B C D E	none occasional, minor moderate build up few spots moderate build up many spots extensive amount blocking channel
Erosion	A B C D E	no erosion minor erosion no threat at present potential future threat pre exiting problem getting worse extensive damage repair quickly

Categories	Conditions	Description
Fences/Gates/Signs	A B C D E	new still good condition no holes/graffiti minor distortion/bent posts holes in fence graffiti on signs fence down heavy vandalism
Fish Ladders	A B C D E	fully operational good condition minor sediment/wear partially functional non functional/blocked
Flap Gates	A B C D E	new good condition questionable functionality, silt etc. needs service non functional, broken missing parts
Gabions	A B C D E	new baskets/rock good condition minor distortion/erosion/rust erosion/rust/deform moderate structure failure
Graffiti	A B C D E	none occasional very few small spots signs and some small tags concrete a few larger tags racial/gang/offensive tags
Herbaceous Veg	A B C D E	No veg some flex grass/plants moderate stemmy grasses large amount stemmy grasses extensive amount of stemmy grasses
Levee Roads	A B C D E	new all weather level minor ruts/surfacing ok moderate ruts surfacing sparce road width <10' surface gone road impassible
Lower Roads	A B C D E	new all weather level minor ruts/surfacing ok moderate ruts surfacing sparce road width <10' surface gone road impassible

Categories	Conditions	Description
Pipe	A B C D E	new functioning properly potential impaired debris/sed/erosion pipe impaired structural failure
Rip Rap	A B C D E	newly installed good condition minor adjacent erosion,veg cover extensive erosion, deformation structural failure
Sediment	A B C D E	none/acceptable minor acceptable moderate build up maybe problem excessive build up blockage, emergency removal
Slide Gates	A B C D E	new good conditions needs service damaged non functional
Trash	A B C D E	none occasional, minor, litter frequent small volumes infrequent large volumes frequent large volumes
Trash Racks	A B C D E	new small amount of debris rack half full rack 3/4 full rack plugged
Trees	A B C D E	Trees on site ok or no trees minor ok for site trees growing in channel downed single or small cluster extensive blockage of channel
Woody Veg	A B C D E	none minor ok for site common on site may be problem moderate size and density extensive size and density blockage

A. SECTION A –Pre-Project Planning and General BMPs

General BMPs are applicable program-wide, for most routine SMP maintenance activities. These measures include standard construction practices and impact avoidance measures that will minimize potential environmental impacts. These BMPs will be implemented by the stream maintenance crew, as appropriate and as overseen by site managers, for all activities associated with the maintenance program. The majority of these BMPs are implemented prior to and during maintenance operations, though the level of activity varies depending on the work type.

Other General BMPs are conducted prior to implementing maintenance activities on site. This group of measures includes procedures to identify site or maintenance constraints, such as biological or cultural resource surveys which coincide with permit compliance requirements. Site design constraints for sediment and bank stabilization activities in particular are also identified as part of the pre-project planning process.

BMP Number	BMP Title	BMP Description
GEN-1	In-Channel Work Window	All ground-disturbing maintenance activities (i.e., sediment removal, bank stabilization, tree removal, and mechanized vegetation management) occurring in the channel (below bankfull) will take place between June 15 and October 15. Requests for work window extensions must be submitted to the regulatory agencies by October 1st, listing the creek names and reaches where a work extension will occur. Work extensions vary per work activity. The agencies will provide a single response within one week. Significant rainfall applies after October 15. An extension through December 31 may apply if the following requirements are met and regulatory agency approval is received: For ground-disturbing activities: ▪ Work may continue if no significant rainfall, defined as greater than 0.5 inches per 24 hours within a local watershed, is either forecasted[1] or observed. Following October 15th, maintenance work shall cease for the season if such a rain event is forecasted or observed. ▪ In the Pajaro Basin, winterized sites will be visually inspected prior to, and within 48 hours following, each significant rain event (defined as rainfall 0.5 inch or greater within a 24-hour period in the subject watershed) to ensure that winterization measures are properly implemented and maintained. Sediment removal ▪ Extended Work Window: 1. Creeks supporting anadromous fish: An extended work window may occur from October 15 through October 31, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first. 2. Creeks not supporting anadromous fish: An extended work window may occur from October 15 through November 30th, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first. ▪ Extended Work Window in Lower Quality Areas:

[1] Weather Forecasts. No phase of the project may be started if that phase and its associated erosion control measures cannot be completed prior to the onset of a storm event if that construction phase may cause the introduction of sediments into the stream. Seventy-two-hour weather forecasts from the National Weather Service or other localized and more detailed weather forecast service will be consulted prior to start up of any phase of the project that may result in sediment runoff to a stream.

BMP Number	BMP Title	BMP Description
		1. Sediment removal work may occur until December 31. 2. Work will only occur on Berryessa Creek (0-88+80; 232+70-236+00; 284+30-288+00), Lower Silver Creek (Reach 3 between Stations 37+40 and 381+19), Thompson Creek (0+00-10+00), Canoas Creek (0+00-390+00), Ross Creek (0+00-86+30), Calabazas Creek (35+00-105+00), and San Tomas Aquino Creek (80+00-100+00) with the following conditions: o site conditions are dry and access for all construction equipment and vehicles will not impact waterways; and o all work will stop if any rainfall is forecast for the next 72 hour period. 3. Work may occur after a significant rainfall event but no later than December 31. 4. Sites must be maintained in a rapidly winterizable[2] state (implement control measures BMP GEN-20). Bank stabilization projects may continue until the approved date stated below. Prior to a forecasted significant rainfall event (0.5 in/24 hrs), all incomplete bank stabilization projects must be winterized. 1. In Creeks Supporting Anadromous Fish o An extended work window may occur until October 31st for bank stabilization projects that will be 50% complete by October 15th. 2. In Creeks Not Supporting Anadromous Fish o An extended work window may occur until November 30th for projects that will be 50% complete by October 15th or until significant rainfall. o An extended work window may occur until November 30th for new bank stabilization projects that will be completed in five (5) days or less, or until significant rainfall. ▪ Instream hand pruning and hand removal of vegetation will occur year round, except when: o Wheeled or tracked equipment needs to access the site by crossing a creek, ponded area, or secondary channel; or o Work occurs in streams that support steelhead. In these streams instream vegetation maintenance will cease on December 31 or when local rainfall greater than 0.5 inches is predicted within a 24-hour period of planned activities, whichever happens first. Modification and removal of instream large woody debris will occur at any time of the year, and as further described in the NMFS Biological Opinion.
GEN-2	Instream Herbicide Application Work Window	Instream herbicide applications will take place between June 15 and October 15, or until the first occurrence of any of the following conditions; whichever happens first: ▪ local rainfall greater than 0.5 inches is forecasted within a 24-hour period from planned application events; or ▪ when steelhead begin upmigrating and spawning in the 14 anadromous steelhead creeks, as determined by a qualified biologist (typically in November/December), o A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). Surfactant use would be limited to non-ionic products, such as Agri-

[2] Winterization is the process to maintain work sites with the appropriate BMP's to prevent erosion, sediment transport, and protect water quality. Winterization occurs upon completion of bank repairs or on incomplete projects after October 15 and prior to the forecast of significant rainfall, 0.5 inches or greater of local watershed rainfall within 24 hours. Winterization shall be completed prior to the occurrence of such actual significant rainfall.

BMP Number	BMP Title	BMP Description
		dex, Competitor, or another brand name using the same ingredients. Any modifications to these materials would require review and approval by NMFS and CDFW. o A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning biological resources and determine which BMPs would be instituted for work to proceed. In addition, herbicide application requirements are as follows: ▪ no direct application into water; ▪ herbicide application shall not occur when wind conditions may result in drift; ▪ herbicide solution shall be applied only until there is a “wet” appearance on the target plants in order to avoid run off; and ▪ where permitted, surfactants shall be added to the spray solution prior to application.
Gen-3 deleted		

Biological Resources

GEN-4	Minimize the Area of Disturbance	To minimize impacts to natural resources, soil disturbance will be kept to the minimum footprint necessary to complete the maintenance operation.
GEN-5	Mitten Crab Control Measure	Sediment from the San Francisco Bay Watershed, including that for reuse, cannot be moved to areas any farther south than Coyote Creek Golf Drive in south San Jose, and the intersection of McKean and Casa Loma Roads.
GEN-6	Minimize Impacts to Nesting Birds via Site	1. For activities occurring between January 15 and August 31, project areas will be checked by a qualified biologist or Designated Individuals (DI – for limited ground nesting species surveys) for nesting birds within 2

BMP Number	BMP Title	BMP Description
	Assessments and Avoidance Measures	weeks prior to starting work. If a lapse in project-related work of 2 weeks or longer occurs, another focused survey will be conducted before project work can be reinitiated. 2. If nesting birds are found, a buffer will be established around the nest and maintained until the young have fledged. Appropriate buffer widths are 0.5 mile for bald and golden eagles; 250 feet for other raptors and the least Bell's vireo, herons, and egrets; 25 feet for ground-nesting non-raptors; 700 feet for the California clapper rail; 600 feet for the California least tern and western snowy plover; and 50 feet for non-raptors nesting on trees, shrubs and structures. Mowing and weed whacking will have a 25 feet buffer. A qualified biologist may identify an alternative buffer based on a site specific-evaluation. No work within the buffer will occur without written approval from a qualified biologist, for as long as the nest is active. 3. All vegetation management, sediment reuse, road grading, or other SMP activities in or immediately adjacent to suitable California clapper rail or Alameda song sparrow nesting habitat, as determined by a qualified biologist, shall not be conducted prior to September 1 (the non-nesting season). 4. If a pre-activity survey in high-quality San Francisco common yellowthroat breeding habitat (as determined by a qualified biologist) identifies more singing male San Francisco common yellowthroats than active nests, then the inconspicuous nests of this species might have been missed. In that case, maintenance activities in that area shall be delayed until the San Francisco common yellowthroat non-breeding season (i.e., August 16–March 14). 5. The boundary of each buffer zone will be marked with fencing, flagging, or other easily identifiable marking if work will occur immediately outside the buffer zone. 6. All protective buffer zones will be maintained until the nest becomes inactive, as determined by a qualified biologist. 7. If monitoring shows that disturbance to actively nesting birds is occurring, buffer widths will be increased until monitoring shows that disturbance is no longer occurring. If this is not possible, work will cease in the area until young have fledged and the nest is no longer active.
GEN-6.5	Protection of Nesting Least Bell's Vireos	1. To the extent feasible, SMP activities within those areas mapped as vireo habitat in the Santa Clara Valley Habitat Plan shall be scheduled to occur outside of the least Bell's vireo nesting season (March 15 – July 31). If it is not feasible for maintenance activities along these reaches to be scheduled during the non-nesting season, the following measures will be implemented. 2. For activities within woody riparian habitat mapped as vireo habitat in the Santa Clara Valley Habitat Plan that will occur between March 15 and July 31, any work will be preceded by a focused survey for least Bell's vireos. Pre-activity surveys will consist of two site visits, conducted on separate days within 14 days before the initiation of maintenance activities in the given area, with at least one of these surveys occurring within 5 calendar days before the initiation of such activities. Surveys will be conducted between dawn and 11:00 a.m., during mild weather conditions (i.e., not during excessive cold, heat, wind, or rain), within all riparian habitat in and within 250 feet of any proposed maintenance location along these reaches. The surveys will be conducted by a qualified biologist who is familiar with the visual and auditory identification of this species. 3. To minimize impacts to nesting least Bell's vireos and other birds, the biologist will not initially be looking for Bell's vireo nests during these surveys. Rather the biologist will look and listen for individual vireos. If a least Bell's vireo is detected, it will be observed to determine whether it is actively nesting. The biologist will note the nest location, or if finding the actual nest could result in excessive disturbance or risk damaging the nest, the biologist will determine the approximate location, based on observation of birds carrying nesting material,

BMP Number	BMP Title	BMP Description
		carrying food, or repeatedly visiting a certain area. 4. If an active nest is found, a minimum 250-foot no-activity buffer will be established around the nest. If a territorial male is found but no nest can be detected, then the approximate centroid of the bird's area of activity will be the point from which the buffer will be applied. The required buffer may be reduced in areas where dense riparian forest occurs between the construction activities and the active nest or where sufficient barriers or topographic relief exists to protect the nest from excessive noise or other disturbance. The biologist will coordinate with the USFWS and CDFW to evaluate exceptions to the minimum no-activity buffer distance on a case-by-case basis. 5. No work will occur within the buffer without verification by a biologist that the nest is inactive and until any fledged young are no longer dependent on adults for food. 6. If a least Bell's vireo and/or its nest is detected during pre-activity surveys, the District will contact the USFWS and CDFG within two working days regarding the presence and location of the bird/nest.
GEN-7	Protection of Burrowing Owls	1. If occupied burrows are identified, a 250 foot radius no work buffer zone will be established around the burrow. The buffer may be modified, with CDFW approval, to take into consideration of paved roads, intervening riparian corridors and levees. 2. No construction work will occur within the 250 foot buffer zone until after the nesting season. 3. After the nesting season work may occur within the 250 foot buffer zone provided: a. A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction) b. The same qualified biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities. c. If there is any change in owl foraging behavior as a result of construction activities, these activities will cease within the 250-foot buffer. d. If the owls are gone for at least one week, the project proponent may request approval from the Santa Clara County Habitat Agency that a qualified biologist excavate the usable burrows to prevent owls from re-occupying the site. After the usable burrows are excavated, the buffer zone will be removed and construction may continue. e. Monitoring must continue as described above for the non-breeding season as long as the burrow remains active. 5. Routine use of existing District maintenance roads within the 250 foot buffer will be allowed. However, no construction traffic will be allowed to use the maintenance road during the active nesting period. 6. Exceptions. a. Mowing on levees may occur during the nesting season and within 250 feet of active burrows provided the burrows are marked by a qualified biologist. b. No vehicle mounted mowers will be used within 10 ft of occupied burrows. c. A qualified biologist will monitor the mowing within the buffer zone and stop the mowing if burrowing owls are observed on the surface at the nest or another burrow. d. Areas within 10 feet of the burrows may be mowed using hand equipment when no owls are visible on the surface. e. All mowing activities within the buffer zone will be completed within 30 minutes.
GEN-8	Protection of Sensitive	Approved herbicides and adjuvants may be applied in habitat areas for sensitive wildlife species (including

BMP Number	BMP Title	BMP Description
	Fauna Species from Herbicide Use Revised, see Section 3.1.3.h.	steelhead, California red-legged frog, California tiger salamander, salt marsh harvest mouse, and Bay checkerspot butterfly); all applications will occur in accordance with federal and state regulations. For sprayable or dust formulations: when the air is calm or moving away from sensitive wildlife habitat, applications will commence on the side nearest the habitat and proceed away from the habitat. When air currents are moving toward habitat, applications will not be made within 200 yards by air or 40 yards by ground upwind from occupied habitat. However, these distances may be modified for the control of invasive species on salmonid streams if the following measures are implemented: ▪ A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). Surfactant use would be limited to non-ionic products, such as Agri-dex, Competitor, or another brand name using the same ingredients. Any modifications to these materials would require review and approval by NMFS and CDFW. ▪ A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning biological resources and determine which BMPs would be instituted for work to proceed.
GEN-9	Avoid Impacts to Special-Status Plant Species and Sensitive Natural Vegetation Communities	A qualified botanist will identify special status plant species and sensitive natural vegetation communities and clearly map or delineate them as needed in order to avoid and/or minimize disturbance, using the CDFW protocols and the *CNPS Botanical Survey Guidelines* to formulate the following protocols: 1. A qualified botanist will use the GIS database, CNDDB, and/or other suitable tools to identify special status plants and sensitive natural vegetation communities located within or near work areas. 2. Surveys of areas identified as sensitive natural communities or suitable habitat for special status plant species will be conducted by a qualified botanist prior to commencement of work. 3. Surveys will be conducted during the appropriate time of the year to adequately identify special-status plants that could occur on the site of proposed maintenance activities. 4. The qualified botanist will ensure avoidance and/or minimize impacts by implementing one or more of the following, as appropriate, per the botanist's recommendation: a) Flag or otherwise delineate in the field the special status plant populations and/or sensitive natural community to be protected; b) Allow adequate buffers around plants or habitat; the location of the buffer zone will be shown on the maintenance design drawings and marked in the field with stakes and/or flagging in such a way that exclusion zones are visible to maintenance personnel without excessive disturbance of the sensitive habitat or population itself (e.g., from installation of fencing). c) Time construction or other activities during dormant and/or non-critical life cycle period; d) Store removed sediment off site; and e) Limit the operation of maintenance equipment to established roads whenever possible. 5. No herbicides, terrestrial or aquatic, will be used in areas identified as potential habitat for special status plant~~s~~ species or containing sensitive natural communities, until a qualified botanist has surveyed the area and determined the locations of special status plant species present. 6. If special status plant species or sensitive communities are present, then a qualified botanist will determine if a given type of vegetation management method is ecologically appropriate for a given area. Alternative

BMP Number	BMP Title	BMP Description
		strategies based on the botanist's recommendations will be coordinated with appropriate staff. 7. All impacts to sensitive natural communities and special status plants identified by the qualified botanist will be avoided and/or minimized
GEN-10	Avoid Impacts to Bay Checkerspot Butterfly and Associated Critical Habitat	1. Areas supporting Bay checkerspot larval host plants will be identified by a qualified botanist and protected from disturbance to the extent feasible, by establishing buffer zones around individual plants or populations. The size of the buffer will be determined by a qualified botanist; the actual distance will depend on the plant species potentially affected and the type of disturbance. No herbicide will be applied to the buffer area, and to the extent feasible, maintenance personnel and equipment will not operate within such areas. 2. Herbicides may be used in serpentine areas that do not contain Bay checkerspot butterfly larval host plants or sensitive plant species and habitat when approved by a qualified botanist and for the following maintenance purposes: a) To protect sensitive species and habitat; b) To manage for control of invasive and non-native plants; and/or c) To maintain access to a facility.
GEN-11	Protection of Salt Marsh Harvest Mouse and California Clapper Rail	1. A District qualified biologist will conduct a desk audit to determine whether suitable Salt Marsh Harvest Mouse (SMHM) or California Clapper Rail (CCR) habitat is present in or adjacent to a maintenance activity. 2. Within 7 days prior to work within the range of the Salt Marsh Harvest Mouse (SMHM) or California Clapper Rail (CCR), as depicted on the District's GIS layers, the proposed project area will be surveyed by a qualified biologist to identify specific habitat areas. Surveyed areas will include work locations and access routes. The range of the salt marsh harvest mouse and California clapper rail is based on the SCVWD's GIS mapping reflecting occurrence information and potential habitat. If this mapping is revised, it will be provided to the Service for review. 3. To minimize or avoid the loss of individuals, activities within or adjacent to California clapper rail and salt marsh harvest mouse habitat will not occur within two hours before or after extreme high tides (6.5 feet or above) when the marsh plain is inundated, because protective cover for those species is limited and activities could prevent them from reaching available cover. 4. Specific habitat areas are vegetated areas of cordgass (*Spartina* spp), marsh gumplant (*Grindelia* spp.), pickleweed (*Sarcocornia pacifica*), alkali heath, (*Frankenia* sp.), and other high marsh vegetation, brackish marsh reaches of creek with heavy accumulations of bulrush thatch (old stands), and high water refugia habitat that may include annual grasses, and shrubs immediately adjacent to channels. 5. Within the identified specific habitat areas, vegetation will be removed by hand from areas to be directly impacted by the work activities if possible (hand removal of vegetation is some channels may not be possible). If within the mapped range of the mouse but outside of areas identified as specific habitat areas, then other methods may be possible. 6. Prior to the initiation of work each day for all vegetation management work, ground or vegetation disturbance, operation of large equipment, grading, sediment removal, and bank stabilization work and prior to expanding the work area, if suitable habitat occurs within the immediate work area, a qualified biologist will conduct a pre-construction survey of all suitable habitat that may be directly or indirectly impacted by the day's activities (work area, access routes, staging areas). a. If during the initial daily survey or during work activities a CCR is observed within or immediately

BMP Number	BMP Title	BMP Description
		adjacent to the work area (50 feet), initiation of work will be delayed until the CCR leaves the work area. b. If during the initial daily survey or during work activities a SMHM or similar rodent is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until a *Site Specific Species Protection Form* can be developed and implemented by a qualified biologist to protect the SMHM or similar rodent is developed and implemented by the qualified biologist. Acceptable plan activities may include one or more of the following activities: 1) establishment of a buffer zone at least 50 feet in radius from the rodent; 2) ongoing active monitoring, 3) construction of silt fence barrier between maintenance work and location of the rodent, 4) delay of work activity until the qualified biologist can provide CDFW and the Service a suggested course of action and seek concurrence. 7. Mowing using heavy equipment (tractors, boom mowers, rider mowers) will not be conducted in habitat areas or within 50 feet of habitat areas. If mowing with hand equipment is necessary within 50 feet of habitat areas, an on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. If SMHM are detected within the area to be mown, no mowing will occur in that area. If CCR are detected within the area to be mown, the mowing will stop until the individual(s) have left the work area. 8. See ANI-2 for additional restrictions. 9. If visual observation cannot confirm California clapper rail left the work area then it is assumed that the individual(s) remains in the work area and the work will not resume until the area has been thoroughly surveyed (and absence confirmed) or the Service has been contacted for guidance.
GEN-12	Protection of Special-Status Amphibian and Reptile Species	1. A District qualified biologist will conduct a desk audit to determine whether suitable special-status amphibian or reptile habitat is present in or adjacent to a maintenance activity based on all available information including the habitats modeled in the Valley Habitat Plan. 2. If the District Wildlife or Fisheries Biologist determines that a special-status amphibian or reptile could occur in the activity area, a qualified biologist will conduct one daytime and one nighttime survey within a 7 day period preceding the onset of maintenance activities. a. If a special-status amphibian or reptile, or the eggs or larvae of a special status amphibian or reptile, are found within the activity area during a pre-activity survey or during project activities, the qualified biologist shall notify the project proponent about the special-status species and conduct the following work specific activities: i. For minor maintenance activities and for vegetation removal activities that will take less than 1 day, a qualified biologist shall conduct a special status species survey on the morning of and prior to the scheduled work. A. If no special status species is found, the work may proceed. B. If eggs or larvae of a special status species are found, a buffer will be established around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed. C. If an active western pond turtle nest is detected within the activity area, a 50-foot buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist. D. If adults or non-larval juveniles of a special status species are found, one of the following two

BMP Number	BMP Title	BMP Description
		procedures will be implemented: i. If, in the opinion of the qualified biologist, capture and removal of the individual to a safe place outside of the work area is less likely to result in adverse effects than leaving the individual in place and rescheduling the work (e.g., if the species could potentially hide and be missed during a follow-up survey), the individual will be captured and relocated by a qualified biologist (with USFWS and/or CDFW approval, depending on the listing status of the species in question), and work may proceed. ii. If, in the opinion of the qualified biologist, the individual is likely to leave the work area on its own, and work can be feasibly rescheduled, a buffer will be established around the location of the individual(s) and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled. ii. For minor maintenance and vegetation removal activities that will take more than 1 day, the qualified biologist shall conduct a special-status species survey on each morning of and prior to the scheduled work commencing. E. If eggs or larvae of a special status species are found, a buffer will be established around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed. F. If an active western pond turtle nest is detected within the activity area, a 50 ft-buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist. G. If adults or non-larval juveniles of a special status species are found, the individual will be captured and relocated by a qualified biologist (with USFWS and/or CDFW approval, depending on the listing status of the species in question), and work may proceed. iii. For Sediment Removal and Bank Stabilization Projects the wildlife or fisheries biologist in cooperation with the project proponent shall complete a *Site Specific Species Protection Form for the project*. Elements of the form include: work rescheduling, training work crews, daily surveys, establishment of buffers and buffer fencing, on-site monitoring, habitat modification in advance of work activities, capture and relocation of individual special-status species, methods of documentation, and reporting of results. b. If no special status amphibian or reptile is found within the activity area during a pre-activity survey, the work may proceed. c. During animal conflict management activities, if special status species are found within a burrow proposed for destruction, a qualified biologist will determine an appropriate buffer distance around that burrow to ensure adequate protection of the habitat. The buffer area may include not destroying adjacent burrows as that may damage subterranean networks of the occupied burrow or produce substrate vibrations which could interfere with prey detection mechanisms. If two consecutive follow up surveys are conducted (spaced 30 days apart) in which the burrow is found to be unoccupied, work can proceed as planned. A naturally found back filled burrow known to have been inhabited by a special-status species will be presumed to still be occupied by that species and a clearly delineated buffer demarcation of the burrow area will be in place for the duration of nearby work activities. In rare instances in which destruction of the burrow is not avoidable during animal conflict management, the animal will be relocated to a safe burrow outside the

BMP Number	BMP Title	BMP Description
		impact area, with USFWS and/or CDFW approval, depending on the listing status of the species in question. A biologist will observe the relocated animal until it is certain that the animal is not in immediate danger of desiccation or predation.
GEN-13	Protection of Bat Colonies	1. A District Wildlife Biologist will conduct a desk audit to determine whether suitable habitat (appropriate roost trees or anthropogenic structures) is present for bat colonies within 100 feet of the work site, staging areas, or access routes. 2. If potential bat colony habitat is determined to be present, within two weeks prior to the onset of work activities a qualified biologist will conduct a survey to look for evidence of a bat use. If evidence is observed, or if potential roost sites are present in areas where evidence of bat use might not be detectable (such as a tree cavity), an evening survey and/or nocturnal acoustic survey may be necessary to determine if the bat colony is active and to identify the specific location of the bat colony. 3. If an active bat colony is present then the qualified biologist will make the following determinations: a. The work can proceed without unduly disturbing the bat colony b. There is a need for a buffer zone to prevent disturbance to the bat colony, and implementation of the buffer zone (determined on a case-by-case basis by a qualified biologist) will reduce or eliminate the disturbance to an acceptable level. 4. If a bat colony is found in a tree or structure that must be removed or physically disturbed the qualified biologist will consult with DFW prior to initiating any removal or exclusion activities.
GEN-14	Protection of San Francisco Dusky-footed Woodrat	1. Prior to work within riparian, oak woodland, or coyote brush scrub habitat, or the removal of any oak trees outside these habitats, a District Wildlife Biologist will conduct a desk audit to determine whether woodrats could be present within suitable habitat for San Francisco dusky-footed woodrat or is known to be present in or adjacent to a maintenance activity site. 2. If the District Wildlife Biologist determines that no San Francisco dusky-footed woodrat habitat is present, or there is habitat present but it will not be affected by the maintenance activity, then no further action is required. 3. If the District Wildlife Biologist determines that suitable San Francisco dusky-footed woodrat habitat is present and may be affected by the maintenance activity, a qualified biologist shall conduct a pre-activity survey within 2 weeks prior to the start of work to determine if woodrat nests are present, or within 5 feet of, the immediate activity area. If woodrat nests are determined to be present, the following measures shall be implemented: a. To the extent feasible, impacts to woodrat nests will be avoided by maintaining a minimum 5-ft buffer between maintenance activities and nests. Even if a 5-ft buffer cannot be maintained, the District will minimize impacts to nests by avoiding the direct destruction or modification of the nests to the extent feasible. b. If one or more woodrat nests are determined to be present and physical disturbance or destruction of the nests cannot be avoided, then the woodrats shall be evicted from their nests and the nest material relocated outside of the disturbance area, prior to onset of activities that would disturb the nest, to avoid injury or mortality of the woodrats. First, an alternate location for the nest material shall be chosen by a qualified biologist based on the following criteria: 1) proximity to current nest location; 2) safe buffer distance from planned work; 3) availability of food resources; and 4) availability of cover. An alternate nest structure will then be built at the chosen location. The structure will be made up of small logs (e.g., available materials 2 inches in diameter or greater) stacked to provide a foundation

BMP Number	BMP Title	BMP Description
		on which the woodrats can add nest material. Subsequently, during the evening hours (i.e., within 2 hours prior to sunset), a qualified biologist will slowly dismantle the existing woodrat nest to allow any woodrats to flee and seek cover. All sticks from the nest will be collected and spread over the alternate structure. If young woodrats that are still dependent on their mother are discovered, relocation efforts will cease for the evening and the California Department of Fish and Wildlife will be contacted for guidance on how to proceed.
Deleted Gen -15 See Section 3.1.3.j.		
GEN-15.5	Avoidance of Impacts on the San Joaquin Kit Fox	1. A qualified District biologist will conduct a desk audit to determine whether an SMP activity will occur in an area where the San Joaquin kit fox could potentially occur (i.e., roughly east of Frazier Lake Road and south of Bloomfield Avenue), and in potential habitat for the species. 2. If the District biologist determines that an SMP activity could occur in an area that could potentially support a kit fox, the SCVWD will implement applicable pre-activity surveys and other measures in accordance with the USFWS's *San Joaquin Kit Fox Survey Protocol for the Northern Range*, as follows: a) Conduct a preconstruction/pre-activity survey no less than 14 days and no more than 30 days prior to the beginning of project implementation. Surveys shall identify kit fox habitat features on the project site and evaluate use by kit fox and, if possible, and assess the potential impacts to the kit fox by the proposed activity. The status of all dens shall be determined and mapped in accordance with the survey protocol. b) If a natal/pupping den is discovered within the project area or within 200 feet of the project boundary, the USFWS shall be immediately notified. Disturbance to all San Joaquin kit fox dens should be avoided to the maximum extent possible. Destruction of any known or natal/pupping kit fox den would require take authorization from the USFWS. c) The project proponent will establish exclusion zones around the kit fox dens, if determined to be present. The configuration of the exclusion should have a radius measured outward from the entrance or cluster of entrances. The following radii are minima to be applied: ▪ Potential den: 50 feet ▪ Known den: 100 feet ▪ Natal/pupping den: Service must be contacted (occupied and unoccupied) ▪ Atypical den: 50 feet.

BMP Number	BMP Title	BMP Description
		3. If take of the San Joaquin kit fox will occur, take authorization from the USFWS and CDFW will be necessary.

General Maintenance Practices

GEN-16	In-Channel Minor Activities	For in-channel minor work activities, work will be conducted from the top of the bank if access is available and there are flows in the channel.
GEN-17	Employee/Contractor Training	All appropriate District staff and contractors will receive annual training on Stream Maintenance Program BMPs. The training will also include an overview of special-status species identification and habitat requirements. District staff and contractors will receive fact sheets to assist with in-the-field identification of special-status species and their habitats.
GEN-18	Paperwork Required On-site	1. Copies of regulatory permits related to the Stream Maintenance Program will be kept on-site and available for review, if requested by regulatory personnel. 2. Copies of the Stream Maintenance Program Manual and this BMP Manual will be kept on-site.
GEN-19	Work Site Housekeeping	1. District employees and contractors will maintain the work site in neat and orderly conditions on a daily basis, and will leave the site in a neat, clean, and orderly condition when work is complete. 2. Slash, sawdust, cuttings, etc. will be removed to clear the site of vegetation debris. As needed, paved access roads and trails will be swept and cleared of any residual vegetation or dirt resulting from the maintenance activity. 3. For activities that last more than one day, materials or equipment left on the site overnight will be stored as inconspicuously as possible, and will be neatly arranged. Any materials and equipment left on the site overnight will be stored to avoid erosion, leaks, or other potential impacts to water quality (see BMPs GEN-24). 4. The District's maintenance crews are responsible for properly removing and disposing of all debris incurred as a result of construction within 72 hours of project completion. 5. All trash that is brought to a project site during maintenance activities (e.g., plastic water bottles, plastic lunch bags, cigarettes) will be collected at the site daily.
GEN-20	Erosion and Sediment Control Measures	1. Soils exposed due to maintenance activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized and water quality protected prior to significant rainfall. The channel bed and areas below the Ordinary High Water Mark (OHWM) are exempt from this BMP. 2. The preference for erosion control fabrics will be to consist of natural fibers; however, steeper slopes and areas that are highly erodible may require more structured erosion control methods. No non-porous fabric will be used as part of a permanent erosion control approach. Plastic sheeting may be used to temporarily protect a slope from runoff, but only if there are no indications that special-status species would be impacted by the application. 3. Erosion control measures will be installed according to manufacturer's specifications. 4. Appropriate measures include, but are not limited to, the following: o Silt Fences o Straw Bale Barriers o Brush or Rock Filters o Storm Drain Inlet Protection o Sediment Traps

BMP Number	BMP Title	BMP Description
		o Sediment Basins o Erosion Control Blankets and Mats o Soil Stabilization (i.e. tackified straw with seed, jute or geotextile blankets, etc.) o Wood chips o Straw mulch 5. All temporary construction-related erosion control methods shall be removed at the completion of the project (e.g. silt fences). 6. Surface barrier applications installed as a method of animal conflict management, such as chain link fencing, woven geotextiles, and other similar materials, will be installed no longer than 300 feet, with at least an equal amount of open area prior to another linear installation; and only on one side of levee slopes. Inboard and outboard areas will only have installations set in an alternating pattern, such that no inboard and outboard levee faces would have erosion control blankets along the same levee stationing. 7. Each maintenance site will be visually inspected at least once daily during extended storm events to confirm that BMPs are effective and maintained as necessary. 8. Each maintenance site will be visually inspected within two business days (48 hours) after each significant rain event to determine whether BMPs were effective and identify the need to modify or maintain existing BMPs or include additional BMPs to be protective.
GEN-21	Staging and Stockpiling of Materials	1. To protect on-site vegetation and water quality, staging areas should occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation. Similarly, all maintenance equipment and materials (e.g., road rock and project spoil) will be contained within the existing service roads, paved roads, or other pre-determined staging areas. 2. Building materials and other maintenance-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water bodies or storm drains. Materials will not be stockpiled longer than seven (7) calendar days. 3. No runoff from the staging areas may be allowed to enter water ways, including the creek channel or storm drains, without being subjected to adequate filtration (e.g., vegetated buffer, swale, hay wattles or bales, silt screens). 4. The discharge of decant water to water ways from any on-site temporary sediment stockpile or storage areas is prohibited. 5. Wet material removed from an isolated creek reach may be pulled to the side of the channel (within the channel and below top of bank) and allowed to naturally drain prior to removal from the channel. Pulled material will be removed from the channel prior to deactivation of the site or forecast of rain. 6. During the wet season, no stockpiled soils will remain exposed, unless surrounded by properly installed and maintained (i.e., per manufacturer specifications) silt fencing or other means of erosion control. During the dry season; exposed, dry stockpiles will be watered, enclosed, covered, or sprayed with non-toxic soil stabilizers (GEN-24). 7. All pipes, culverts, or similar structures stored at a site within sensitive species areas, for one or more overnight periods shall be securely capped prior to storage or inspected before the pipe is subsequently moved. If any potential special-status species are observed within a pipe, a District biologist shall be consulted on what steps should be taken to protect the species. If a District biologist is on-site, they may remove the special status species from the pipes and relocate to the nearest appropriate and unaffected habitat.

BMP Number	BMP Title	BMP Description
GEN-22	Sediment Transport	To prevent sediment-laden water from being released back into waterways during transport of spoils to disposal locations, truck beds will be lined with an impervious material (e.g., plastic), or the tailgate blocked with wattles, hay bales, or other appropriate filtration material. Trucks may then drain excess water by slightly tilting the loads and allowing the water to drain out through the applied filter, but only within the active project area of the creek where the sediment is being loaded into the trucks or within an identified vegetated area (swale) that is separated from the creek.
GEN-23	Stream Access	District personnel will use existing access ramps and roads to the extent feasible. If necessary to avoid large mature trees, native vegetation, or other significant habitat features, temporary access points will be constructed in a manner that minimizes impacts according to the following guidelines: 1. Temporary access points will be constructed as close to the work area as possible to minimize equipment transport 2. In considering channel access routes, slopes of greater than 20 percent will be avoided, if possible. 3. Any temporary fill used for access will be removed upon completion of the project and pre-project topography will be restored to the extent possible. 4. When temporary access is removed, disturbed areas will be revegetated or filled with compacted soil, seeded, and/or stabilized with erosion control fabric immediately after construction to prevent future erosion. 5. Personnel will use the appropriate equipment for the job that minimizes impacts and disturbance to the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, will be used depending on the site and maintenance activity.
GEN-24	On-Site Hazardous Materials Management	1. An inventory of all hazardous materials used (and/or expected to be used) at the worksite and the end products that are produced (and/or expected to be produced) after their use will be maintained by the worksite manager. 2. As appropriate, containers will be properly labeled with a “Hazardous Waste” label and hazardous waste will be properly recycled or disposed of off-site. 3. Contact of chemicals with precipitation will be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage. 4. Quantities of toxic materials, such as equipment fuels and lubricants, will be stored with secondary containment that is capable of containing 110% of the primary container(s). 5. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials will not contact soil and not be allowed to enter surface waters or the storm drainage system. 6. All toxic materials, including waste disposal containers, will be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water. 7. Sanitation facilities (e.g., portable toilets) will be placed outside of the creek channel and floodplain. Direct connections with soil, the storm drainage system, and surface waters will be avoided. 8. Sanitation facilities will be regularly cleaned and/or replaced, and inspected daily for leaks and spills.
GEN-25	Existing Hazardous Materials	If hazardous materials, such as oil, batteries or paint cans, are encountered at the maintenance sites, the District will carefully remove and dispose of them according to applicable regulatory requirements. District staff will wear proper protective gear and store the waste in appropriate hazardous waste containers until it can be disposed at a hazardous waste facility.
GEN-26	Spill Prevention and Response	The District will prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels following these measures:

BMP Number	BMP Title	BMP Description
		1. District field personnel will be appropriately trained in spill prevention, hazardous material control, and clean up of accidental spills. 2. Equipment and materials for cleanup of spills will be available on site and spills and leaks will be cleaned up immediately and disposed of according to applicable regulatory requirements. 3. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means. 4. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations). All field personnel will be advised of these locations. 5. District staff will routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained. *Spill Response Measures:* For small spills on impervious surfaces, absorbent materials will be used to remove the spill, rather than hosing it down with water. For small spills on pervious surfaces such as soil, the spill will be excavated and properly disposed rather than burying it. Absorbent materials will be collected and disposed of properly and promptly. If a hazardous materials spill occurs that cannot be contained or cleaned up with the onsite materials, the onsite District field personnel will be responsible for immediately initiating an emergency response sequence by notifying the proper authorities (i.e., District Emergency Response (ER) Team and public fire and hazmat agencies) of the release; taking appropriate defensive steps from a safe distance to secure the site to minimize damage to people, environment, and property (PEP); and deferring all other response activities to public emergency response agencies and/or the District Emergency Response (ER) Team or District ER Contractor. Depending on the nature of the release, the District ER Team's actions will include: urgent (responding within 2 hours of notification) field response site reconnaissance, emergency sequence initiation, defensive containment, release control, incident command; or priority (non 2-hour) field response site reconnaissance and clean-up operations. If a "reportable" spill of petroleum products occurs, the District's Stream Maintenance Implementation Program Manager will be notified and action taken to contact the appropriate safety and cleanup crews. A reportable spill is defined as when: ▪ a film or sheen on, or discoloration of, the water surface or adjoining bank/shoreline is observed; or ▪ a sludge or emulsion is deposited beneath the surface of the water or adjoining banks/shorelines (40 Code of Federal Regulations 110); or when ▪ another violation of water quality standards is observed. A written description of the reportable release must be submitted to the appropriate Regional Water Quality Control Board and the California Department of Toxic Substances Control (DTSC). This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. If an appreciable spill has occurred, and results determine that project activities have adversely affected surface water or groundwater quality, a detailed analysis will be performed to the specifications of DTSC to identify the likely cause of contamination. This analysis will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the District or contractors will select and implement

BMP Number	BMP Title	BMP Description
		measures to control contamination, with a performance standard that surface and groundwater quality will be returned to baseline conditions. These measures will be subject to approval by the District, DTSC, and the Regional Water Quality Control Board.
GEN-27	Existing Hazardous Sites	Upon selection of maintenance project locations, the District will conduct a search for existing known contaminated sites, as part of its annual preparation of the Notice of Proposed Work (NPW), on the State Water Resource Control Board's GeoTracker Web site (http://www.geotracker.waterboards.ca.gov). The Geotracker search will only be performed for the District's ground disturbing activities. For any proposed ground disturbing maintenance sites located within 1,500 feet of any "open" sites where contamination has not been remediated, the District will contact the RWQCB case manager listed in the database. The District will work with the case manager to ensure maintenance activities would not affect cleanup or monitoring activities or threaten the public or environment.
GEN-28	Fire Prevention	1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will ~~: a) H~~have appropriate fire suppression equipment available at the work site.
GEN-29	Dust Management	The District will implement the Bay Area Air Quality Management District's (BAAQMD) required Dust Control Measures (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx?la=en). Current measures stipulated by the BAAQMD Guidelines include the following: 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered. 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. 4. Water used to wash the various exposed surfaces (i.e., parking areas, staging areas, soil piles, graded areas, etc.) will not be allowed to enter the water way. 5. All vehicle speeds on unpaved roads shall be limited to 15 mph. 6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. 7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. 8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator. 9. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

BMP Number	BMP Title	BMP Description
GEN-30	Vehicle and Equipment Maintenance	1. All vehicles and equipment will be kept clean. Excessive build-up of oil and grease will be prevented. 2. All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work. Maintenance, repairs, or other necessary actions will be taken to prevent or repair leaks, prior to use. 3. Incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) will be checked for leaking oil and fluids. Vehicles or equipment visibly leaking operational fluids will not be allowed on-site. 4. No heavy equipment will operate in a live stream. This will not apply to activities for which no other option exists, such as sediment removal which cannot be conducted from top of bank, etc. In these cases, dewatering will be conducted as necessary, following the protocols in BMPs GEN-33 or GEN-34. 5. No equipment servicing will be done in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps and generators). 6. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location, and that can be performed without releasing any material into the floodway or water, will be conducted in the channel or floodplain. 7. If necessary, all servicing of equipment done at the job site will be conducted in a designated, protected area to reduce threats to water quality from vehicle fluid spills. Designated areas will not directly connect to the ground, surface water, or the storm drain system. The service area will be clearly designated with berms, sandbags, or other barriers. Secondary containment, such as a drain pan, to catch spills or leaks will be used when removing or changing fluids. Fluids will be stored in appropriate containers with covers, and properly recycled or disposed of offsite.
GEN-31	Vehicle Cleaning	1. Equipment will be cleaned of any visible sediment or vegetation clumps before transferring and using in a different watershed to avoid spreading pathogens or exotic/invasive species. 2. Vehicle and equipment washing can occur on-site only as needed to prevent the spread of sediment, pathogens or exotic/invasive species. No runoff from vehicle or equipment washing is allowed to enter water bodies, including creek channels and storm drains, without being subjected to adequate filtration (e.g., vegetated buffers, straw wattles or bales, fiber rolls, and silt screens). The discharge of decant water from any on-site wash area to water bodies or to areas outside of the active project site is prohibited. Additional vehicle/equipment washing will occur at the approved wash area in the District's corporation yard.
GEN-32	Vehicle and Equipment Fueling	1. No fueling will be done in the channel (top-of-bank to top-of-bank) or immediate floodplain unless equipment stationed in these locations cannot be readily relocated (e.g., pumps and generators). 2. All off-site fueling sites (i.e., on access roads above the top-of-bank) will be equipped with secondary containment and avoid a direct connection to soil, surface water, or the storm drainage system. 3. For stationary equipment that must be fueled on-site, secondary containment, such as a drain pan or drop cloth, will be used to prevent accidental spills of fuels from reaching the soil, surface water, or the storm drain system.

BMP Number	BMP Title	BMP Description
Dewatering		
GEN-33	Dewatering for Non-Tidal Sites	When sediment removal and bank stabilization work area includes a flowing stream, the entire streamflow will be diverted around the work area by construction of a temporary dam and/or bypass. Where appropriate, stream flow diversions will occur via gravity driven systems. *A. Planning to avoid and minimize impacts to water quality and aquatic wildlife:* 1. For construction and monitoring of a stream flow bypass, the *Sediment Removal and Bank Stabilization Projects* checklist will be completed. 2. Recommendations by a qualified Fisheries Biologist to protect native fisheries and aquatic vertebrates will be incorporated into the bypass design. The recommendations may include but are not limited to: i. Screening the stream flow diversion source or pump to prevent entrainment of native fish or amphibian species. The screening dimensions will be appropriate to the species present. ii. Relocation of native aquatic vertebrates. This will include the methods to be used to capture and hold and move the aquatic vertebrates and a description of where the aquatic vertebrates will be relocated. 3. Depending on the channel configurations, sediment removal activities may occur where the flows are not bypassed around the work site as long as a berm is left between the work area and stream flows to minimize water quality impacts during excavation activities. The berm between the work and the live channel will be wide enough to prevent introduction of turbid water from the cell into the live channel. *B. Construction*: 1. The construction of facilities will be based on the water bypass plan. 2. Coffer dams will be installed both upstream and downstream of the work area to minimize impacts or the distance necessary to accomplish effective passive systems. 3. In streams where water may enter the construction site from downstream (reverse flow) additional coffer dams (downstream) may be necessary. When multiple coffer dams are constructed, the upstream dam will be constructed first. 4. Instream cofferdams will only be built from materials such as sandbags, earth fill, clean gravel, or rubber bladders which will cause little or no siltation or turbidity. 5. Plastic sheeting will be placed over k-rails, timbers, and earth fill to minimize water seepage into and out of the maintenance areas. The plastic sheets will be firmly anchored, using sandbags, to the streambed to minimize water seepage. 6. When pumping is necessary to dewater a work site, a temporary siltation basin and/or use of silt bags may be required to prevent sediment from re-entering the wetted channel. Pump intakes will be screened to prevent harm to aquatic wildlife. 7. If necessary to prevent erosion an energy dissipater will be constructed at the discharge point. 8. Timing of flow diversions will be coordinated with the completion of the dam structure to facilitate not drying up the downstream creek area and to minimize dry back conditions. *C. Implementation*: 1. Water flows downstream of the project site will be maintained to prevent stranding aquatic vertebrates.

BMP Number	BMP Title	BMP Description
		2. Water diverted around work sites and water detained by coffer dams will be protected from maintenance activity-related pollutants, such as soils, equipment lubricants or fuels. 3. The *Fish Relocation Guidelines* (Attachment B) will be implemented to ensure that fish and other aquatic vertebrates are not stranded during construction and implementation of channel dewatering. a) Native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist. Timing of work in streams that supports a significant number of amphibians will be delayed until metamorphosis occurs to minimize impacts to the resource. Capture and relocation of aquatic native vertebrates is not required at individual work sites when site conditions preclude reasonably effective operation of capture gear and equipment. b) Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work. 4. Filtration devices (silt bags attached to the end of discharge hoses and pipes to remove sediment from discharged water) or settling basins will be provided as necessary at discharge sites to ensure that the turbidity of discharged water is not visibly more turbid than the water in the channel upstream of the maintenance site. If increases in turbidity are observed, additional measures will be implemented such as a larger settling basin or additional filtration. If increases in turbidity persist, the District's Stream Maintenance Program Implementation Project Manager will be alerted since turbidity measurements may be required. 5. Water remaining in the work area will be removed by evaporation, seepage, or pumping. When pumping is required to dewater a site, the decanted water will be discharged with water bypassed around the site or in a separate erosion control – energy dissipation area/vegetated swale. The turbidity of discharged water will not be visibly more turbid than the receiving water. *Deconstruction*: 1. When maintenance is completed, the flow diversion structure will be removed as soon as possible. Impounded water will be released at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat. 2. Removal will normally proceed from downstream in an upstream direction. 3. When diversion structures are removed, the ponded water will be directed back into the low-flow channel in a phased manner to minimize erosion and downstream water quality impacts. Normal flows will be restored. 4. The area disturbed by flow bypass mechanisms will be restored to the pre-project condition at the completion of the project (to the extent practical). This may include, but is not limited to, recontouring the area and planting of riparian vegetation.

BMP Number	BMP Title	BMP Description
GEN-34	Dewatering in Tidal Work Areas	For tidal areas, a downstream cofferdam will be constructed to prevent the work area from being inundated by tidal flows. 1. Installation of cofferdams and fish exclusion measures will be installed at low tide when the channel and project site are at their driest. 2. It is preferable to not use any bypass pipes when work is being conducted on one side of the channel, if isolated by the cofferdam, and flows can continue on the other side of the creek channel without entering the project area. 3. If downstream flows cannot be diverted around the project site, the creek waters will be transmitted around the site through cofferdam bypass pipes. Waters discharged through tidal cofferdam bypass pipes will not exceed 50 NTUs over the background levels of the tidal waters into which they are discharged. 4. Cofferdams in tidal areas may be made from earthen or gravel material. If earth is used, the downstream and upstream faces will be covered by a protected covering (e.g., plastic or fabric) if needed to minimize erosion. A protected covering or sheeting will be placed on the water side of an earthen coffer dam to protect water quality. 5. When maintenance is completed, the cofferdams and bypass pipes will be removed as soon as possible but no more than 72 hours after work is completed. Flows will be restored at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat.
GEN-35	Pump/Generator Operations and Maintenance	When needed to assist in channel dewatering, pumps and generators will be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators will be maintained according to manufacturers' specifications to regulate flows to prevent dryback or washout conditions. 2. Pumps will be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. All pump intakes will be screened. Pumps in steelhead creeks will be screened according to NMFS criteria (http://www.swr.noaa.gov/sr/fishscrn.pdf) to prevent entrainment of steelhead.
Public Safety		
GEN-36	Public Outreach	The public will be informed of stream maintenance work prior to the start of work as part of the preparation of the NPW for all projects in the NPW: 1. Each spring, a newspaper notice will be published with information on the NPW work sites, approximate work dates, and contact information. 2. Neighborhood Work Notices will be distributed as part of the NPW preparation prior to the start of work. 3. Local governments (cities and County) will be notified of scheduled maintenance work. The NPW will be submitted to the public works departments, local fire districts, and the District's Flood Protection and Watershed Advisory Committees. 4. The District will post specific information on individual maintenance projects on the Stream Maintenance Web site: (http://valleywater.org/EkContent.aspx?id=379&terms=stream+maintenance) 5. For high profile projects, at the District's discretion, signs will be posted in the neighborhood to notify the public at least one week in advance of maintenance schedules, trail closures, and road/lane closures as necessary and as possible. Signage used at work sites will include contact information for lodging comments and/or complaints regarding the maintenance activities.
GEN-37	Implement Public Safety Measures	The District will implement public safety measures during maintenance as follows: 1. Construction signs will be posted at job sites warning the public of construction work and to exercise caution,

BMP Number	BMP Title	BMP Description
		as appropriate to public accessed areas. 2. Where work is proposed adjacent to a recreational trail, warning signs will be posted several feet beyond the limits of work. Signs will also be posted if trails will be temporarily closed. 3. If needed, a lane will be temporarily closed to allow for trucks to pull into and out of access points to the work site. 4. Temporary fencing, either the orange safety type or chain link, will be installed above repair sites on bank stabilization projects. 5. When necessary, District or contracted staff will provide traffic control and site security.
GEN-38	Minimize Noise Disturbances to Residential Areas	The District will implement maintenance practices that minimize disturbances to residential areas surrounding work sites. 1. With the exception of emergencies, work will be conducted during normal working hours. Maintenance activities in residential areas will not occur on Saturdays, Sundays, or District observed holidays except during emergencies, or with approval by the local jurisdiction and advance notification of surrounding residents. 2. Vehicles, generators and heavy equipment will be equipped with adequate mufflers. 3. Idling of vehicles will be prohibited beyond 5 minutes unless operation of the engine is required to operate a necessary system such as a power take-off (PTO).
GEN-39	Planning for Pedestrians, Traffic Flow, and Safety Measures	1. Work will be staged and conducted in a manner that maintains two-way traffic flow on public roadways in the vicinity of the work site. If temporary lane closures are necessary, they will be coordinated with the appropriate jurisdictional agency and scheduled to occur outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. Any lane closures will include advance warning signage, a detour route and flaggers in both directions. When work is conducted on public roads and may have the potential to affect traffic flow, work will be coordinated with local emergency service providers as necessary to ensure that emergency vehicle access and response is not impeded. 2. Bicycle and pedestrian facility closures will be scheduled outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. 3. Public transit access and routes will be maintained in the vicinity of the work site. If public transit will be affected by temporary road closures and require detours, affected transit authorities will be consulted and kept informed of project activities. 4. Adequate parking will be provided or designated public parking areas will be used for maintenance-related vehicles not in use through the maintenance period. 5. Access to driveways and private roads will be maintained. If brief periods of maintenance would temporarily block access, property owners will be notified prior to maintenance activities.

BMP Number	BMP Title	BMP Description
Cultural Resources		
GEN-40	Discovery of Cultural Remains or Historic or Paleontological Artifacts	Work in areas where remains or artifacts are found will be restricted or stopped until proper protocols are met. 1. Work at the location of the find will halt immediately within 50 feet of the find. A “no work” zone shall be established utilizing appropriate flagging to delineate the boundary of this zone, which shall measure at least 50 feet in all directions from the find. 2. The District shall retain the services of a Consulting Archaeologist or Paleontologist, who shall visit the discovery site as soon as practicable, and perform minor hand-excavation to describe the archaeological or paleontological resources present and assess the amount of disturbance. 3. The Consulting Archaeologist shall provide to the District and the Corps, at a minimum, written and digital-photographic documentation of all observed materials, utilizing the guidelines for evaluating archaeological resources for the California Register of Historic Places (CRHP) and National Register of Historic Places (NRHP). Based on the assessment, the District and Corps shall identify the CEQA and Section 106 cultural-resources compliance procedure to be implemented. 4. If the find appears to not meet the CRHP or NRHP criteria of significance, and the Corps archaeologist concurs with the Consulting Archaeologist’s conclusions, construction shall continue while monitored by the Consulting Archaeologist. The authorized maintenance work shall resume at the discovery site only after the District has retained a Consulting Archaeologist to monitor and the Watershed Manager has received notification from the Corps to continue work. 5. If the find appears significant, avoidance of additional impacts is the preferred alternative. The Consulting Archaeologist shall determine if adverse impacts to the resources can be avoided. 6. When avoidance is not practical (e.g., maintenance activities cannot be deferred or they must be completed to satisfy the SMP objective), the District shall develop an Action Plan and submit it to the Corps within 48 hours of Consulting Archaeologist’s evaluation of the discovery. The action Plan may be submitted via e-mail to ~~(~~rstradford@spd.usace.army.mil~~)~~. The Action Plan is synonymous with a data-recovery plan. It shall be prepared in accordance with the current professional standards and State guidelines for reporting the results of the work, and shall describe the services of a Native American Consultant and a proposal for curation of cultural materials recovered from a non-grave context. 7. The recovery effort will be detailed in a report prepared by the archaeologist in accordance with current archaeological standards. Any non-grave artifacts will be placed with an appropriate repository. 8. The Consulting Paleontologist will meet the Society for Vertebrate Paleontology’s criteria for a “qualified professional paleontologist” (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995). 9. The paleontologist will follow the Society for Vertebrate Paleontology’s guidelines for treatment of the artifact. Treatment may include preparation and recovery of fossil materials for an appropriate museum or university collection, and may include preparation of a report describing the finds. The District will be responsible for ensuring that paleontologist’s recommendations are implemented. 10. In the event of discovery of human remains (or the find consists of bones suspected to be human), the field crew supervisor shall take immediate steps to secure and protect such remains from vandalism during periods when work crews are absent.) 11. Immediately notify the Santa Clara County Coroner and provide any information that identify the remains as Native American. If the remains are determined to be from a prehistoric Native American, or determined to be a Native American from the ethnographic period, the Coroner shall contact the Native American Heritage

BMP Number	BMP Title	BMP Description
		Commission (NAHC) within 24 hours of being notified of the remains. The NAHC then designates and notifies within 24 hours a Most Likely Descendant (MLD). The MLD has 24 hours to consult and provide recommendations for the treatment or disposition, with proper dignity, of the human remains and grave goods. 12. Preservation in situ is the preferred option. Human remains shall be preserved in situ if continuation of the maintenance work, as determined by the Consulting Archaeologist and MLD, will not cause further damage to the remains. The remains and artifacts shall be documented and the find location carefully backfilled (with protective geo-fabric if desirable) and recorded in District project files. 13. Human remains or cultural items exposed during maintenance that cannot be protected from further damage shall be exhumed by the Consulting Archaeologist at the discretion of the MLD and reburied with the concurrence of the MLD in a place mutually agreed upon by all parties.
GEN-41	Review of Projects with Native Soil	A cultural resources specialist will conduct a review and evaluation of those sites that would involve disturbance / excavation of native soil previously undisturbed by contemporary human activities to determine their potential for affecting significant cultural resources. The evaluation of the potential to disturb cultural resources will be based on an initial review of archival information provided by the California Historical Resources System/Northwest Information Center (CHRIS/NWIC) in regard to the project area based on a 0.25 mile search radius. It is recommended that this initial archival review be completed by a professional archaeologist who will be able to view confidential site location data and literature to arrive at a preliminary sensitivity determination. If necessary, a further archival record search and literature review (including a review of the Sacred Lands Inventory of the Native American Heritage Commission); and a field inventory of the project area will be conducted to determine the presence/absence of surface cultural materials associated with either prehistoric or historic occupation. The results along with any mitigation and/or management recommendations would be presented in an appropriate report format and include any necessary maps, figures, and correspondence with interested parties. A summary table indicating appropriate management actions (e.g., monitoring during construction, presence/absence testing for subsurface resources; data recovery, etc.) will be developed for each project site reviewed. The management actions will be implemented on site to avoid significant effects to cultural resources.
Utilities		
GEN-42	Investigation of Utility Line Locations	An evaluation of the locations of utility lines that could be affected by maintenance activities will be conducted annually as part of the preparation of the Notice of Proposed Work (NPW). Utilities will be avoided as much as possible. For maintenance areas with the potential for adverse effects on utility services, the following measures shall be implemented: 1. Utility excavation or encroachment permits shall be required from the appropriate agencies. These permits include measures to minimize utility disruption. The District and its contractors shall comply with permit conditions. Such conditions shall be included in construction contract specifications. 2. Utility locations shall be verified through a field survey (potholing) and use of the Underground Service Alert services. 3. Detailed specifications shall be prepared as part of the design plans to include procedures for the excavation, support, and/or fill of areas around utility cables and pipelines. All affected utility services shall be notified of the District's maintenance plans and schedule. Arrangements shall be made with these entities regarding protection, relocation, or temporary disconnection of services. 4. Residents and businesses in the project area shall be notified of planned utility service disruption 2 to 4 days in advance, in conformance with state standards. 5. Disconnected cables and lines shall be reconnected promptly.

B. SECTION B – Sediment Removal BMPs

This group of BMPs is intended to be implemented specifically during sediment removal activities to avoid potential impacts on biological resources.

BMP Number	BMP Title	BMP Description
SED-1	Groundwater Management	If high levels of groundwater (i.e., visible water) are encountered during excavations in a work area, the water will be pumped out of the work site or left within the work area if the work activity is not causing water quality degradation in a live stream. Water Quality monitoring would need to occur. If necessary to protect water quality, the extracted water will be discharged into specifically constructed infiltration basins, holding ponds, or areas with vegetation to remove sediment prior to the water re-entering a creek. Water discharged into vegetated areas or swales will be pumped in a manner that will not create erosion around vegetation.
SED-2	Prevent Scour Downstream of Sediment Removal	Sediment removal sites in the transport zone on alluvial fans may cause increased scour downstream if they experience scouring flows or rapid sediment accumulation after maintenance. After sediment removal, the channel will be graded so that the transition between the existing channel both upstream and downstream of the maintenance area is smooth and continuous between the maintained and non-maintained areas and does not present a sudden vertical transition (wall of sediment) or other blockage that could erode once flows are restored to the channel.
SED-3	Restore Channel Features	Low-flow channels within non-tidal streams will be contoured to facilitate fish passage and will emulate the pre-construction conditions as closely as possible, within the finished channel topography.
SED-4	Berm Bypass	Where sediment removal is accomplished without a bypass by removing alternating cells, the berm between the work and the live channel will be wide enough to prevent introduction of turbid water from the cell into the live channel.
SED-5	Sediment Characterization	Projects involving sediment removal at stream gauges, outfalls, culverts, flap gates, tide gates, grade control structures, bridges, fish ladders, and fish screens in excess of 25 cubic yards shall be characterized in accordance with the SCVWD's Sediment Characterization Plans for SMP-2. These projects shall be reported in the annual summary report. Sediment removed will not be reused without pre-approval from appropriate regulatory agencies. See section 5.4 for information on the waiver process.

C. SECTION C – Vegetation Management BMPs

These BMPs provide specific and detailed guidance on the variety of vegetation management procedures implemented by the District. BMPs for the following maintenance techniques are included: tree pruning, tree removal, plant removal, woody debris management, herbicide application, mowing, discing, flaming, and grazing. Practices will be implemented by fully trained and qualified field crews.

C. SECTION C - Vegetation Management BMPs Cont'd

BMP Number	BMP Title	BMP Description
VEG-1	Minimize Local Erosion Increase from In-channel Vegetation Removal	To minimize the potential effect of localized erosion, the toe of the bank will be protected by leaving vegetation to the maximum extent possible and consistent with the maintenance guidelines or original design requirements.
VEG-2	Non-native Invasive Plant Removal	Invasive species (e.g. cape ivy [*Delairea odorata/Senecio mikanoides]*, arundo [*Arundo donax*]) will be disposed of in a manner that will not contribute to the further spread of the species. Cape ivy removed during a project shall be bagged and disposed of in a landfill. Arundo canes will be prevented from floating downstream or otherwise entering the creek or waterway.
VEG-3	Use Appropriate Equipment for Instream Removal	When using heavy equipment to cut or remove instream vegetation, low ground pressure equipment, such as tracked wheels will be utilized to reduce impacts to the streambed.
VEG-4	Use Flamers with Caution	1. A fire extinguisher, water supply and other appropriate fire suppression equipment will always be kept close to the work site in case of an emergency. 2. Propane tanks will be checked for leaks and proper functioning prior to and proceeding use of flaming equipment. The propane tank will be treated as a hazardous material.
VEG-5	Conduct Flaming During Appropriate Weather and Seasonal Conditions	Flamers will not be used during periods of high fire danger or in areas where fuel or climate conditions could accidentally ignite a fire.
VEG-6	Standard Grazing Procedures	1. Vegetation and areas to be preserved will be fenced off to exclude grazing animals. 2. Grazing animals will be excluded from stream channels, using fencing or other barriers.

D. SECTION D – Bank Stabilization BMPs

These BMPs provide additional guidance during implementation of bank stabilization projects to avoid impacts on biological and cultural resources. Review of the Post-Project Restoration BMPs in Section F is recommended because those measures will be implemented after bank stabilization projects are complete. The BMPs included in this section are implemented by the field crew and site manager.

BMP Number	BMP Title	BMP Description
BANK-1	Bank Stabilization Design to Prevent Erosion Downstream	To further prevent potential downstream erosion impacts due to bank stabilization, the site design will be adjusted to provide proactive protection of vulnerable areas within the reach of the worksite. Such measures include, but are not limited to, appropriately keyed-in coir logs, riparian planting, strategic placement of rock, and flow deflectors. Bank stabilization will include appropriate transition designs upstream and downstream of the work site to prevent potential erosion impacts.
BANK-2	Concrete Use Near Waterways	Concrete that has not been cured is alkaline and can increase the pH of the water. Fresh concrete will be isolated until it no longer poses a threat to water quality using the following appropriate measures: 1. Wet sacked concrete will be excluded from the wetted channel for a period of 30 days after installation. During that time, the wet sacked concrete will be kept moist (such as covering with wet carpet) and runoff from the wet

D. SECTION D - Bank Stabilization BMPs Cont'd

BMP Number	BMP Title	BMP Description
		sacked concrete will not be allowed to enter a live stream. 2. Poured concrete will be excluded from the wetted channel for a period of 30 days after it is poured. During that time, the poured concrete will be kept moist, and runoff from the wet concrete will not be allowed to enter a live stream. Commercial sealants (e.g., Deep Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water will be excluded from the site until the sealant is dry. 3. Dry sacked concrete will not be used in any channel. 4. An area outside of the channel and floodplain will be designated to clean out concrete transit vehicles.
BANK-3	Bank Stabilization Post-Construction Maintenance	The District may maintain or repair bank stabilization projects that are less than 2 years old that are damaged by winter flows. The District will notify the regulatory agencies 24 hours prior to beginning the work and the work will be reported as part of the Post-Construction Report submitted by January 15 of each year or if necessary, the subsequent year. Appropriate BMPs will be applied during maintenance repairs.

E. SECTION E – Post-Project Restoration BMPs

These BMPs will be implemented, as appropriate, on all sites that involve ground disturbance.

BMP Number	BMP Title	BMP Description
REVEG-1	Seeding	Sites where maintenance activities result in exposed soil will be stabilized to prevent erosion. Disturbed areas shall be seeded with native seed as soon as is appropriate after maintenance activities are complete. An erosion control seed mix may be applied to exposed soils, and down to the ordinary high water mark (OHWM). 1. The seed mix should consist of California native grasses (e.g., *Hordeum brachyantherum*, *Elymus glaucus*, and *Vulpia microstachyes*) or annual, sterile seed mix. 2. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable, or have other appropriate erosion control measures in place (GEN-20).
REVEG-2	Planting Material	Revegetation and replacement plantings will consist of locally collected native species. Species selection will be based on surveys of natural areas on the same creek that have a similar ecological setting and/or as appropriate for the site location.

F. SECTION F – Management of Animal Conflict BMPs

Methods of animal management included in the SMP are avoidance, biological controls, physical alterations, habitat alterations, and lethal controls. Of all these methods, implementation of lethal controls has the highest potential for environmental and biological impacts. Therefore, the animal management BMPs provided in this section focus on lethal controls. The application area for lethal controls will be identified during the annual planning process (see the Biological Resource Planning BMPs) and guided as directed by wildlife biologists. Species habitat areas are defined by the District's GIS species mapping, updated CNDDB and known local biological information and are included in the SMP Update Subsequent EIR.

F. SECTION F - Management of Animal Conflict BMPs Cont'd

BMP Number	BMP Title	BMP Description
ANI-1	Avoid Redistribution of Rodenticides	Carcass surveys will be conducted periodically when acute poisons and first generation anticoagulants are used. The frequency of the carcass surveys will be specific to the type of rodenticide used, to minimize secondary poisoning impacts: • Acute toxins – Daily carcass surveys, beginning the first day after application until the end of the baiting period for acute toxins used above-ground. • Anticoagulants - Within 7 days of installation of first generation anticoagulant bait, and weekly thereafter. Anytime a carcass is found, daily carcass surveys will begin for as long as carcasses are found until no carcasses are found during a daily survey. Once no carcasses are found, carcass surveys will return to the weekly carcass survey timeline maximum from the date of initial installation of an anticoagulant bait station. To verify that the frequency of carcass surveys is adequate, a biologist will conduct daily carcass surveys 2 times per year over one baiting cycle. Based on the results of these surveys, the timing of carcass surveys will be adjusted if necessary. Any spilled bait will be cleaned up immediately.
ANI-2	Prevent Harm to the Salt Marsh Harvest Mouse and California Clapper Rail	1. No rodenticides or fumigants will be used within the range of the SMHM or CCR as identified on District range maps. 2. Methods of rodent control within SMHM or CCR habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any SMHM that inadvertently enter the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.
ANI-3	Burrowing Owl, Bald Eagle and Golden Eagle Buffer Zone	Per the California Department of Fish and Wildlife's 2008 *Guidance for Burrowing Owl Conservation*, a 656-yard buffer will be established around known burrowing owl locations where no rodenticides or fumigants (including smoke bombs) will be used. A 0.5-mile buffer will be established around known bald eagle and golden eagle nesting locations where no rodenticides will be used.
ANI-4	Animal Control in Sensitive Amphibian Habitat	1. Fumigants will not be used within the habitat areas of special status amphibians. 2. The use of bait stations within the potential habitat areas of California red-legged frog, California tiger salamander, or foothill yellow-legged frog will be limited to bait stations specifically designed to prevent entry by these species. 3. Any live traps will allow California red-legged frogs, California tiger salamanders, or foothill yellow-legged frogs to safely exit (e.g., by having openings measuring no smaller than 2 inches by 1 inch).
ANI-5	Slurry Mixture near Waterways	All slurry type mixes used to fill rodent burrows will be prevented from entering any waterway by using appropriate erosion control methods and according to the manufacturer's specifications. If the creek bed is dry or has been dewatered, any material that has entered the channel will be removed.
ANI-6	Species requiring depredation permit	Animal Conflict Management will not include lethal control of species listed in California F&G Code Section 4181 inlcuding beaver and gray squirrel without first obtaining a depredation permit.

G. SECTION G – Use of Pesticides

Pesticides may be used for vegetation management or control of animal damage.

BMP Number	BMP Title	BMP Description
HM-4	Posting and Notification for Pesticide Use	Posting of areas where pesticides are used will be performed in compliance with District Policy Ad-8.2 Pesticide Use as follows: 1. Posting will be performed in compliance with the label requirements of the product being applied. 2. In addition, posting will be provided for any products applied in areas used by the public for recreational purposes, or those areas readily accessible to the public, regardless of whether the label requires such notification. In doing this, the District ensures that exposure risk is minimized further by adopting practices that go beyond the product label requirements. (The posting method may be modified to avoid destruction of bait stations or scattering of rodenticide.) 3. These postings will notify staff and the general public of the date and time of application, the product's active ingredients, and common name, and the time of allowable re-entry into the treated area. 4. Signs will not be removed until after the end of the specified re-entry interval. 5. Right-to-know literature on the product will be made available to anyone in the area during the re-entry period. 6. A District staff contact phone number will be posted on the sign, including a cellular phone number. 7. Notification of pesticide activities will be made as required by law. Also, the District will maintain records of neighbors with specific needs relative to notification before treatment of an adjacent area so that such needs are met.

Source: Data compiled by Horizon Water and Environment in 2011

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

April 7, 2015
CIWQS Place No. 757384 (SG)

San Francisco Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

Attention: Len Materman
Email: Len@sfcjpa.org

Subject: Conditional Water Quality Certification for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, Cities of Palo Alto and East Palo Alto, Santa Clara and San Mateo Counties

Dear Mr. Materman:

Regional Water Board staff has reviewed the application materials submitted by the San Francisquito Creek Joint Powers Authority (JPA) for the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project (Project) located in Santa Clara and San Mateo counties. The Santa Clara Valley Water District (District) is the Project's local sponsor. The JPA has applied to the U.S. Army Corps of Engineers (Corps) Regulatory Branch for an Individual Permit to: (1) discharge dredge and fill materials to waters of the United States pursuant to section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344); and (2) place structures and work in navigable waters pursuant to section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 320.2). We have determined that the Project, as proposed, will not violate State water quality standards and accordingly issue a conditional CWA section 401 water quality certification (Certification) for the Project.

The JPA submitted a certification application for the Project dated March 12, 2013. On February 27, 2014, the Regional Water Board denied the application without prejudice based on insufficient information on which to issue certification. The JPA resubmitted the application on July 31, 2014. The Regional Water Board issued a second incomplete application letter requesting additional information on August 29, 2014. The JPA provided supplemental information, which was received October 10 and October 17, 2014, upon which the Regional Water Board determined the application to be complete. All referenced materials submitted by the JPA are collectively referred to as the Application.

As of the date of this Certification, aspects of the Project remain under discussion with other government agencies, and, as such, the Project design may be subject to change. Also as a result, the JPA has in some cases submitted application information that is not final or has not yet submitted information necessary for the Regional Water Board to accept final plans (e.g., for mitigation for impacts to creeks and wetlands, coffer dam construction and removal, creek dewatering, groundwater

management, utility line construction and abandonment, placement and stabilization of fill in levees and on wetlands, beneficial reuse of excavated sediment, and disposal of excess sediment/cut). Where that is the case, this Certification requires submittal of final plans, acceptable to the Regional Water Board Executive Officer (Executive Officer), prior to commencement of Project construction or commencement of construction for the relevant Project component.

A. Project Location and Site Description

The Project is located on San Francisquito Creek (Creek) along a 1.5-mile stretch of the Creek from San Francisco Bay to East Bayshore Road, a frontage road to U.S. Highway 101. This stretch of the Creek is a managed earthen flood control channel. The Project is designed to increase the flow conveyance capacity of the creek channel for a combination of the 100-year flow event, the 100-year high tide event, and 26 inches of sea level rise.

This stretch of the Creek is on the boundary between Santa Clara and San Mateo counties. The Project area is divided into three reaches. A reach is a continuous part of the Creek between two specified points. The lower reach is from San Francisco Bay to Friendship Bridge, the middle reach from Friendship Bridge to Daphne Way, and the upper reach from Daphne Way to East Bayshore Road. This Certification refers to the Project area south of the creek channel centerline as the "south bank" and the area north of the creek channel centerline as the "north bank." The JPA refers to these areas as left and right banks, respectively, in its design plans and other documents. From the JPA naming scheme, the station numbers along the Creek and levees are labeled "L-line" for station locations south of the creek channel, "R-line" for station locations north of the creek channel, and "C-line" for the creek channel centerline stations.

The City of Palo Alto, within Santa Clara County, borders the south bank in all three reaches. The Palo Alto Municipal Golf Course borders the majority of the south bank, with the Palo Alto airport bordering a 600-foot stretch of the eastern-most section of the south bank. The north bank of the Project area is bordered by San Mateo County, with the Faber Tract Marsh in the lower reach and the City of East Palo Alto in the middle and upper reach borders.

The Creek provides important migration, spawning, and juvenile rearing habitat for winter-run steelhead. In addition, green sturgeon and longfin smelt are known to inhabit the South Bay and its tidally-influenced tributaries. The Faber Tract and the Laumeister Tract (north of the Faber Tract) provide ideal habitat for special status species including Ridgway's (formerly California clapper) rail, black rail, salt marsh harvest mouse, and salt marsh wandering shrew. Additionally, suitable habitat occurs along the creek channel, and these species have the potential to occur in the Project area.

B. Project Purpose

The purpose of the Project is to improve the Creek's channel capacity to accommodate the 100-year flood flow event for Creek flows coupled with the influence of San Francisco Bay tides, including projected sea level rise, from the downstream face of East Bayshore Road down to the Bay. It would reduce local fluvial flood risks in the Project area during storm events, provide the capacity needed for future upstream improvements, and increase and improve ecological habitat and recreational opportunities.

C. Project Description

The JPA proposes to increase the Creek's flood flow capacity to contain the one percent flood flow event through the following activities:

1. **Excavate in-channel sediments:** About 175,890 cubic yards of sediment will be removed from along 5,775 linear feet of the creek channel and associated channel expansion area to increase creek capacity and to maximize conveyance. In-channel sediment will not be reused because it is unlikely to provide suitable material for levee embankment use.

2. **Rebuild and relocate levees:** The JPA will widen the creek channel by rebuilding the East Palo Alto Levee (Northern Levee) and relocating the Palo Alto Levee/Palo Alto Municipal Golf Course Levee (Southern Levee), which will reduce tidal influences in the Creek and increase channel capacity.

   a. *Northern Levee:* About 3,296 linear feet (station (STA) 30+00 to STA 55+00) of the levee will be raised to increase channel capacity. As shown in the draft 100 percent design plans, sheets X-7 through X-14, the elevation increase varies by up to 4 feet based on existing conditions and the necessary modifications along the levee. Approximately 55,000 cubic yards of fill will be used to increase the height of the levee.

   b. *Southern Levee:* About 2,728 linear feet (STA 23+00 to STA 54+00) will be relocated up to approximately 200 feet into the Palo Alto Municipal Golf Course and raised to increase channel capacity. The elevation increase varies by up to 4 feet based on existing conditions and the necessary modifications at each station as shown in sheets X-6 through X-14 in the draft 100 percent design plans. Approximately 84,700 cubic yards of fill will be used for the levee relocation.

3. **Construct levee maintenance roads:** The JPA will build about 10,176 linear feet of maintenance roads on the newly raised and relocated levees. The maintenance roads will also serve as pedestrian/bicycle trails. The roads will be up to 16 feet wide and paved with crushed granite, except for a section on the south bank from stations L-line 28+00 through 54+00 that will be paved with asphalt as part of the Bay Trail. The Bay Trail section will have up to 41,600 square feet of asphalt (2,600 linear feet, up to 16 feet wide), as shown in sheet G-3 in the Application's supplemental figures. This Certification requires the JPA to submit a Post-Construction Stormwater Management Plan to describe how stormwater runoff from the paved Bay Trail surface will be diverted away from the Creek and other waters of the State, consistent with the Regional Water Board's Municipal Regional Stormwater Permit (NPDES Permit No. CAS612008; Order No. R2-2009-0074, as amended by Order No. R2-2011-0083, and as may be subsequently amended or reissued) requirements for post-construction stormwater management for new or replacement impervious surfaces.

4. **Raise and grade the Faber Tract Levee:** The JPA will raise and grade a portion of the currently unmaintained levee between the Creek and the Faber Tract (Faber Tract Levee) closer to its original design elevation to stabilize the levee. The new levee design will allow the Creek to periodically flood the marsh to mimic the current discharge pattern.

   Fill will be added to the Faber Tract Levee along 350 linear feet (0.77 acres) (STA 21+00 to STA 24+00) to reduce concerns regarding levee erosion and the potential for mass wasting leading to levee failure. In addition, the JPA will raise the lowest levee crest elevation downstream of the Friendship Bridge from a minimum elevation of 11 feet to 13 feet and incorporate a 6H:1V levee side slope on the side sloping into the Faber Tract. The 6H:1V levee side slope will help protect the levee toe from potential erosion due to flow overtopping along a 400 foot distance as the levee transitions upstream to a higher elevation closer to the Friendship Bridge. The new area of impact from the existing levee toe to the proposed levee toe is approximately 0.42 acres (18,383 square

feet). Approximately 12,000 cubic yards of clean imported fill will be used to increase the height of the levee.

5. **Degrade Bay Levee:** The JPA will degrade a section of the levee north of the Creek and east of the Faber Tract (Bay Levee) to restore the Creek-Bay interface in the marsh area east of the Faber Tract and to reduce water surface elevations in the Creek between Friendship Bridge and the Bay. About 2,820 cubic yards of sediment/soil will be removed along 600 linear feet (0.73 acres) of the Bay Levee (STA 3+50 to 9+50) downstream of the Faber Tract in a marsh area that is already subject to daily tides from the Bay. This will further connect the marsh to the Creek, allow the channel to expand out over the marsh area at a point further upstream than under existing conditions, and decrease the water surface elevation during large flood events.

6. **Construct floodwalls:** The JPA will construct floodwalls in the upper reach to increase capacity and maintain consistency with the California Department of Transportation's (Caltrans) enlargement of the U.S. 101/East Bayshore Road Bridge over the Creek (Caltrans facility) as follows:

   a. *East Palo Alto Floodwall:* Concrete floodwalls up to 4 feet above top of bank (up to 13 feet from channel bottom) will be constructed along approximately 2,350 linear feet (STA 52+00 to STA 77+50) of the Northern Levee; and

   b. *Palo Alto Floodwall:* Concrete floodwalls up to 4 feet above top of bank (up to 13 feet from channel bottom) will be constructed along approximately 2,879 linear feet (STA 51+00 to STA 77+50) of the Southern Levee.

7. **Install rock slope protection:** The JPA will install approximately 4,735 linear feet (5.86 acres) of rock-slope levee protection (RSP) at various locations along the length of the Project to protect the levee against erosion and to stabilize the floodwalls. The RSP on the levees will be installed from the toe of the levee up the bank approximately 10 to 15 feet.

8. **Construct Friendship Bridge boardwalk extension:** The JPA will construct a boardwalk extension to the Friendship Bridge. The existing Friendship Bridge will be retained and a 202-linear foot boardwalk will be constructed from the retained eastern footing of the bridge and across the newly-expanded Creek to connect with the realigned Southern Levee. The boardwalk will be the same width as the Friendship Bridge (140 feet long and 10 feet wide), constructed of timber deck and concrete piles, and require twenty 18-inch diameter concrete piles. The elevation of the low mark of the boardwalk will be set above the highest anticipated flood elevation, with the lowest point of the bridge a minimum of 5 feet above the marsh plain terrace beneath it. This Certification contains a condition prohibiting the use of chemically-treated wood on top of and inboard of the levees (i.e., in a location where it could discharge to State waters or otherwise impact beneficial uses, which are discussed in Finding D below), which applies to the boardwalk extension.

9. **Relocate portion of channel:** About 1,100 linear feet of the channel (C-line stations 43+00 to 54+00, as shown in the draft 100 percent design plans, will be relocated up to 80 feet to the east due to its existing close proximity to the proposed inboard levee toe. The final low flow channel alignment will be roughly equidistant between the Northern Levee and the new Southern Levee location and will have the same elevation as the existing channel elevation.

10. **Relocate or remove utilities:** The JPA will remove, abandon, or replace several utility components for electricity, gas, water, sanitary sewer, and stormwater runoff present within the Project right-of-way. This Certification requires, prior to the beginning of work, the JPA to prepare and submit an acceptable utility relocation plan that identifies, for example, appropriate measures to prevent impacts during horizontal directional drilling, proposed disposal locations or methods for excess sediment, elevations of live and abandoned utilities, and related information. In addition, the plan shall document the locations of any utilities abandoned in place.

    a. *Electricity and gas systems.* The JPA will coordinate with Pacific Gas and Electric (PG&E) to perform the following electricity and gas transmission system work before creek channel and levee construction work begins:

        i. *Electricity transmission system.* PG&E will realign the existing electricity transmission system that currently crosses over the Creek from L-line STA 52+00 (south bank) to R-line STA 48+00 (north bank). The new line will be shifted 250 feet south and cross over the Creek at L-line STA 51+00 (south bank) to R-line STA 52+00 on the north bank. The Project will include removing a pole from both banks; replacing two existing poles, one on each bank; and adding two new poles on the north bank for the new line. In addition, PG&E will remove wires from six poles that run north to south along the far north bank right-of-way between R-line STA 30+00 to STA 56+00. Of these six poles, one will be raised by 15 feet. The realigned section will connect to the southern-most pole in this series. Any replacement poles will be made of light-duty steel.

        PG&E will replace the foundation of an existing electric transmission tower located in the floodplain of the future channel alignment footprint at STA R-48+00, approximately 2,000 feet upstream of the Friendship Bridge. PG&E will demolish the existing foundation, build a temporary shoo-fly support, and build a permanent concrete foundation at the existing foundation site. The electricity tower on the old foundation will be lifted and placed onto the permanent concrete foundation with an area of 625 square feet. An access ramp will be built on the inboard side of the levee for this tower. This Certification includes a condition for the JPA to submit a utility plan that shall include elevations for all the new utilities.

        ii. *Gas transmission system.* PG&E will abandon in place 3,000 linear feet of the gas transmission line located in the Project right-of-way, of which about 1,350 linear feet is in the new channel realignment footprint. PG&E estimates that the old line is 4.7 feet below grade beneath the creek channel and will confirm the elevation during excavation activities. This Certification includes a condition requiring the JPA to remove the section of the existing gas transmission pipeline extending beneath the creek channel, floodplain, and levees, which is approximately 1,350 linear feet from the inboard top-of-bank of the Southern Levee to the inboard top-of-bank of the Northern Levee.

        The new gas line will be aligned south to north in the golf course, then will cross east to west through the Project right-of-way upstream of the Friendship Bridge from L-line STA 32+00 (south bank) to R-line STA 34+00 (north bank), and will extend west to a connection in East Palo Alto. The pipeline tunnel under the Creek will be bored by horizontal direction drilling at 25 feet below ground. The other portions of the pipeline will be installed by cut and fill at a minimum of 4 feet below ground surface.

        PG&E will place three trench spoils piles equidistant from south to north along the south bank. Each pile is planned to be 100 feet by 100 feet. On the north bank, PG&E will place

another 100 foot by 100 foot spoils pile next to the borehole site. The suitability of the spoils for reuse to cover the new pipeline will be determined after they are appropriately assessed during the utility activities, and any unused spoils will be hauled from the site and appropriately disposed of at an approved upland facility.

b. *Sanitary sewer.* The JPA will realign a sanitary sewer line that currently crosses the Creek at the Friendship Bridge. As proposed, this task will involve open trenching with a minimum depth below ground surface of 3.5 feet for the new line. The sanitary sewer line would be encased in armored steel where it crosses the Creek. The new alignment will cross the creek at L-line STA 27+50 (south bank) through the channel at C-line STA 29+90 to R-line STA 27+60 (north bank). This work would be concurrent with the levee construction work so will not have separate impacts to waters of the State. The JPA will remove about 960 linear feet of existing sanitary sewer line. This Certification includes a condition requiring the JPA to submit information demonstrating that the line cannot be constructed at a deeper depth below the creek channel bottom or otherwise that there is not a reasonably foreseeable chance that the line could constrain the creek channel in the future.

c. *Storm drains and stormwater outfall.* The JPA will remove various storm drain pipelines existing within the golf course that will be under the future Southern Levee and widened creek channel post project. This work will be concurrent with the levee and channel work so will not have separate impacts to waters of the State. Caltrans plans to remove an abandoned 96-inch stormwater outlet within the Project area adjacent to the east border of the Project area (east of STA L-76; sheet C-47), as shown in the 100 percent design plans, sheet C-47, before the JPA begins Southern Levee construction activities.

11. **Dewatering:** The full length of the Project from Highway 101 to the mouth of the creek will be dewatered as discussed in the JPA's *Temporary Dewatering Plan* (October 14, 2014 draft). The Regional Water Board requires a Dewatering Plan to address diversion of surface water and management of groundwater seepage in construction areas.

    The Dewatering Plan states that at the end of each construction season, the JPA will remove all cofferdams, re-water the dewatered creek areas, and restore the creek habitat. The JPA will implement best management practices (BMPs) to avoid and minimize impacts to water quality and will analyze and monitor the water being returned to the creek channel to ensure the effectiveness of the BMPs.

    This Certification includes a condition requiring the JPA to revise the Dewatering Plan to address both surface water and groundwater management to ensure the proposed discharges meet applicable water quality objectives. The revised Dewatering Plan shall include a Surface Water Diversion Plan that describes, for example, the JPA's procedures for placing and removing coffer dams with minimal impacts to the Creek. The revised Dewatering Plan shall also include a Groundwater Management Plan that describes the BMPs that will be implemented to ensure groundwater flows are appropriately pumped, contained, and analyzed such that they meet applicable water quality objectives before discharging the flow back into the Creek downstream of the lower coffer dam.

12. **Sediment disposal and fill import:** The JPA plans to excavate about 175,890 cubic yards of fill or sediment during the levee modification and channel widening activities. About 20 percent of this sediment will be hauled offsite. The JPA anticipates placing the other 80 percent of sediment in the adjacent golf course for use in a future golf course reconfiguration project being managed by the

City of Palo Alto. About 190,800 cubic yards of fill will be imported for use in raising levee elevations.

This Certification contains a condition for the JPA to characterize any sediment being hauled out of the Project area to determine the appropriately-permitted upland location for disposal or to determine if the sediment may be beneficially-reused for the Project or at another location. In addition, this Certification includes a condition for the JPA to characterize all imported fill material being used in the Project in accordance with the Dredged Material Management Office guidance document *Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region* (Corps Public Notice 01-01, or most current version) and the Regional Water Board May 2000 staff report, *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines*, or the most current revised version.

13. **Disposal of materials other than sediment or soil:** This Certification includes a condition for the JPA to dispose of any other waste materials in an appropriately-permitted upland location. This applies to materials such as, but not limited to, wooden utility poles, electric wires, and other utility components removed from the Project area.

14. **Staging, access, and haul routes:** The Project's staging, access, and haul routes are designated based on work on the north or south banks as follows:

    a. **North Bank**

        i. Site access and a construction staging area will be located at the end of O'Connor Street near the intersection with Daisy Lane in East Palo Alto. The haul route will be along O'Connor Street to Pulgas Avenue, East Bayshore Road, and Embarcadero Road to U.S. 101. This is the designated route for large vehicles, including dump trucks and flatbed trucks, in the City of East Palo Alto.

        ii. Site access and a construction staging area will be located at the end of Daphne Way at Jasmine Way in East Palo Alto. The haul route will be along Jasmine Way to Camelia Drive, Pulgas Avenue, East Bayshore Road, and Embarcadero Road to U.S. 101. Large vehicles, including but not limited to dump trucks and flatbed trucks, will be prohibited on Daphne Way and Jasmine Way. Further vehicle restrictions on Daphne Way and Jasmine Way may be required by the City of East Palo Alto and will be determined during development of the Project Traffic Plan.

        iii. Site access and a construction staging area will be located at the end of Verbena Drive at Abelia Way. The haul route will be along Verbena Drive to Camelia Drive, Pulgas Avenue, East Bayshore Road, and Embarcadero Road to U.S. 101. Large vehicles, including but not limited to dump trucks and flatbed trucks, will be prohibited on Verbena Drive and Camelia Drive. Further vehicle restrictions on Verbena Drive and Camelia Drive may be required by the City of East Palo Alto and will be determined during development of the Project Traffic Plan.

    b. **South Bank**

        i. Site access will be at the Palo Alto Pump Station, accessed from East Bayshore Road. The haul route will be along East Bayshore Road to Embarcadero Road and U.S. 101.

        ii. Site access will be at Geng Road between the Baylands Athletic Center and the Golf Course. The haul route will be along Geng Road to Embarcadero Road and U.S. 101.

D. Impacts

The San Francisco Bay Basin Water Quality Control Plan (Basin Plan) defines the beneficial uses of waters of the State. The Project will impact the Creek. The Basin Plan assigns the following beneficial uses to the Creek: Cold Freshwater Habitat (COLD), Fish Migration (MIGR), Fish Spawning (SPWN), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Water Contact Recreation (REC-1), and Noncontact Water Recreation (REC-2).

The Project will permanently fill 9.41 acres and temporarily disturb approximately 3.86 acres of waters of the State due to Project activities. These estimated Project impacts are itemized by habitat type in Table 1 below. This Certification includes a condition requiring the JPA to prepare a final mitigation and monitoring plan (MMP) that describes how the JPA will mitigate for permanent and temporary Project impacts.

Table 1 - Impacted Areas by Habitat Type

Habitats	Purpose of Impact	Permanent Impacts (acres)		Temporary Impacts (acres)		Total (acres)
		Area	Subtotal	Area	Subtotal	
Diked Marsh	South levee alignment; channel widening	2.86	2.88	0.02	0.21	**3.09**
	North side loss at base of improved levee	0.02		0.19		
Freshwater Pond	South levee construction; channel realignment	1.13	1.13			**1.13**
Freshwater Marsh	South levee construction; channel realignment	0.33	0.33			**0.33**
Tidal Salt Marsh	Sediment removal in creek channel	2.82	3.18	0.84	1.33	**4.51**
	Fill in low spot in Faber Tract Levee	0.35		0.16		
	Bay Levee degradation	0.01		0.33		
Tidal Channel/ Bay Waters	Channel realignment	0.9	0.9	2.32	2.32	**3.12**
Riparian	Channel widening; marsh plain creation	0.5	0.5			**0.5**
Rock Slope Protection	Project-wide stability for floodwalls, levees, and banks	0.49	0.49			**0.49**
TOTAL			**9.41**		**3.86**	**13.27**

The following list shows the linear feet of impacts from Project activities, where (P) is for permanent impact and (T) is for temporary impact:

- 5,775 linear feet of sediment excavation (T)
- 3,296 linear feet of Northern Levee (P)
- 2,728 linear feet of Southern Levee (P)
- 350 linear feet of Faber Tract Levee (P)
- 600 linear feet of Bay Levee (P)
- 1,100 linear feet of tidal channel relocation (P)

- 543 linear feet of rock slope protection (P)

E. Mitigation

This Certification requires the JPA to restore permanently-affected riparian and wetland/marsh habitat and other waters of the State onsite at a minimum mitigation-to-effect ratio of 2:1 and to restore temporarily-affected habitat at a minimum mitigation-to-effect ratio of 1:1 to ensure the Project results in no net loss and a long-term net gain in wetland area, function, and value. The ratio of 2:1 for permanent impacts and 1:1 for temporary impacts will apply as long as onsite construction of a mitigation activity is completed within 12 months of the date when the associated impact first occurs. This Certification requires the JPA to complete an additional 10 percent mitigation per year, on an areal basis, for the portion of mitigation not completed within the required 12-month period. This Certification includes a condition for the JPA to maintain a schedule to track actual Project activity start dates, and the start dates of impacts to waters of the State and the associated mitigations.

The JPA will mitigate for permanent and temporary Project impacts in accordance with the final MMP. The JPA submitted a draft MMP to the Regional Water Board, the Corps, the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) in October 2014.

F. Maintenance

The JPA delegated operations and maintenance within the Project area to the District and the City of East Palo Alto on November 20, 2014 (JPA Resolution 14.11.20). The JPA, in consultation with the District and the cities of East Palo Alto and Palo Alto, is considering also adding the City of Palo Alto to the delegation agreement, although the City of Palo Alto is already within the District's jurisdiction. Maintenance will be conducted in accordance with the San Francisquito Creek Flood Reduction, Ecosystems Restoration, and Recreation Project, San Francisco Bay to Highway 101, Operation & Maintenance Manual (October 2014; final document in progress) (O&M Manual) and be consistent with the District's Stream Maintenance Program. The revised O&M Manual shall cover site-specific work requirements within the Project area such as vegetation management; and repair of animal damage to levees, erosion sites, flood damage, and access and maintenance roads. This Certification includes a condition for the JPA to submit, or cause the operations and maintenance-delegated entities to submit, a revised O&M Manual.

G. California Environmental Quality Act Compliance

On October 25, 2012, the JPA, as lead agency, certified an Environmental Impact Report (EIR) for the Project in accordance with the California Environmental Quality Act (CEQA) (JPA Resolution Number 12-10-25A). The JPA submitted an endorsed Notice of Determination, dated July 25, 2013, indicating that the JPA would carry out or approve the Project (JPA Resolution Number 13-07-25) in compliance with CEQA (Project State Clearinghouse Number 2010092048). The Regional Water Board, as a responsible agency under CEQA, has considered the EIR and finds that it appropriately addressed the Project's reasonably foreseeable potential environmental impacts.

H. EcoAtlas

It has been determined through regional, State, and national studies that tracking of mitigation/ restoration projects must be improved to better assess the performance of these projects, following monitoring periods that last several years. In addition, to effectively carry out the State's Wetlands Conservation Policy of no net loss to wetlands, the State needs to closely track both wetland losses and

mitigation/restoration project success. Therefore, this Certification requires that the JPA use the California Wetlands Form to provide Project information related to impacts and mitigation/restoration measures. An electronic copy of the form and instructions can be downloaded at: http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml. Project information concerning impacts and mitigation/restoration will be made available at the web link: http://www.ecoatlas.org/regions/ecoregion/bay-delta/projects.

Certification and General Waste Discharge Requirements: I hereby issue an order certifying that any discharge from the Project will comply with the applicable provisions of CWA sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003 - 0017 - DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification," which requires compliance with all conditions of this Certification. The following conditions are associated with this Certification:

1. The JPA shall construct the Project in conformance with the Project description provided in the Application. Any changes to Project design must receive Executive Officer approval before the changes are implemented.

2. All technical reports, plans, and related information required by this Certification shall be submitted acceptable to the Executive Officer. Any changes to plans accepted by the Executive Officer must be accepted in writing prior to implementation of the change(s).

3. Construction shall not commence on any phase of the Project until all required documents, reports, plans, and studies required in this Certification associated with that phase of the Project have been submitted to the Executive Officer or the Regional Water Board and found acceptable by the Executive Officer or the Regional Water Board.

4. During construction activities, the JPA shall minimize disturbance or removal of vegetation in accordance with the Application's Box 16: Avoidance of Impacts. The JPA shall stabilize the Project area by incorporating appropriate BMPs, including the successful reestablishment of native vegetation, to enhance wildlife habitat values and to prevent and control erosion and sedimentation.

5. No debris, soil, chemically-treated wood, cement, concrete, or washings thereof, oil or other petroleum products, or any other unauthorized construction related materials or wastes shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into waters of the State. When operations are completed, the JPA shall remove any excess material from the work area and any areas adjacent to the work area where such material may be washed into waters of the State.

6. The use of chemically-treated wood on or anywhere between the Project's levees, such as for boardwalks, utility line supports, and signposts, is prohibited, unless the JPA submits a report acceptable to the Executive Officer prior to such use demonstrating that no feasible alternative exists. Additionally, to avoid the leaching of copper and other chemicals toxic to aquatic species into the water column and sediment, only piles consisting of inert materials shall be installed. These materials may include steel, concrete, untreated wood, composite, or reinforced plastic. The use of marine paints containing copper and/or tributyltin is prohibited, without exception.

7. The JPA shall not operate any equipment in stream channels or other waters where there is flowing or standing water. No fueling, cleaning, or maintenance of vehicles or equipment shall take place within any areas where an accidental discharge to waters of the State may occur.

8. All work performed within waters of the State shall be completed in a manner that minimizes impacts to water quality, beneficial uses, and wetland and riparian habitat along the Creek and the Bay.

9. This Certification does not allow for the take, or incidental take, of any special status species. The JPA shall use the protocols specified by CDFW, USFWS, NMFS, and the Corps to ensure that Project activities do not impact the beneficial uses of COLD, MIGR, WARM, WILD, and the Preservation of Rare and Endangered Species.

10. The JPA shall adhere to the Terms and Conditions and the Reasonable and Prudent Measures in the most current *Endangered Species Consultation* issued for the Project by NMFS and the *Conservation Recommendations in the Essential Fish Habitat Consultation* also issued for the Project by NMFS.

11. The JPA shall adhere to the Terms and Conditions and the Reasonable and Prudent Measures in the most current *Biological Opinion* issued for the Project by USFWS.

12. Project construction activities shall be restricted to the time periods during the year and conditions allowed by the Corps, BCDC, USFWS, NMFS, and CDFW as specified in their permits, biological opinions, and agreements. Temporary extensions of the specified work periods may be granted upon receipt of written authorization from the applicable agencies and the Executive Officer.

13. Concrete used in the Project shall be allowed to completely cure (a minimum of 28 days) or be treated with a CDFW-approved sealant before it comes into contact with flowing water.

14. **Dewatering Plan.** Not later than 30 days prior to the commencement of dewatering activities, as discussed in Finding C.11, the JPA shall submit and implement a Dewatering Plan acceptable to the Executive Officer. The Dewatering Plan shall describe how the JPA will implement dewatering and rewatering activities for each creek reach in a manner that will be protective of the Creek's water quality and beneficial uses and will avoid exceedances of the applicable receiving water quality objectives including, but not limited to, turbidity, pH, temperature, dissolved sulfide, and dissolved oxygen. The Dewatering Plan shall include plans (i.e., diagrams or drawings; maps showing locations of activities and structure; and other design details as appropriate) for and appropriate discussion of all dewatering system components, such as diversion pipes, water storage, water quality monitoring, and discharge methods. In addition, the Dewatering Plan shall identify an appropriate discharge point for the proposed dewatering flows downstream of the lower coffer dam. The Dewatering Plan shall include, at a minimum, the following specific plans:

    a. *Surface Water Management Plan*. The JPA shall prepare and implement a Surface Water Diversion Plan as part of the Dewatering Plan. In addition to the general dewatering requirements discussed above, the Surface Water Diversion Plan shall include:

        i. procedures and methods for maintaining natural flow upstream and downstream of the Project area; for avoiding and preventing sedimentation and erosion upstream or downstream of the Project area; and for achieving discharge and receiving water quality objectives;

ii. methods for installing, maintaining, inspecting, and removing coffer dams with minimal or no impacts to the Creek. In addition, the plan shall describe how the Creek will be restored when coffer dams are removed after each construction season; and

iii. procedures for diverting the flow from two municipal storm drain pump stations that normally discharge into the Project area.

b. *Groundwater Management Plan.* The JPA shall prepare and implement a Groundwater Management Plan as part of the Dewatering Plan. At a minimum, the Groundwater Management Plan shall include detailed descriptions of the procedures for pumping, diverting, containing, and analyzing groundwater that upwells from trenching and other grading and excavation activities. In addition, the plan shall include:

i. a sketch of the approximate excavation and grading locations anticipated to generate groundwater needing to be managed during the construction activity;

ii. the purpose of each excavation activity where groundwater will be managed;

iii. anticipated depth and length of each excavation area;

iv. plans for containing and monitoring groundwater flow before discharging it to the Creek downstream of the lower coffer dam; and

v. identification of an appropriate discharge point for the proposed dewatering flows downstream of the lower coffer dam.

15. Creek dewatering discharges, accumulated groundwater or stormwater removed during dewatering of excavations, and diverted creek and stormwater flows shall not be discharged to waters of the State without meeting the following discharge and receiving water limitations:

a. Discharge pH - the instantaneous discharge pH shall be in the range of 6.5 to 8.5 and shall not vary from ambient pH by more than 0.5 pH units.

b. Discharge Dissolved Oxygen - the discharge dissolved oxygen concentration shall be no less than 5.0 milligrams per liter (mg/L) as an hourly average for discharging into tidal water and 7.0 mg/L (hourly average) for discharging into non-tidal receiving waters.

c. Discharge Dissolved Sulfide shall not be greater than 0.1 mg/L.

d. Receiving Water Turbidity - the receiving water turbidity measured as nephelometric turbidity units (NTU) shall not be greater than 10 percent of natural conditions in areas where natural turbidity is greater than 50 NTU (daily average). All Project discharge plans shall identify an acceptable location or locations at which to measure background turbidity. The JPA shall monitor receiving water and discharge turbidity at least one time every 8 hours on days when discharges from excavations or any other dewatering processes may occur.

e. Nutrients - the receiving waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

f. There shall be no violation of any water quality standard for receiving waters adopted by the Regional Water Board or the State Water Resources Control Board.

16. No later than 60 days before the beginning of work, the JPA shall prepare and submit a utility relocation plan, acceptable to the Executive Officer, that identifies, at a minimum, appropriate measures to prevent impacts during horizontal directional drilling, elevations of live and abandoned utilities, proposed disposal locations or methods for excess sediment, proposed sediment reuse, and related information. In addition, the plan shall document the locations of any utilities abandoned in place.

17. No later than 60 days prior to commencing any drilling activity, the JPA shall submit boring plans acceptable to the Executive Officer. At a minimum, the boring plans shall include: a sketch of the approximate locations of drill entry and exit points; the proposed depth of bore(s) and a description of streambed conditions that supports the proposed depth of the bore; the approximate length of the proposed bores; type and size of boring equipment to be used; the estimated time to complete the bore; a list of lubricants and muds to be used; the name of the contractor and cell phone numbers of its construction supervisor and monitor; name of the environmental and biological monitor; site-specific monitoring conditions; monitoring protocols; and a containment and cleanup plan in the event of a discharge of drilling muds or other materials to a receiving water or to a location where they could be discharged to a receiving water.

    a. The JPA shall monitor drill mud pressure and volume at all times during drilling to ensure that hydrofracture or other loss of drill muds has not occurred. In the event of a sudden loss in pressure or volume, the JPA shall take appropriate steps, including immediately halting the drilling operation, to ensure that drilling muds are not discharged to waters of the State.

    b. Drilling within 50 feet of the creek channel shall only be performed when it is possible to visually monitor the creek bed for any indications of hydrofracture within the creek channel. In the event of any visual indication of hydrofracture, the JPA shall take appropriate steps, including immediately halting the drilling operation, to ensure that drilling muds are not discharged to waters of the State.

    c. All drilling muds, slurries, oils, oil-contaminated water, and other waste materials removed from the bore hole or otherwise used during the Project shall be disposed of at a permitted landfill, another appropriately-permitted site, or at an upland site approved in advance by the Executive Officer.

18. No later than 60 days prior to commencing the proposed relocation of the sanitary sewer line, the JPA shall submit a technical report, acceptable to the Executive Officer, that identifies the depth below the channel at which the sanitary sewer line is to be relocated and demonstrates that the line cannot be constructed at a deeper depth below the creek channel bottom, or otherwise that there is not a reasonably foreseeable chance that the line could constrain the creek channel in the future.

19. No later than 60 days prior to commencing the proposed abandonment of the PG&E gas transmission line the JPA shall submit a technical report, acceptable to the Executive Officer, that includes plans to remove the section of the PG&E gas pipeline to be abandoned that runs beneath the Project's creek channel from the inboard top-of-bank of the Southern Levee to the inboard top-of-bank of the Northern Levee. The JPA shall complete the utility line relocations and removals, or cause them to be completed, consistent with the accepted report.

20. Prior to placing any imported fill material at the Project area, including all placement of fill in areas below the top of bank, on levees, and at any other location where the fill is a discharge to or has the potential to discharge to the Creek or other waters of the State, the JPA shall submit a technical

report, acceptable to the Executive Officer, that the chemical concentrations in the imported fill soil are in compliance with the protocols specified in the following documents:

a. The Dredged Material Management Office (DMMO) guidance document, *Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region* (Corps Public Notice 01-01, or most current version) (Inland Testing Manual) with the exception that the water column bioassay simulating in-bay unconfined aquatic disposal shall be replaced with the modified effluent elutriate test, as described in Appendix B of the Inland Testing Manual, for both water column toxicity and chemistry (DMMO suite of metals only); and,

b. The Regional Water Board May 2000 staff report, *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines*, or the most current revised version. Regional Water Board staff shall review and approve data characterizing the quality of all material proposed for use as fill prior to placement of fill at any of the levee, marsh, or channel areas at the Project site. Modifications to these procedures may be approved on a case-by-case basis, pending the JPA's ability to demonstrate that the imported fill material is unlikely to adversely impact beneficial uses.

21. Prior to reusing any sediment spoils, the JPA shall characterize the material to ensure the chemical concentrations are in compliance with the guidance documents from the DMMO and Regional Water Board discussed in Condition 20. The JPA shall characterize any unused spoils to determine the appropriate disposal of the material at an approved upland facility. The JPA shall maintain hauling receipts for all sediment hauled from the Project area and make them available upon request by the Executive Officer.

22. The JPA shall obtain coverage under and comply with the statewide NPDES General Permit for Discharges of Stormwater Associated with Construction Activity (Order No. DWQ-2009-0009, as amended by Order Nos. 2010-0014-DWQ and 2012-006-DWQ) (Construction Stormwater Permit). As part of its compliance, the JPA shall:

a. Submit, no later than 30 days before starting Project construction activities, a Storm Water Pollution Prevention Plan (SWPPP), prepared consistent with the requirements of the Construction Stormwater Permit and acceptable to the Executive Officer;

b. Stabilize all exposed/disturbed areas within the Project area, including using effective erosion and sediment control BMPs throughout all phases of construction to prevent the discharge of sediment-laden runoff to waters of the State. At no time shall sediment-laden runoff be allowed to enter wetlands or other waters of the State. Erosion and sediment control BMPs shall be monitored before, during, and after each storm event. Repairs and improvements to erosion and sediment control BMPs shall be implemented as necessary to prevent erosion and the discharge of sediment to waters of the State;

c. Ensure that, prior to the start of the rainy season, disturbed areas of waters of the State and disturbed areas that drain to waters of the State are protected with correctly installed erosion control BMPs (e.g., jute, straw, coconut fiber erosion control fabric, coir logs, straw) and are revegetated with propagules (seeds, cuttings, divisions) of locally-collected native plants; and

d. Where areas of bare soil are exposed during the rainy season, use silt control measures where silt and/or earthen fill threaten to enter waters of the State. Silt control structures shall be monitored for effectiveness and shall be repaired or replaced as needed. Buildup of soil behind

silt fences shall be removed promptly, and any breaches or undermined areas repaired immediately.

e. Prepare and implement a spill prevention and control plan to prevent any fuel or other equipment-related materials in the Project area from being discharged into the creek channel.

23. No later than 60 days after receiving all necessary permits, biological opinions, agreements, and other agency approvals from the Corps, USFWS, NMFS, CDFW, the Regional Water Board, and the Bay Conservation and Development Commission (BCDC), the JPA shall submit a final MMP, acceptable to the Executive Officer, that incorporates all modifications to the draft MMP that were necessitated by comments on the October 2014 draft MMP by the Regional Water Board, the Corps, USFWS, NMFS, and CDFW, and by conditions of the Corps, CDFW, the Regional Water Board, and BCDC permits for the Project. In addition, the final MMP shall be submitted not less than 60 days prior to commencement of Project construction.

The JPA shall restore permanently-affected riparian and wetland/marsh habitat and other waters of the State onsite at a minimum mitigation-to-effect ratio of 2:1 and shall restore temporarily-affected habitat at a minimum mitigation-to-effect ratio of 1:1 to ensure the Project results in no net loss and a long-term net gain in wetland area, function, and value. The ratio of 2:1 for permanent impacts and 1:1 for temporary impacts shall apply as long as onsite construction of a mitigation activity is completed within 12 months of the date when the associated impact first occurs. Should completion of mitigation construction be delayed for any reason beyond those deadlines, the JPA shall complete an additional 10 percent mitigation per year, on an areal or linear foot basis, as appropriate, on or adjacent to the Project site, for the portion of mitigation not completed within 12 months of impact occurrence. If additional mitigation on or adjacent to the Project site is not available, the JPA shall propose mitigation at an alternate site, and higher ratios than those prescribed above may apply based on the location, function, and value of the alternate site.

The JPA shall maintain a Mitigation-Impact Calendar to track Project activities including the start dates of impacts to waters of the State and the associated mitigation activities. The JPA shall make the Mitigation-Impact Calendar available for review by the Executive Officer upon request.

Consistent with the California Wetlands Conservation Policy, the Executive Officer shall require amounts of mitigation greater than the 10 percent per year addition as the mitigation is further offsite or out-of-kind relative to Project impacts. The additional mitigation shall be proposed, acceptable to the Executive Officer, as part of a revised MMP. As of the date of this Certification, Table 2 lists the minimum required amounts of mitigation for proposed Project impacts:

Table 2 - Minimum Mitigation Area Required Based on Impacts[1]

Habitat Type	Permanent Impacts		Temporary Impacts	
	Area (acres)	Mitigation Area Required	Area (acres)	Mitigation Area Required
Diked Marsh	2.88	5.76	0.21	0.21
Freshwater Pond	1.13	2.26		
Freshwater Marsh	0.33	0.66		
Tidal Salt Marsh	3.18	6.36	1.33	1.33
Tidal Channel/ Bay Waters	0.9	1.8	2.32	2.32
Riparian	0.5	1.0		

Rock Slope Protection	0.49	0.98		
TOTAL	**9.41**	**18.82**	**3.86**	**3.86**

Notes:

[1] The minimum mitigation areas are based on a mitigation-to-effect ratio of 2:1 for permanent impacts and 1:1 for temporary impacts.

24. Mitigation areas shall be monitored for a minimum of five years, or longer if necessary, until the mitigation performance and success criteria as specified in the MMP required above have been achieved. The JPA shall submit Annual Reports, acceptable to the Executive Officer, no later than January 31 following each year in which mitigation is monitored, until the mitigation habitat has been successfully established. The Annual Reports shall describe each year's monitoring results, compare these results to the previous years' monitoring results and annual performance and success criteria, and describe progress made towards meeting the approved final success criteria. If annual performance criteria are not met, the Annual Reports shall identify remedial actions that will be implemented to achieve the mitigation success criteria, acceptable to the Executive Officer. The annual mitigation monitoring and reporting activities, and remedial actions as necessary, shall continue until the approved mitigation success criteria have been achieved. In the event it is determined that the proposed success criteria cannot be achieved in a mitigation area, an alternative mitigation plan shall be proposed acceptable to the Executive Officer to supplement and/or compensate for the failed mitigation.

25. Not later than 30 days after successfully completing all the Project's compensatory mitigation, including meeting all mitigation success criteria, the JPA shall submit, acceptable to the Executive Officer, a Notice of Mitigation Monitoring Completion to Susan Glendening at sglendening@waterboards.ca.gov, or to the current Regional Water Board staff member assigned to the Project. The Notice of Mitigation Monitoring Completion shall reference CIWQS place ID number 757384. The JPA shall submit a comprehensive final mitigation monitoring report, acceptable to the Executive Officer, with the Notice of Mitigation Monitoring Completion. The final mitigation monitoring report shall clearly document: (a) the compensatory mitigation habitat has met the performance criteria specified in the final MMP, and (b) the completion date for mitigation habitat monitoring.

26. The JPA shall use the standard California Wetlands Form to provide Project information describing impacts and restoration measures no later than 14 days from the date of the final MMP approved pursuant to Condition 23. An electronic copy of the form can be downloaded at: http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml. The completed form shall be submitted electronically to habitatdata@waterboards.ca.gov or shall be submitted as a hard copy to both (1) the Regional Water Board (see the address on the letterhead), to the attention of EcoAtlas, and (2) the San Francisco Estuary Institute, 4911 Central Avenue, Richmond, CA 94804, to the attention of EcoAtlas.

27. The JPA shall coordinate the development of final construction plans with the Corps, USFWS, NMFS, CDFW, and the Regional Water Board that are consistent with a joint approval of design features for all threatened and endangered species including Central Coast steelhead, salt mouse harvest mouse, and Ridgway's rail. The final plans shall include the approved MMP and specifications for marsh restoration. The marsh restoration specifications shall include elevations of marsh and floodplain terraces and associated plant species, channel stability treatments, and habitat treatments for each elevation as specified by a coordinated agreement among the above five agencies. Project construction shall be subject to a letter of final approval by the Executive Officer

contingent upon his/her receipt of letters from the above named agencies that the Project's final construction plans meet their joint requirements.

28. No later than 60 days prior to construction, JPA shall submit, acceptable to the Executive Officer, a Post-Construction Stormwater Management Plan to show how stormwater runoff from newly-created impervious surfaces will be diverted away from any water of the State in the Project area and not result in water quality impacts downgradient of the impervious surfaces. The Post-Construction Stormwater Management Plan shall be consistent with the Regional Water Board's Municipal Regional Stormwater Permit (Order No. R2-2009-0074, as amended by Order No. R2-2011-0083, and as may be subsequently amended or reissued) requirements for post-construction stormwater management for new or replacement impervious surfaces.

29. Should any levee or floodwall settle more than the design projections, the JPA shall expeditiously repair the structure(s) and provide repair reports describing elevation differences from the design and re-evaluate with the resource agencies how to address short term protection needs and long term structural improvements required to maintain public safety.

30. No later than 60 days after completing construction of the Project, the JPA shall submit an as-built report of the Project to the Regional Water Board, acceptable to the Executive Officer. The as-built report shall include revised Project plans showing the actual areas of temporary disturbance and permanent fill. The as-built report shall also describe fill removal activities undertaken to restore temporarily-impacted sites to their original condition. The as-built report shall be submitted either by email to staff or by uploading it to the Regional Water Board's FTP internet site. Instructions for uploading documents to the FTP internet site are available at http://www.waterboards.ca.gov/sanfranciscobay/publications_forms/documents/FTP_Discharger_Guide-12-2010.pdf. If the as-built report is submitted by uploading it to the FTP internet site, JPA shall notify the Regional Water Board case manager via email.

31. No later than 60 days after receiving all necessary permits, biological opinions, agreements, or other agency approvals, i.e., from the Corps, USFWS, NMFS, CDFW, the Regional Water Board, and BCDC, the JPA shall submit a revised Operations and Maintenance Manual, acceptable to the Executive Officer, that incorporates all modifications to the MMP that were necessitated by conditions of those permits, agreements, or other approvals. The revised Operations and Maintenance Manual shall conform to the following requirements:

    a. Be consistent with the District's Stream Maintenance Program.

    b. Clearly specify the responsibilities of the JPA and its delegates for operations and maintenance in accordance with Resolution 14.11.20 and any future resolutions the JPA may adopt to delegate or otherwise define operations and maintenance responsibilities.

    c. Clearly specify any mitigation actions that may be necessary for operations and maintenance activities, which may include, but not be limited to, addressing potential sedimentation and erosion and other impacts to ensure: (1) long-term habitat protection and enhancement; (2) flood protection performance; and (3) long-term sustainability of the creek channel and the creek-marsh interface along the Faber Tract Levee in face of sea level rise.

    d. The revised manual may cover regular creek channel operations and maintenance activities in the Project area.

e. The Operations and Maintenance Manual shall be updated at a minimum every five years to meet the strategies and actions necessary for potential impacts from global climate change, as discussed in the next condition, and to incorporate lessons learned from previous operations and maintenance activities.

32. The JPA shall submit, at least once every five years, a technical report proposing revisions to the Operations and Maintenance Manual, acceptable to the Executive Officer, and describe adaptive management strategies to be implemented, and a corresponding implementation schedule, designed for the continued healthy functioning of the creek channel within the Project area and the creek-marsh interface along the Faber Tract Levee. This technical report shall address the best balance for sediment and hydrology and landscape conditions for the creek channel and marsh in the context of sea level rise and other potential climate change impacts, such as changes in storm surges and the tidal prism, for the primary purpose of implementing long-term protection strategies for the endangered species dependent on the creek channel and marsh. The technical reports shall make recommendations to adjust the Project as necessary to manage potential future impacts based on the most current climate change science within each five-year cycle.

33. This Certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to Title 23 of the California Code of Regulations (23 CCR) subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

34. This Certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to section 13330 and section 3867 of the California Water Code (CWC) and 23 CCR.

35. Certification is conditioned upon total payment of the full fee required in State regulations (23 CCR §3833). Payment of the full fee amount of $59,000 was received on March 12, 2013.

Please be aware that any violation of this Certification's conditions is a violation of State law and subject to administrative civil liability pursuant to CWC section 13350. Failure to meet any condition of a certification may subject the JPA to civil liability imposed by the Regional Water Board to a maximum of $5,000 per day of violation or $10 for each gallon of waste discharged in violation of this action. Any requirement for a report made as a condition to this action (i.e., condition numbers 14, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 28, 30, 31, and 32) is a formal requirement pursuant to CWC section 13267 (see Fact Sheet attached), and failure to submit, late submittals, and inadequate submittals, or falsification of technical reports is also subject to civil liability as described in CWC section 13268. We anticipate, should new information come to our attention that indicates a water quality problem with this Project, the Regional Water Board may issue waste discharge requirements pursuant to 23 CCR, section 3857.

Finally, the Regional Water Board recognizes that the JPA plans additional phases of flood management project work on the Creek. The Regional Water Board will not certify any subsequent phases unless the JPA develops and implements, in a timely manner acceptable to the Executive Officer, plans for using a stakeholder coordination team approach to project permitting. Such a team should be jointly formed by the JPA and State and federal regulatory and resource agencies and include interested public stakeholders. The goal of using such a stakeholder coordination approach

would be to help ensure the timely development and implementation of a multi-objective project supported by local, State, and federal stakeholders. The JPA should consider facilitating meetings of such a team by a mutually-agreed upon neutral facilitator. Regional Water Board staff is available to assist the JPA in developing and implementing this permitting approach.

If you have any questions, please contact Susan Glendening at (510) 622-2462 or via email to sglendening@waterboards.ca.gov.

Sincerely,

Bruce H. Wolfe
Executive Officer

Attachment 1:

Fact Sheet - California Water Code, Section 13267

Cc: Kevin Murray, JPA, kmurray@JPA.org
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Luisa Valiela, U.S. EPA, valiela.luisa@epamail.epa.gov
Melissa Scianni, U.S. EPA, Scianni.Melissa@epa.gov
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Fact Sheet – Requirements for Submitting Technical Reports Under Section 13267 of the California Water Code

What does it mean when the Regional Water Board requires a technical report?
Section 13267 of the California Water Code provides that "…the regional board may require that any person who has discharged, discharges, or who is suspected of having discharged or discharging, or who proposes to discharge waste...that could affect the quality of waters...shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires."

This requirement for a technical report seems to mean that I am guilty of something, or at least responsible for cleaning something up. What if that is not so?
The requirement for a technical report is a tool the Regional Water Board uses to investigate water quality issues or problems. The information provided can be used by the Regional Water Board to clarify whether a given party has responsibility.

Are there limits to what the Regional Water Board can ask for?
Yes. The information required must relate to an actual or suspected or proposed discharge of waste (including discharges of waste where the initial discharge occurred many years ago), and the burden of compliance must bear a reasonable relationship to the need for the report and the benefits obtained. The Regional Water Board is required to explain the reasons for its request.

What if I can provide the information, but not by the date specified?
A time extension may be given for good cause. Your request should be promptly submitted in writing, giving reasons.

Are there penalties if I don't comply?
Depending on the situation, the Regional Water Board can impose a fine of up to $5,000 per day, and a court can impose fines of up to $25,000 per day as well as criminal penalties. A person who submits false information or fails to comply with a requirement to submit a technical report may be found guilty of a misdemeanor. For some reports, submission of false information may be a felony.

Do I have to use a consultant or attorney to comply?
There is no legal requirement for this, but as a practical matter, in most cases the specialized nature of the information required makes use of a consultant and/or attorney advisable.

What if I disagree with the 13267 requirements and the Regional Water Board staff will not change the requirement and/or date to comply?
You may ask that the Regional Water Board reconsider the requirement, and/or submit a petition to the State Water Resources Control Board. See California Water Code sections 13320 and 13321 for details. A request for reconsideration to the Regional Water Board does not affect the 30-day deadline within which to file a petition to the State Water Resources Control Board.

If I have more questions, whom do I ask?
Requirements for technical reports include the name, telephone number, and email address of the Regional Water Board staff contact.

[1] All code sections referenced herein can be found by going to www.leginfo.ca.gov.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
BAY DELTA REGION
7329 SILVERADO TRAIL
NAPA, CALIFORNIA 94558
(707) 944-5500

STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2013-0092-R3
SAN FRANCISQUITO CREEK

MR. KEVIN MURRAY
San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and the San Francisquito Creek Joint Powers Authority (Permittee), as represented by Kevin Murray.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified CDFW on March 15, 2013 that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project is located along San Francisquito Creek, on the eastern edge of East Palo Alto, in southeastern San Mateo County and northwestern Santa Clara County, in the State of California. The Palo Alto Municipal Golf Course (Golf Course) and Palo Alto Airport are adjacent to the eastern and southern boundaries of the project site. The project area can be accessed from East Bayshore Road (on the northeastern side of Highway 101). The project is located at Latitude 37.453057 N, Longitude -122.127577 W on the Palo Alto U.S.G.S Quadrangle Map, and at Latitude 37.453057 N, Longitude -122.115942 W on the Mountain View U.S.G.S Quadrangle Map.

The project area is shown in Exhibit A. Within this Agreement, the right bank will refer to the San Mateo County (East Palo Alto) side of the creek, and the left bank will refer to the Santa Clara County (Palo Alto) side of the creek (from downstream to upstream).

PROJECT DESCRIPTION

The purpose of the project is to improve channel capacity for San Francisquito Creek flows, coupled with the influence of the San Francisco Bay tides, and including projected sea-level rise, from the downstream face of East Bayshore Road to San Francisco Bay. The goals of the project are to improve flood protection, habitat, and recreational opportunities with the following objectives: protect properties and infrastructure between East Bayshore Road and the San Francisco Bay from creek flows resulting from 100-year fluvial flood flows occurring at the same time as a 100-year tide that includes projected sea-level rise through 2067; accommodate future flood protection measures (e.g., possible bridge removals or modifications) that are expected to be constructed upstream of the project; enhance habitat along the project reach, particularly for threatened and endangered species; enhance recreational uses; and minimize operational and maintenance requirements.

Major project elements include installation of floodwalls in the upper reach downstream of East Bayshore Road, and levee setbacks and improvements to widen the channel and increase levee height and stability between East Palo Alto and the Golf Course. Project activities include excavating sediment deposits within the channel to maximize conveyance; constructing sheetpile floodwalls in the upper reach to increase capacity and maintain consistency with Caltrans' newly constructed enlargement of the U.S. 101/East Bayshore Road bridge over San Francisquito Creek; and rebuilding levees, degrading levees, and relocating a portion of the southern levee (left bank) to widen the channel to reduce the influence of tides and increase channel capacity. Other major project elements include the extension of Friendship Bridge via a boardwalk across new marshland within the widened channel, and marshplain creation and restoration. Project activities are anticipated to take place over two construction seasons.

Sediment Removal

A total of approximately 11,000 cubic yards (CY) of sediment will be excavated from the channel (not including the excavation that will occur as a result of construction of structural elements). Sediment will be excavated along approximately 2,200 linear feet of the left bank (Station L-Lines 31+50 to 53+50) and along approximately 2,600 linear feet of the right bank (Station R-Line 32+50 to 42+50, 50+50 to 62+50, and 66+50 to 70+50).

Flood Walls

Sheetpile floodwalls with tops measuring approximately 20 feet North American Vertical Datum (NAVD 88) in elevation will be constructed along portions of the right and left banks of the channel. The floodwalls will be constructed along the right bank at the following locations: 1) Station R-Line 54+00 to 75+54 (approximately 2,154 feet in length and between 10.5 feet and 13.4 feet in height above the channel bench); 2)

Station R-Line 30+40 to 31+60 (approximately 120 feet in length and 13 feet in height above the channel bench); and 3) Station R-Line 29+60 to 29+96 (approximately 36 feet in length and 15 feet in height above the channel bench). The floodwalls will be constructed along the left bank at the following locations: 1) Station L-Line 71+57 to 76+19 (approximately 462 feet in length and between 13.2 feet and 15 feet in height above the channel bench); and 2) Station L-Line 49+23 to71+05 (approximately 2,182 feet in length and between 11.5 feet and 12.4 feet in height above the channel bench).

Earthen Levees
Existing earthen levees measuring between 13.5 feet and 17.5 feet NAVD 88 in elevation will be enlarged to approximately between 17.8 feet and 19.5 feet NAVD 88 along portions of the right and left banks of the channel. The existing earthen levee on the right bank at Station R-Line 29+60 to 75+50 (measuring 4,590 feet in length, 65 feet in width at the toe, and 8 feet above the channel bench) will be modified from Station R-Line 29+60 to Station 54+00 (approximately 2,440 feet in length, 75 feet in width at the toe, and 12 feet above the channel bench). The existing earthen levee on the left bank at Station L-Line 23+10 to 72+50 (measuring 4,940 feet in length, 44-60 feet in width at the toe, and 8 feet above the channel bench) will be modified from Station L-Line 22+73 to 49+23 (approximately 2,650 feet in length, 82-94 feet in width at the toe, and 12 feet above the channel bench).

A portion of the earthen levee on the left bank (mentioned above) will be relocated inland to an area currently occupied by the Golf Course. This relocated levee will be moved up to approximately 103 feet further inland (away from the San Francisquito Creek channel) relative to the existing levee to increase channel capacity at the existing constriction point. Except for a section around the eastern footings of Friendship Bridge, the old levee will be removed and the area restored to marsh plain. The portion of the levee containing the Friendship Bridge footings will remain as an island (referred to in the design plans [labeled Draft 100% and dated July 2015] as Friendship Island).

Access Roads
Access roads, which will also serve as trails, will be constructed at the tops of the levee crowns on both the left and right banks. These access roads/trails will measure approximately16 feet in width, but may be narrowed down to 12 feet in width near structures and residences in order to maximize the stream width in these locations. Access roads/trails will be overlain with aggregate base and in some areas will also be paved with asphalt concrete.

Rock Slope Protection
Approximately 3.71 acres (6,276 linear feet) of rock slope protection (RSP) will be placed along portions of some of the levee tops and inboard levee slopes, as well as on the top and side slopes of Friendship Island.

Faber Tract Levee Stability Improvement

The project is separated from the Faber Tract of the U.S. Fish and Wildlife Service's (USFWS) Don Edwards Wildlife Refuge (Refuge) by an existing levee (Faber Tract Levee). The Faber Tract is known to contain a high density of Ridgway's rail (*Rallus obsoletus obsoletus*), and a likely population of salt-marsh harvest mouse (*Reithrodontomys raviventris*). To minimize impacts to the high quality habitat of the Faber Tract for these species, fill will be added to portions of the Faber Tract Levee to reduce concerns regarding levee erosion and the potential for mass levee failure. A 400-foot section of levee crest downstream of Friendship Bridge will be raised from a minimum elevation of 11 feet to 13 feet, and the marsh side of the Faber Tract Levee will be sloped 6H:1V into the Faber Tract marsh. The 6H:1V Faber Tract Levee side slope will help protect the levee toe from erosion due to flow overtopping a 400-foot distance as the Faber Tract Levee transitions to a higher elevation upstream near Friendship Bridge.

Friendship Bridge

The existing Friendship Bridge [measuring approximately 140 feet long, 11.5 feet wide, 15 feet high, with a freeboard water surface elevation (WSE) to soffit of 4.9 feet] will be retained and extended as a boardwalk from the retained eastern footing across the new marsh plain terrace to the relocated left bank levee. The abutments supporting Friendship Bridge will remain unchanged. Adjacent to the existing bridge on the left side of the creek, the project will include a marsh plain terrace that will be graded to an elevation equal to the mean higher high water (MHHW) tide elevation. This terrace will create a continuous tidal marsh beginning in the lower reach of the project, surrounding Friendship Bridge's southeast approach, and extending upstream along the creek's left bank. The terrace will be inundated during spring tides and more moderate stream flow events. The left end of Friendship Bridge will stand in the marsh plain terrace after the project is implemented. A boardwalk will traverse the marsh plain from the left bank and will tie into the abutment on the left end of Friendship Bridge. The boardwalk will be the same width (approximately 11.5 feet wide) as Friendship Bridge and measure approximately 202 feet long and 10 feet high. The boardwalk will have a freeboard WSE of 3.7 feet at the new levee, and 2.4 feet at Friendship Island (flows will be allowed over the boardwalk). The boardwalk will be constructed of a timber deck and 12 concrete piles (each measuring 18 inches in diameter). The elevation of the low mark of the boardwalk will be set above the highest anticipated flood elevation, with the lowest point of the bridge a minimum of 5 feet above the marsh plain terrace beneath it.

Bay Levee Degrade

Downstream of the Faber Tract, in a separate, lower-quality marsh area that is subject to daily tides from San Francisco Bay, approximately 600 feet an existing levee (referred to as the Bay Levee) separating the creek from this marsh area will be degraded from Station 3+50 to Station 9+50. This levee degrade will allow further connection of the marsh to the creek and decrease the WSE in the creek during large flood events, allowing the channel to expand out over the marsh area at a point further upstream than under existing conditions.

Dewatering
Water diversion will be implemented to maintain the work site as water-free as possible for the duration of in-channel work. The full width of the channel from the tops of bank will be dewatered. Water incursion is expected from San Francisco Bay tides, natural and urban runoff flows from upstream, outfalls downstream from the U.S. 101/East Bayshore Road bridge, and discharges from the O'Connor Pump Station in East Palo Alto and the Palo Alto Pump Station.

Water diversion will include cofferdams upstream (to intercept stream flows) and downstream (to block tidal Bay waters) of the work site. Stream flows upstream of the site will be pumped and passed through piping that bypasses the work site. Discharges from the two municipal pump stations will be pumped from the clear wells into the diversion piping. Dewatering sumps may be necessary for excavation, as depth to groundwater has been determined to be 1-3 feet below existing channel invert.

Utility Relocation
Project activities will require the relocation, removal, or raising of some of Pacific Gas and Electric's (PG&E) electric transmission towers (T) and poles, abandonment of existing and construction of new gas transmission lines, and realignment or relocation of sewer lines and storm drains.

T1 and T4 will be raised 15 feet. T2, which is currently located outside of the wetted portion of the stream channel, will be permanently removed. T3 will be relocated approximately 25 feet north of where T2 is currently located. Due to the fact that T3 will be within the creek channel once project construction is complete, there will be a fortified concrete pier (measuring approximately 625 square feet in area and 3 feet high) supporting each of the four legs of the tower placed into the newly widened channel. T3 will be 25 feet taller than T2. A temporary shoo-fly structure will be built to enable construction of T3. The shoo-fly structure will be supported by one wooden pole placed 25 feet south of the existing T2 and a second pole placed 75 feet north of the existing T2. The poles of the shoo-fly structure will be placed in the toe of the existing levee and will be removed once the new tower (T3) is fully operational.

Several utilities will be removed as a result of the relocation of the left levee into the Golf Course in the area of the Friendship Bridge extension. These utilities include a portion of an abandoned 24-inch sanitary sewer line, a portion of a 6-inch solid storm drain flex pipe, a portion of a joint trench (containing electrical and irrigation water), and a portion of a potable water line. Just upstream of Friendship Bridge, a 14-inch sanitary sewer line, which will be capped and plugged outside of the right of way on the right bank, crosses the channel to the left bank. This sanitary sewer line and associated vault will be removed.

A City of Palo Alto 96-inch diameter storm drain and outfall at Station L-line Station 76+00 will be relocated within the abutment for the Caltrans U.S. 101/Eat Bayshore Road Bridge and resized to 30 inches. A 30-inch diameter storm drain and outfall at

Station L-line 75+10 will be removed. A storm drain at the existing Santa Clara Valley Water District mitigation site Station C-Line 69+75 to 72+15 will be daylighted at the newly constructed bank (Station L-line Station 67+75). The storm drain and outfall at Station R-line 69+00 will be removed.

Portions of the existing PG&E gas transmission line (from Station R-line 50+50 to Station L-line 53+00) between the International School of the Peninsula and Friendship Bridge on both right and left banks are located within the realigned channel and will be removed. An approximately 1,350-foot length of abandoned PG&E gas transmission line that runs beneath channel from the right bank to the left bank will be removed (Station R-line 44+75 to Station L-line 53+00). A new 24-inch gas pipeline will be installed on the Palo Alto side of the creek (Station L-line 29+00). The pipeline will cross to the East Palo Alto side near Friendship Bridge (Station R-line 32+00), where it will tie in to the existing pipeline. The new pipeline will tie into the old pipeline at the electrical transmission tower east of the recreation area parking lot, at the end of Geng Road in Palo Alto. The new pipeline will extend northward on the left bank to the approximate location of Friendship Bridge just south of O'Connor Street. Between Geng Road and Friendship Bridge, the pipeline will lie within the Golf Course at a minimum of 15 feet east of the proposed new levee. At Friendship Bridge, the new pipeline will cross under the creek channel to the right bank, where it will tie into the existing pipeline. The tunnel for the new pipeline under the creek channel will be bored via horizontal directional drilling. The trench for the pipe on the left bank will be constructed by cut and fill. The pipeline will be located a minimum of 4 feet below grade.

Operation and Maintenance
Post-operation and maintenance activities beyond the term of this Agreement will be performed under the Santa Clara Valley Water District's Stream Maintenance Program (1600-2011-0336-R3). Post-construction operation and maintenance activities at the project site that may be performed during the term of this Agreement include mowing of approximately 6.49 acres of grassland habitat along the inboard face of the levees (except on the Faber Tract levee) up to three times per year, removal of invasive species from the restored tidal marsh, trash and debris removal, and burrowing rodent control.

Marshplain Creation and Restoration
Herbicides will be used to conduct the initial removal of invasive plant species prior to marshplain creation and restoration activities. Approximately 9.76 acres of tidal marsh will be created, and approximately 5.38 acres of tidal marsh will be passively restored as a result of this project.

Steelhead Passage Features
Six velocity refuge features (approximate locations shown in Exhibit A) will be installed within the project footprint in the San Francisquito Creek channel to improve steelhead (*Oncorhynchus mykiss*) passage. Features will include five rock and rootwad structures

(constructed features including wood logs with and without rootwads and large rocks for anchoring) in the middle reach (upstream of Friendship Bridge) and one rock spur (partial weir) in the lower reach (immediately downstream of Friendship Bridge).

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include: the federally threatened Central California Coast steelhead; the federal candidate and state threatened longfin smelt (*Spirinchus thaleichthys*); the federally threatened and state species of special concern California red-legged frog (CRLF) (*Rana draytonii*), green sturgeon (*Acipenser medirostris*), and western snowy plover (*Charadrius alexandrinus nivosus*); the federally threatened and state fully protected black rail (*Laterallus jamaicensis coturniculus*); the federally endangered and state fully protected salt marsh harvest mouse (SMHM), California Ridgway's rail, San Francisco garter snake (SFGS) (*Thamnophis sirtalis tetrataenia*), and California least tern (*Sternula antillarum browni*); the fully protected white-tailed kite (*Elanus leucurus*); the state species of special concern western pond turtle (WPT) (*Actinemys marmorata*), western burrowing owl (BUOW) (*Athene cunicularia hypogea*), northern harrier (*Circus cyaneus*), San Francisco common yellowthroat (*Geothlypis trichas sinuosa*), and Alameda song sparrow (*Melospiza melodia pusillula*); other native and non-native fish species, and nesting birds.

Existing plant resources the project could substantially adversely affect include: the California Native Plant Society (CNPS) 1B.2 alkali milk-vetch (*Astragalus tener* var. *tener*), San Joaquin spearscale (*Atrixplex joaquiniana*), Congdon's tarplant (*Centromadia parryi* ssp. *condonii*), Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*), and saline clover (*Trifolium depauperatum* ssp. *hydrophilum*); the CNPS 1A hairless popcorn flower (*Plagiobothrys glaber*); the CNPS 2B.2 slender-leaved pondweed (*Stuckenia filiformis*); and the Federally Endangered and CNPS 1B.1 California seablite (*Suaeda californica*).

The adverse effects the project could have on the fish or wildlife resources identified above, without implementation of the Measures to Protect Fish and Wildlife Resources specified below, include: permanent loss of natural bed or bank; channel profile widening; loss of bank stability during construction; increased bank erosion; accelerated channel scour; increased turbidity; changes in pH; short-term release of contaminants; short-term changes in dissolved oxygen, water temperature, and stream flow; dryback of stream channels; permanent loss of wetland vegetation; permanent decline in vegetative diversity; colonization by exotic plant species; change in stream flow; temporary impacts to stream due to dewatering activities; direct take of aquatic species from pumps; construction of trenches that can capture terrestrial and semi-aquatic organisms; temporary loss of wildlife connectivity to water source; temporary loss of terrestrial animal species' travel routes due to construction; disturbance or mortality of terrestrial, aquatic, and semi-aquatic fish and wildlife species; and disturbance to nesting birds.

Exhibit B shows a summary of permanent and temporary impacts to channel, wetland, and riparian habitat types. Exhibit C is a map showing the permanent and temporary impacts to the channel and various wetland types referenced in Exhibit B. The project

will result in a total (both permanent and temporary) of approximately 3.13 acres of impacts to diked marsh which is found on the landward side of the levees and was likely tidal salt marsh historically (prior to the original construction of the levees) and supports vegetation typically dominated by saltgrass (*Distichlis spicata*), pickleweed (*Salicornia pacifica* and *S. virginica*), alkali heath (*Frankenia salina*), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*). The project will also result in a total of approximately 4.51 acres of impacts to tidal salt marsh which supports vegetation typically dominated by Pacific cordgrass (*Spartina foliosa*), pickleweed, perennial peppergrass (*Lepidium latifolium*), gumplant (*Grindelia stricta*), and alkali heath; and a total of approximately 2.43 acres of impacts to tidal channel and bay water habitat.

Approximately 0.57 acres of riparian habitat will be impacted by this project. Of approximately 114 trees to be removed, 48 trees are native, 59 trees are considered non-native and invasive, and 7 trees are considered non-native and ornamental. Exhibit D contains a tree removal map. Approximately fourteen of the native trees will be removed from an off-site riparian mitigation site that was required for project impacts associated with the Santa Clara Valley Water District's Matadero/Barron Creeks Long-Term Remediation Project (1600-2003-0119-R3). Approximately three of the native trees will be removed from a riparian mitigation site associated with the City of Palo Alto's Pump Station Project (1600-2007-0046-R3). These two existing mitigation sites are not protected under a Conservation Easement.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify CDFW if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, CDFW shall contact Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that CDFW personnel may enter the project site at any time to verify compliance with the Agreement.

1.5 Notification of Commencement and Completion of Work. Permittee shall notify CDFW within 5 working days of beginning work and within 5 working days of completion of work within the stream channel for each construction season covered in this Agreement. Notification shall be made to Tami Schane, Environmental Scientist, by email (tami.schane@wildlife.ca.gov) or by phone (415) 831-4640.

1.6 Final Plans and Specifications. Permittee shall provide final construction plans and specifications to CDFW prior to construction. Permittee shall notify CDFW of any modifications to the project description as stated above. At the discretion of CDFW, project modifications may require an amendment or a new Streambed Alteration Agreement.

1.7 Unauthorized Take. This Agreement does not authorize the take, including incidental take, of any State or federally listed threatened or endangered species, or of species that are otherwise protected under FGC. Permittee may be required, as prescribed in the California and U.S. Endangered Species Acts, to obtain take coverage for State and federally listed species prior to commencement of the project. Any unauthorized take of listed species may result in prosecution and nullification of this Agreement.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

2.1 Work Period. To avoid impacts to longfin smelt, green sturgeon and steelhead, dewatering shall begin no earlier than June 15 and extend no later than October 15 for each work season during the term of this Agreement. Construction activities outside of the stream channel shall be confined to the period between May 1 and October 15. Revegetation work in a given reach is not confined to this work period but shall be completed within the wet season following completion of the project in that reach. Requests for extensions to conduct work within the stream or adjacent marsh shall be coordinated with Tami Schane, Environmental Scientist, by email (tami.schane@wildlife.ca.gov) or by phone (415) 831-4640.

2.2 Work Period Modification. If Permittee needs more time to complete Project activities, work may be authorized outside of the work period and extended on a day-to-day basis by contacting Tami Schane, Environmental Scientist, by email (tami.schane@wildlife.ca.gov) or by phone (415) 831-4640, or the CDFW Bay Delta Regional Office by mail, or by phone (707) 944-5500.

If Permittee requests a work period extension, Permittee shall submit such a request in writing to the CDFW Bay Delta Regional Office. The request shall: i) describe the extent of work already completed; ii) detail the activities that remain to be completed; iii) detail the time required to complete each of the remaining activities; and iv) provide photographs of both the current work completed and the proposed site for continued work. The work period variance shall be issued at the discretion of CDFW. CDFW reserves the right to require additional measures to protect biological resources as a condition for granting the variance. CDFW shall have 10 calendar days to review the proposed work period variance.

2.3 Precipitation Forecasts. Precipitation forecasts shall be considered when planning construction activities. Construction activities shall cease and all necessary erosion control measures shall be implemented prior to the onset of substantial precipitation defined as 0.5 inch or more within a 24-hour period. Construction activities that are halted due to precipitation may resume when precipitation ceases and the National Weather Service 72-hour weather forecast indicates a 20% or less chance of precipitation. Weather forecasts shall be documented upon request by CDFW.

2.4 Dewatering. Work shall be performed in isolation from the flowing stream. The entire stream flow shall be diverted around the project work area using water-tight coffer dams and piping consistent with the Temporary Water Diversion Plan dated September 3, 2015, and received by CDFW in the submittal of additional information dated September 14, 2015, unless otherwise conditioned herein. Upon removal of the water diversion system, flows shall be gradually restored to the channel in a manner that avoids an erosive surge of water. Gravel-filled bags and plastic sheeting may be used to prevent leaking at the cofferdams. Sand-filled bags shall not be used at any time within the limits of the stream channel. The project site shall be dewatered using Baker tanks with a total capacity of 21,000 gallons for testing and appropriate discharge or disposal. Screened pumps shall be used in accordance with CDFW's fish screening criteria (http://www.dfg.ca.gov/fish/Resources/Projects/Engin/Engin_ScreenCriteria.asp).

2.5 Silt Curtain. A Type 3 Department of Transportation (DOT) floating silt curtain or CDFW-approved equivalent shall be installed on the outboard side of the Bay Levee during Bay Levee excavation, to prevent sediment from entering the adjacent marshland and San Francisco Bay. If it is possible to perform the Bay Levee excavation without entering the channel, the same type of floating silt curtain shall be installed on the channel side of the Bay Levee to prevent sediment from entering the channel.

2.6 No Equipment in Wetted Areas. Equipment shall not be operated in wetted areas, including but not limited to ponded, flowing, or wetland areas, or within the live stream channel below the level of top-of-bank.

2.7 Erosion Control. Erosion control measures shall be utilized throughout all phases of the project where sediment runoff from exposed slopes threatens to enter any stream channels. At no time shall silt laden runoff be allowed to enter any stream channels. To protect exposed soils from erosion during discharges, erosion control blankets, mats, or geotextiles shall be placed over the erodible surfaces. Any erosion control materials used within the stream channels during discharges shall be removed immediately upon completion of water discharges. No erosion control materials shall contain any plastic or monofilament netting.

2.8 CDFW-Approved Qualified Biologist(s) and Monitor(s). Permittee shall submit to CDFW for written approval, the names and resumes of all qualified biologists and biological monitors involved in conducting surveys and/or monitoring work.

A qualified biologist is an individual who shall have a minimum of five years of academic training and professional experience in biological sciences and related resource management activities with a minimum of two years conducting surveys for each species that may be present within the project area.

A biological monitor is an individual who shall have academic and professional experience in biological sciences and related resource management activities as it pertains to this project, experience with construction-level biological monitoring, be able to recognize species that may be present within the project area, and be familiar with the habits and behavior of those species.

2.9 Nesting Bird Surveys. If construction, grading, or other project-related improvements are scheduled during the nesting season of protected raptors and migratory birds January 15 to September 1, a focused survey for active nests of such birds shall be conducted by a qualified biologist within fourteen (14) days prior to the beginning of project-related activities. The results of the survey shall be sent to Tami Schane, Environmental Scientist, by email (tami.schane@wildlife.ca.gov) prior to the start of project activities. Refer to Notification Number 1600-2013-0092-R3 when submitting the survey results to CDFW. If an active nest is found, Permittee shall consult with the USFWS and CDFW regarding appropriate action to comply with the Migratory Bird Treaty Act (MBTA) of 1918 and the FGC of California. If a lapse in project-related work of 15 days or longer occurs, another focused survey and if required, consultation with CDFW and USFWS, shall be required before project work can be reinitiated.

2.10 Buffers. Active nests shall be designated as “Ecologically Sensitive Areas” and protected (while occupied) during project activities with the establishment of a fence barrier or flagging surrounding the nest site. If an active nest is found, the qualified biologist shall establish an appropriate buffer to be in compliance with the MBTA and Fish and Game Code 3503. The qualified biologist shall monitor the nesting birds and shall increase the buffer if the qualified biologist determines the birds are showing signs of unusual or stressed behavior by project activities.

Abnormal nesting behaviors which may cause reproductive harm include, but are not limited to, defensive flights/vocalizations directed towards project personnel, standing up from a brooding position, and flying away from the nest. The qualified biologist shall have authority to order the cessation of all nearby project activities if the nesting exhibit abnormal behavior which may cause reproductive failure (nest abandonment and loss of eggs and/or young) until an appropriate buffer is established. Typical minimum distances of the protective buffers surrounding each identified nest site is a 50-foot radius except for raptors, herons, and egrets; and a 300-foot radius around active nests for hawks, owls, herons, and egrets. All protective buffer zones shall be maintained, and no entrance shall be allowed into protective buffer zones, until the nest becomes inactive. If monitoring shows that disturbance of actively nesting birds is occurring, buffer widths shall be increased until monitoring shows that disturbance is no longer occurring. If this is not possible, work shall cease in the area until young have fledged and the nest is no longer active.

2.11 CRLF Survey. Prior to and within 48 hours of the planned start of project activities, a focused survey for CRLF shall be conducted by a qualified biologist to determine if they are present in the area. If CRLF individuals are found, CDFW and USFWS shall be notified immediately to determine the correct course of action and project activities shall not begin until approved by CDFW. CDFW may submit additional written avoidance, minimization and mitigation measures if CRLF are found within the project area. Those additional measures shall be considered part of this Agreement. CRLF shall not be relocated without authorization from USFWS.

2.12 SFGS Survey. Prior to and within 48 hours of the planned start of project activities, a focused survey for SFGS shall be conducted by a qualified biologist to determine if they are present in the area. If SFGS individuals are found, then work shall be stopped immediately by the qualified biologist, and the GGS shall be allowed to leave the work area on its own volition. CDFW shall be notified of any such occurrences. If the SFGS does not leave the area, then no work shall commence until CDFW has made a determination on how to proceed with work activities. The qualified biologist shall be present on site to monitor for this species during the operation of large equipment within 300 feet of freshwater pond areas. The qualified biologist shall have the authority to stop work if deemed necessary for any reason to protect SFGS.

2.13 WPT Survey. Prior to and within 48 hours of the planned start of project activities, a focused survey for WPT shall be conducted by a qualified biologist to determine if they are present in the area. If WPT individuals are found, CDFW shall be notified immediately to determine the correct course of action and project activities shall not begin until approved by CDFW. CDFW may submit additional written avoidance, minimization and mitigation measures if WPT are found within the project area. Those additional measures shall be considered part of this Agreement. In addition, Permittee shall notify CDFW in any instance where WPTs

are relocated. Notification shall be made to Tami Schane, Environmental Scientist, by email (tami.schane@wildlife.ca.gov) or by phone (415) 831-4640.

2.14 WPT Exclusion. If WPT individuals are found, they shall be excluded from entering the project site. CDFW-approved exclusion fencing shall be installed around those areas or where equipment may be stockpiled. The lower edge of the fence shall be buried at least four (4) inches to prevent burrowing animals from tunneling under the fence.

2.15 Daily Species Inspection. If WPT individuals are found, after installation of the fence barrier, the biological monitor (or qualified biologist) shall conduct daily inspections of the project work area, and staging area prior to the commencement of construction activities. If the biological monitor or qualified biologist determines that sensitive species are not within the work area, equipment or materials may be moved onto the work site and project activities may commence under the direct observation of the biological monitor or qualified biologist.

2.16 BUOW. Permittee shall implement all conservation measures applicable to BUOW under the Santa Clara Valley Habitat Plan, including the BUOW Conservation Strategy. For any project activities located in grassland or bare ground habitat, Permittee shall survey the surrounding work area and associated grassland habitat to identify any nests sites and/or any BUOW foraging habitat. If there are BUOW nests on the project site, or if there are nests dependent on the grasslands on the project site, Permittee shall conduct an impact analysis to determine whether there will be any permanent impacts (permanent impacts under the BUOW Conservation Strategy are defined as those impacts where the site cannot be restored to pre-project conditions within one year) to BUOW nests or associated foraging habitat. If there are BUOW nests within 250 feet of project activities, Permittee shall establish a 250-foot radius, no work buffer zone around occupied BUOW nests. Buffers may be modified, with CDFW approval, by a qualified biologist based on location of paved roads, intervening riparian corridors, and levees.

2.17 California Ridgway's Rail, California Black Rail, and SMHM Survey. Prior to and within 48 hours of the planned start of project activities, a qualified biologist shall thoroughly inspect the work area and adjacent tidal or brackish marsh areas to determine if California Ridgway's rail, California black rail, or SMHM are present in these areas. If a mouse of any species, California Ridgway's rail, or California black rail is observed within the work area, then work shall be stopped immediately by the qualified biologist, and the mouse or rail shall be allowed to leave the work area on its own volition. CDFW shall be notified of any such occurrences. If the mouse or rail does not leave the area, then no work shall commence until CDFW has made a determination on how to proceed with work activities. The qualified biologist shall be present on site to monitor for these species during the operation of large equipment within 300 feet of brackish marsh areas. The qualified biologist

shall have the authority to stop work if deemed necessary for any reason to protect California Ridgway's rail, California black rail, or SMHM.

2.18 Work within California Ridgway's Rail, California Black Rail, and SMHM Habitat. Project activities within or adjacent to habitat suitable for California Ridgway's rail, California black rail, or SMHM shall not occur within 2 hours before or after extreme high tides (6.5 feet or above) when the marsh plain is inundated.

2.19 Vegetation Removal Within SMHM Habitat. Vegetation removal within suitable habitat for SMHM shall be conducted by hand. Hand removal of vegetation shall start at the edge farthest from the largest contiguous salt marsh area and work its way towards the salt marsh, providing cover for SMHM and allowing them to move towards the salt marsh as vegetation is being removed.

2.20 SMHM Exclusion Fencing. In consultation with CDFW and USFWS, SMHM-proof exclusion fencing shall be placed around a defined work area immediately following vegetation removal and before proposed project activities begin. All supports for the exclusion fencing shall be placed on the inside of the work area to prevent SMHM from climbing the stakes into the work area. The SMHM-proof exclusion fencing shall be at least two feet high but no higher than 4 feet. The fencing shall be made of a heavy plastic sheeting material that is too smooth for SMHM to climb. The toe of the fence shall be buried approximately four inches in the ground to prevent SMHM from crawling or burrowing underneath it. A 4-foot buffer shall be maintained free of vegetation around the exclusion fencing and work areas. The final design and proposed location of the fencing shall be reviewed and approved by CDFW and USFWS prior to placement.

2.21 Daily Site Inspection for SMHM. Prior to initiation of work each day within 300 feet of tidal or pickleweed habitats, a qualified biologist shall thoroughly inspect the work area and adjacent habitat areas to determine if salt marsh harvest mice are present. The biologist shall ensure the exclusion fencing has no holes or rips, and the base remains buried. The fenced area shall be inspected daily to ensure that no SMHM are trapped.

2.22 Mowing. To minimize the possibility of injuring or killing SMHM during mowing activities associated with maintenance, mowing activities shall be preceded by cutting of vegetation with hand tools only. Once vegetation has been cut to a level such that the ground is clearly visible, mowing activities shall proceed with a biological monitor walking in front of the mower, scanning the area for any SMHM. Mowing shall be conducted in upland vegetation only and shall be prohibited in any marsh or marsh/transition zone vegetation.

2.23 Burrowing Rodent Control. Burrowing rodent (such as ground squirrel and gopher) control activities within 330 feet of marsh/brackish marsh habitat suitable for California Ridgway's rail or SMHM shall be limited to live trapping efforts only. All

live traps shall have openings measuring no smaller than 2 inches (horizontal) by 1 inch (vertical) to allow any SMHM that inadvertently enter the trap to easily escape. All traps shall be placed outside of pickleweed areas and above the high tide line. Burrowing rodent control using rodenticides shall be limited to areas outside of known and potential habitat for California Ridgway's rail, California black rail, or SMHM. Any rodenticide use shall be limited to first-generation rodenticides only.

2.24 Stranded Aquatic Life. Permittee shall check daily for stranded aquatic life as the water level in the dewatering area drops. All reasonable efforts shall be made to capture and move all native fish observed in the dewatered areas. Capture methods may include fish landing nets, dip nets, buckets, electrofishing, and by hand. Captured native fish shall be released immediately in the closest body of water adjacent to the work site. For any species listed under the California Endangered Species Act or Federal Endangered Species Act, only a qualified biologist with the necessary permits issued by CDFW and/or National Marine Fisheries Service can supervise the relocation of listed species. Handling of said listed species shall be restricted solely to a qualified biologist with the necessary permits issued by CDFW and/or National Marine Fisheries Service. The Permittee shall contact CDFW no less than 24 hours and no greater than 72 hours of relocation activities. In the event that the Permittee intends to dispatch non-native fish species, Permittee shall coordinate with CDFW fisheries staff to apply for any applicable permits such as a permit to destroy nuisance fish (FG 793).

2.25 Steep-Walled Holes, Pits, and Trenches. All steep-walled holes, pits, or trenches exceeding 6 inches deep shall be secured against animal entry at the close of each day or any time the opening will be left unattended for more than one hour. Plywood or similar materials with no gaps shall be used to cover the trench (if possible), holes, and pit. In the absence of covers, escape ramps shall be provided, constructed of earth or untreated wood, sloped no steeper than 2:1, and located no further than 15 feet apart.

2.26 Pipes, Hoses, and Similar Structures. All pipes, hoses, or similar structures less than 12 inches in diameter shall be closed or covered to prevent animal entry. All construction pipes or similar structures greater than 2 inches in diameter stored at the project site overnight shall be inspected thoroughly for wildlife by a qualified biologist before the pipe or similar structure is buried, capped, used, or moved.

2.27 Herbicide Use. Only herbicides registered with the California Department of Pesticide Regulation shall be used. All herbicides shall be applied in accordance with regulations set by the California Department of Pesticide Regulation and used according to labeled instructions. Only herbicides and surfactants registered for aquatic use may be applied within the banks of the stream channel. Precautions shall be used to avoid contact of herbicide with native and non-target plant species. Use of herbicides within the banks of the stream channel shall be limited to the period between June 15 and October 15. There shall be no application of

herbicide directly into water. Herbicide application shall not occur when wind conditions may result in drift. Herbicide solution shall be applied only until there is a wet appearance on the target plants to avoid runoff.

2.28 Staging of Materials. Staging and storage areas for vehicles, equipment, and any other materials shall be located outside of the stream channels and banks. Stationary equipment such as motors, pumps, generators, compressors, and welders, located within or adjacent to the stream channels shall be positioned over drip-pans. Any equipment or vehicles driven and/or operated within or adjacent to the stream channels shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life. Vehicles shall be moved a minimum of 65 feet away from any stream channels prior to refueling and lubrication.

2.29 Hazardous Materials. Debris, soil, silt, bark, rubbish, slash, sawdust, creosote-treated wood, raw cement/concrete or washings thereof, asphalt, paint, or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from project-related activities, shall be prevented from contaminating the soil and/or entering the waters of the State. Any of these materials, placed within or where they may enter a stream or lake, by Permittee or any party working under contract, or with the permission of the Permittee, shall be removed immediately. All chemicals stored in staging areas shall be stored in secondary containment with no less than 110% capacity. Proper storage and security shall be implemented to ensure that chemicals are not spilled or vandalized.

2.30 Frac-Out Contingency Plan. Permittee shall design, pre-plan and direct the horizontal directional drilling operations in such a way as to minimize the risk of spills of all types. At least 30 days prior to horizontal directional drilling operations, Permittee shall provide to CDFW for review and approval, a frac-out contingency plan to address the possibility of the release of drilling lubricants through fractures in the streambed or bank ("frac-outs"). The plan shall be on site at all times and all contractors shall have pre-arranged duties in case of a frac-out. Cleanup equipment shall be on site prior to the start of operations. In case of a frac-out, all drilling shall cease, and all personal shall implement the cleanup contingency plan. Operations shall not resume until the frac-out is located, contained, and cleaned up. CDFW shall be notified on every frac-out immediately. Notification shall be made to Tami Schane, Environmental Scientist, by email (tami.schane@wildlife.ca.gov) or by phone (415) 831-4640. Directional drilling shall not resume until approved by CDFW.

2.31 Drilling Mud. At no time shall drill cuttings, drilling mud, and/or materials or water contaminated with bentonite or any other substance deemed deleterious to fish or wildlife be allowed to enter the stream or be placed where they may be washed into the stream. Any contaminated water/materials from the drilling and/or project

activities shall be pumped or placed into a holding facility and removed for proper disposal. Discharge or release of any contaminant, including drilling fluid, into a waterway is prohibited by Fish and Game Code 5650, except as authorized by Fish and Game Code 5650(b).

2.32 Spill Kits. Prior to entering the work site, all field personnel shall know the location of spill kits and trained in their appropriate use.

2.33 No Dumping of Litter or Debris. There shall be no dumping of litter or construction debris within the channel, riparian zone, or adjacent marsh. All litter, debris, and waste shall be picked up daily and properly disposed at an appropriate site.

2.34 Concrete Use Near Waterways. Poured concrete, including grout associated with rock riprap, and any runoff exposed to poured concrete shall be excluded from stream flows and the wetted channel for a minimum period of 30 days after it is installed. During that time the concrete shall be kept moist, and runoff from the concrete shall not be allowed to enter a waterway. Sealant or curing accelerant may be applied to the poured concrete surface or slurry where difficulty in excluding water flow from the uncured concrete surface for a long period may occur; however, pH testing of water exposed to uncured concrete shall be performed to ensure that the pH range shall remain between 6.5 and 8.3. Any sealant or accelerant to be used shall first have the material safety data sheets (MSDS) for all active chemical ingredients submitted and accepted by CDFW before application in construction. All MSDS shall include environmental toxicity information. If sealant is used, water shall be excluded from the site until the sealant is dry.

3. Compensatory Measures

To compensate for adverse impacts to fish and wildlife resources identified above that cannot be avoided or minimized, Permittee shall implement each measure listed below.

3.1 Mitigation and Monitoring Plan. At least 30 days prior to the start of project activities, Permittee shall submit to CDFW for review and written approval, an updated Mitigation and Monitoring Plan (MMP) to replace the Draft MMP (*San Francisquito Creek Flood Reduction, Ecosystem, Restoration, and Recreation Mitigation and Monitoring Plan*, dated December 2015) that was submitted to CDFW via email on December 17, 2015. The updated MMP shall reflect the current project description, including an updated assessment of temporary, semi-permanent, and permanent impacts as described in this Agreement and associated Exhibits, and associated compensatory mitigation for each habitat type, such as habitat creation, restoration and levee enhancements. The updated MMP shall include revegetation details, including but not limited to, species composition, planting locations, plant palettes, hydroseeding methods, irrigation requirements, contingency measures, plant establishment periods, revegetation monitoring, performance standards, and success criteria for percent cover, survivorship,

health and vigor ratings, and non-native vegetation cover. The planting plan for levee enhancements around the Faber Tract shall include linear feet and acreage of vegetation removal and planting; planting species palette; planting densities; and success criteria. The updated MMP shall also include a detailed description of mitigation associated with impacts to special-status species habitat such as invasive plant species removal, installation of passage features for steelhead, and upland refugia mounds in the Faber Tract for California Ridgway's rail.

3.2 Temporary, Semi-Permanent, and Permanent Impacts. CDFW defines temporary impacts as those impacts where habitat at the impact site can be fully restored to pre-project conditions, values, and functions within one year of impact. CDFW defines semi-permanent impacts as those impacts where habitat at the impact site can be fully restored to pre-project conditions, values, and functions within two years of impact. CDFW defines permanent impacts as those impacts where habitat at the impact site either cannot be restored, due to permanent removal of habitat, or where habitat at the impact site will require greater than two years to be restored to pre-project conditions, values, and functions relative to time of impact.

3.3 Temporary Wetland and Channel Impact Mitigation. Temporary impacts to 4.47 acres of wetland and channel habitat (0.80 acres of diked marsh, 1.33 acres of tidal salt marsh, and 2.34 acres of tidal channel), shall be compensated at a minimum ratio of 1:1. Passive restoration methods may be used if they will result in the site meeting the definition of a temporary impact per Measure 3.2. The updated MMP (refer to Measure 3.1) shall include measures to actively restore the site if passive restoration is not successful.

3.4 Permanent Wetland and Channel Impact Mitigation. Permanent impacts to 5.60 acres of wetland and channel habitat (2.33 acres of diked marsh, 3.18 acres of tidal salt marsh, and 0.09 acres of tidal channel), shall be compensated at a minimum ratio of ratio of 2:1 through the installation of 11.2 acres of tidal marsh plantings. Plantings shall include approximately 7.63 acres of native high marsh plantings, 6.64 acres of high marsh/transition zone plantings, and 0.87 acre of high marsh/transition zone seed mix. Permittee shall include a planting plan (including species palette, planting densities, and success criteria) in the updated MMP (see Measure 3.1).

3.5 Riparian Tree Mitigation. In consideration of the dominance of non-native and invasive species within the project impact area, the fact that riparian trees did not historically occur within the project area, and to minimize perching opportunities for avian predators in the salt marsh habitat, loss of native and non-native riparian trees shall be compensated by a combination of out-of-kind/on-site mitigation and in-kind/off-site mitigation. Loss of 0.57 acres of riparian habitat shall be mitigated out-of-kind and on-site at a 2:1 ratio with restoration of 1.14 acres of tidal wetland which historically occurred within the project area. To fully meet the mitigation required to compensate for the loss of riparian trees, trees shall also be replaced

off-site at an appropriate location(s) as described in the updated MMP. The following tree replacement ratios shall apply:

3.5.1 Native tree species (except for oak) measuring 2-6 inches dbh shall be replaced with native tree species at a minimum ratio of 1:1 (trees replaced: trees impacted).
3.5.2 Native tree species (except for oak) measuring 7-30 inches dbh shall be replaced with native tree species at a minimum ratio of 3:1 (trees replaced: trees impacted).
3.5.3 Native tree species (except for oak) measuring greater than 30 inches dbh shall be replaced with native tree species at a minimum ratio of 5:1 (trees replaced: trees impacted).
3.5.4 Native oak trees measuring less than 13 inches dbh shall be replaced with similar native oak trees at a minimum ratio of 5:1 (trees replaced: trees impacted).
3.5.5 Native oak trees measuring 13-18 inches dbh shall be replaced with similar native oak trees at a minimum ratio of 8:1 (trees replaced: trees impacted).
3.5.6 Native oak trees measuring greater than 18 inches dbh shall be replaced with similar native oak trees at a minimum ratio of 10:1 (trees replaced: trees impacted).
3.5.7 Native trees removed from the mitigation sites associated with the Santa Clara Valley Water District's Matadero/Barron Creeks Long-Term Remediation Project and the City of Palo Alto's Pump Station Project shall be replaced at a minimum ratio of 6:1.

CDFW will consider installation of replacement tree plantings at an off-site location, to be described in the updated MMP and subject to CDFW approval. The updated MMP shall also include an updated assessment identifying the impacted riparian trees by species, dbh range, project element, and an updated planting plan (including species palette, planting densities, and success criteria).

3.6 Irrigation. Supplemental watering shall be used as necessary to establish and maintain plant growth in order to meet success criteria. Irrigation shall be done in the most water efficient manner possible, such as using hand watering, drip/micro-irrigation, or through the use of a time release system.

3.7 Phytophthora. Permittee shall implement measures to avoid using plant stock that may be infected with the plant pathogen *Phytophthora* sp. Measures to avoid contamination with *Phytophthora* sp. may include, but are not limited to, avoiding collection of propagules from 1) known or likely infected areas; 2) during wet conditions; 3) when soil is muddy; or 4) from within 0.5 meters of the soil surface. Measures may also include implementing heat or chemical treatments to collected seeds prior to installation. Such measures shall be included in the planting plan in the updated MMP that shall be submitted to CDFW for review and approval (see Measure 3.1).

4. Reporting Measures

Permittee shall meet each reporting requirement described below.

4.1 Annual Monitoring Report. Permittee shall provide to CDFW an annual monitoring report by February 1st of each year of monitoring until CDFW provides approval in writing that the Permittee's final mitigation success criteria have been achieved. The first annual monitoring report shall be due the first year after project completion.

CONTACT INFORMATION

Any communication that Permittee or CDFW submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or CDFW specifies by written notice to the other.

To Permittee:

Kevin Murray
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025
Phone (650) 324-1972
kmurray@sfcjpa.org

To CDFW:

Department of Fish and Wildlife
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
Attn: Lake and Streambed Alteration Program – Tami Schane
Notification #1600-2013-0092-R3
Fax (415) 831-4640 (call same number ahead of time to arrange fax time)
tami.schane@wildlife.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW's endorsement of, or require Permittee to proceed with the project. The decision to proceed with the project is Permittee's alone.

SUSPENSION AND REVOCATION

CDFW may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 *et seq*. (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and Permittee. To request an amendment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (FGC section 1605(f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after Permittee's signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the

applicable FGC section 711.4 filing fee listed at http://www.wildlife.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on December 31, 2020 unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

EXHIBITS

The documents listed below are included as exhibits to the Agreement and incorporated herein by reference.

Exhibit A. (Figure 1 – Proposed Project Elements)
Exhibit B. (Summary Table)
Exhibit C. (Figures 1a-1d - Impacts to Wetlands and Other Waters)
Exhibit D. (Tree Removal Map)

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

FOR SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY

_____ _____

Kevin Murray
Project Manager

Date

FOR DEPARTMENT OF FISH AND WILDLIFE

Craig Weightman
Environmental Program Manager

Date

Prepared by: Tami Schane
Environmental Scientist

Date Submitted: December 28, 2015
Date Revised: February 3, 2016

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue Room 325
Santa Rosa, California 95404

DEC 3 0 2015

Refer to NMFS No: SWR-2013-9572

Lieutenant Colonel John C. Morrow
U.S. Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project near the cities of East Palo Alto and Palo Alto in San Mateo and Santa Clara counties, California (Corps file #2013-00030S).

Dear Colonel Morrow:

Thank you for your letter of April 26, 2013, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the U.S. Army Corps of Engineers' (Corps) proposed authorization for the San Francisquito Creek Joint Powers Authority to undertake the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project in San Mateo and Santa Clara counties, California, under Section 404 of the Clean Water Act of 1973, as amended (33 USC Section 1344 *et seq.*).

The enclosed biological opinion is based on our review of the proposed project and describes NMFS' analysis of potential effects on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and threatened southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) and their critical habitat in accordance with section 7 of the ESA. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of threatened CCC steelhead or southern DPS green sturgeon, nor is it likely to adversely modify their critical habitat. However, NMFS anticipates take of CCC steelhead will occur during project construction as juvenile steelhead are likely to be present during dewatering of the work site for construction. An incidental take statement which applies to this project with non-discretionary terms and conditions is included with the enclosed biological opinion.

This document also includes the results of our analysis of the action's likely effects on Essential Fish Habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Based on our review, NMFS concludes the proposed project

would adversely affect EFH for species managed within the Pacific Coast Groundfish and Coastal Pelagic Species Fishery Management Plans. NMFS has included a conservation recommendation that can be taken by the action agency to avoid, minimize, or otherwise offset potential adverse effects on EFH. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving EFH Conservation Recommendations.

Please contact Amanda Morrison, North-Central Coast Office in Santa Rosa, California at (707) 575-6083 or Amanda.Morrison@noaa.gov if you have any questions concerning this biological opinion or EFH response, or if you require additional information.

Sincerely,

for

William W. Stelle, Jr.
Regional Administrator

Enclosure

cc: Gregory Brown, Corps Regulatory, San Francisco
Joseph Terry, US Fish and Wildlife Service, Sacramento
Tami Schane, California Department of Fish and Wildlife, Yountville
Susan Glendening, San Francisco Regional Water Quality Control Board, Oakland
Len Materman, San Francisquito Creek Joint Powers Authority, Menlo Park
Copy to ARN File # 151422SWR2013SR00116
Copy to Chron File

Endangered Species Act Section 7(a)(2) Biological Opinion
and Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project
San Mateo and Santa Clara Counties, California
(Corps File No. 2013-00030S)

NMFS Consultation Number: SWR-2013-9572

Action Agency: Army Corps of Engineers, San Francisco District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Central California Coast steelhead (*O. mykiss*)	Threatened	Yes	No	No
North American Green Sturgeon (*Acipenser medirostris*)	Threatened	Yes	No	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Groundfish	Yes	Yes
Pacific Coast Salmon	No	No
Coastal Pelagic	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: for

William W. Stelle, Jr.
Regional Administrator

Date: December 30, 2015

LIST OF ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BCDC	Bay Conservation and Development Commission
BMP	Best Management Practices
BOR	Federal Bureau of Reclamation
CDFW	California Department of Fish and Wildlife
Caltrans	California Department of Transportation
CCC	Central California Coast steelhead
Corps	U.S. Army Corps of Engineers
cy	cubic yards
cfs	cubic feet per second
DWR	California Department of Water Resources
DPS	distinct population segment
EFH	essential fish habitat
FMP	Fishery Management Plan
ft/s	foot per second
GCID	Glenn-Colusa Irrigation District
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MHHW	mean higher high water
MLLW	mean lower low water
MTL	mean tide level
mg/l	milligrams per liter
mm	millimeter
MMP	Mitigation and Monitoring Plan
NMFS	National Marine Fisheries Service
NTU	nephelometric turbidity units
O&M	Operations and Maintenance
PG&E	Pacific Gas and Electric
Refuge	U.S. Fish and Wildlife Don Edwards San Francisco Bay National Wildlife Refuge
RBDD	Red Bluff Diversion Dam
RSP	rock-slope protection
SFRWQCB	San Francisco Regional Water Quality Control Board
SFCJPA	San Francisquito Creek Joint Powers Authority
SCVWD	Santa Clara Valley Water District
SMP	Stream Maintenance Program
S-CCC	South-Central California Coast steelhead
SWRCB	State Water Resources Control Board
SHEP	Steelhead Habitat Enhancement Program
USFWS	U.S. Fish and Wildlife Service

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS' Public Consultation Tracking System (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). A complete record of this consultation is on file at the NMFS North-Central Coast Office in Santa Rosa, California.

1.2 Consultation History

November 8, 2011: NMFS attended a site visit along with staff from San Francisquito Creek Joint Powers Authority (SFCJPA), Santa Clara Valley Water District (SCVWD), and the U.S. Army Corps of Engineers (Corps).

April 26, 2013: NMFS received from the Corps the project's Biological Assessment (BA) (ICF International 2012) and the request for consultation on the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project (Project). In the initiation letter, the Corps determined the project may affect, but is not likely to adversely affect, threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and threatened southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) and their critical habitat. Additionally, the Corps determined that the project would not have substantial adverse effects on EFH for various federally managed fish species within the Pacific Coast Groundfish, Pacific Coast Salmon, and Coastal Pelagic Species Fishery Management Plans (FMP).

May 13, 2013: NMFS sent an electronic message to the Corps commenting on the BA and requesting additional information on the proposed project. The message mentioned that the description of the project contained in the

BA did not contain sufficient detail for NMFS to assess the potential impacts of the project, and requested additional clarification on the project description (*i.e.*, dewatering activities and using heavy equipment in the channel).

February – July 2014: NMFS attended multiple interagency meetings regarding the project with staff from the U.S. Fish and Wildlife Service's (USFWS) Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), the Corps, SCVWD, SFCJPA, California Department of Fish and Wildlife (CDFW), San Francisco Regional Water Quality Control Board (SFRWQCB), NMFS, and the Bay Conservation and Development Commission (BCDC) to discuss the various alternative configurations for the proposed project including filling in low spots in the Main Faber Marsh levee, degrading the Bay levee adjacent to Outer Faber Marsh near the mouth of San Francisquito Creek, and further setting back the levee into the Palo Alto Municipal Golf Course.

August 28, 2014: NMFS received from the Corps and SFCJPA the amended BA for the Project.

October 15, 2014: NMFS attended a site visit along with staff from SFCJPA, SCVWD, CDFW, and Corps. During the site visit NMFS was informed several additional documents regarding the project were available. These documents consisted of the Draft Mitigation and Monitoring Plan (MMP) (SFCJPA 2015c), Draft Operations and Maintenance (O&M) Plan (SFCJPA 2015a), and Temporary Water Diversion Plan (SFCJPA 2015b). NMFS received these documents from the SFCJPA on October 17, 2014.

November 3, 2014: NMFS sent a letter to the Corps and SFCJPA commenting on the August 2014 amended BA, the Draft MMP, and the Draft O&M Plan and requested additional information on channel capacity, sedimentation, and flooding, and fish passage and habitat. In this letter, NMFS also informed the Corps and SFCJPA that this information was necessary to complete the NMFS assessment of potential project impacts and conclude consultation.

April 24, 2015: NMFS attended a meeting with the Corps, SFRWQCB, SCVWD, and SFCJPA to discuss NMFS's comments and questions raised in the November 3, 2014, letter. The SFCJPA agreed to investigate the feasibility of, and provide to NMFS a conceptual proposal for incorporation of several project features (*i.e.*, velocity refuges and passive tidal marsh revegetation) to improve conditions for fish. The SFCJPA further agreed to provide: 1) updated planting plans and landscape sheets; 2) a table of wetlands impacts and mitigation calculations; 3) an updated MMP; 4) written responses to the points

	raised in the NMFS letter of November 3, 2014; and 5) HEC-RAS model results for existing conditions and proposed conditions. In addition, NMFS informed the Corps that the project may adversely affect ESA-listed species, critical habitat, and EFH and that a formal consultation will likely be necessary.
May – July 2015:	NMFS received via electronic mail from SFCJPA the responses to NMFS's comments and questions raised in the November 3, 2014, letter and the additional information the SFCJPA agreed to provide at the April 24, 2015, meeting.
July - October 2015:	NMFS participated in biweekly conference calls with SFCJPA, the Corps, USFWS, the Refuge, and SCVWD to discuss the information needed to complete the NMFS assessment.
July 30, 2015:	During a biweekly conference call with the SFCJPA, Corps, USFWS, and SCVWD, NMFS requested the SFCJPA and SCVWD schedule a future, focused meeting among themselves, USFWS (Regulatory and Refuge), Corps, and NMFS to discuss a scenario in which certain elevations of marsh plain would be allowed to passively revegetate.
August 19, 2015	NMFS provided via electronic mail to SFCJPA and the Corps comments on the additional information provided by the SFCJPA between May and July 2015 (*e.g.*, additional hydraulic and hydrologic information).
August 26, 2015:	NMFS participated in a conference call with SFCJPA and SCVWD to provide clarification on the additional hydrologic and hydraulic information NMFS requested on August 19, 2015.
September 3-24, 2015:	NMFS received via electronic mail from SFCJPA updated versions of the Draft O&M Plan (SFCJPA 2015); Temporary Water Diversion Plan; Draft MMP; and hydraulic and hydrologic information.
September 24, 2015:	NMFS participated in a conference call with SFCJPA, Corps, USFWS, and SCVWD to inform the Corps and SFCJPA that NMFS believes the information provided completes the consultation request package.
October 13, 2015:	NMFS attended a meeting with SFCJPA, SCVWD, Corps, USFWS Regulatory, Refuge, and SFRWQCB to discuss the tidal marsh design elevations and revegetation activities. During the meeting NMFS requested that the SFCJPA modify the proposed tidal marsh elevations to increase tidal salt marsh complexity and enhance ESA-listed fish habitat. The SFCJPA and SCVWD agreed to consider modifications and follow-up with NMFS within two weeks.

October 20, 2015:	Via electronic mail to the SFCJPA, SCVWD, and Corps, NMFS requested additional hydrologic information (*e.g.*, HEC-RAS model results for the 1 percent, 5 percent, and 50 percent [March-June] exceedance flows).
November 5, 2015:	During the biweekly project update call, NMFS informed the SFCJPA and Corps that SFRWQCB Estuarine Geomorphologist, Christina Toms, spoke with NMFS on October 26, 2015, regarding modifications to the Project's marshplain designs. NMFS explained the SFRWQCB believed that a passive approach to creating channel complexity in the tidal salt marsh would not be successful in the action area due to intense fluvial influences and that alternative methods would need to be taken to enhance ESA-listed fish habitat, specifically adult fish passage conditions. NMFS informed the SFCJPA that they will provide a memo summarizing their analysis of the Project's impacts on fish habitat and recommendations on the types of habitat enhancements that would be needed to enhance fish habitat within two weeks. NMFS also confirmed that they could rush completion of the Opinion, with a goal of completing it by December 15, 2015.
November 23, 2015:	NMFS provided the Corps, SFCJPA, and other resource agency representatives a technical memo prepared by fish passage engineer, Dave White, which summarized the fish passage issues associated with high channel velocities under some streamflow conditions in the project reach, and suggested design elements to provide velocity refuge in the project reach.
November 30, 2015:	In response to recommendations provided in the NMFS November 23, 2015, fish passage review memorandum, the SFCJPA submitted to NMFS and the Corps a preliminary proposal for the location, number and type of steelhead migration features to be incorporated in to project.
December 1, 2015:	A telephone conference call with representatives of NMFS, SFCJPA, USFWS and SCVWD was held to discuss SFCJPA's proposed steelhead fish passage features. NMFS informed the group that the proposal will likely address the most significant high velocity areas by creating resting sites behind boulders and rootwads. The SFCJPA agreed to incorporate these features into the project and continue to work with NMFS to develop the specific designs for each feature.
December 2, 2015:	The SFCJPA provided a revised proposal for steelhead fish passage features based on the December 1, 2015, conference call with NMFS.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The Corps proposes to issue a permit under Section 404 of the Clean Water Act of 1973 (33 U.S.C. Section 1344) to the SFCJPA to construct a 1.5 mile flood protection and habitat restoration project along San Francisquito Creek from San Francisco Bay to East Bayshore Road, near the cities of East Palo Alto and Palo Alto in San Mateo and Santa Clara counties, California (Figures 1-5). The SFCJPA is a regional government agency whose members include the Cities of Palo Alto, Menlo Park, and East Palo Alto, the San Mateo County Flood Control District, and the SCVWD. The purpose of the proposed activity is to improve flood protection (up to a 100-year flood flow event coupled with the influence of tides and projected sea level rise), restore and enhance habitat functions, and improve recreational opportunities within the project area. Major project elements include: levee setback and improvements, construction of floodwalls, extension of a pedestrian bridge, excavation of sediment deposits within the channel to maximize flood conveyance, relocation and removal of utilities, and revegetation of tidal marsh habitats. Construction of the project elements would likely take two years to complete. The project is scheduled to begin in 2016 and to be completed by 2018.

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interdependent or interrelated actions associated with the proposed action.

1.3.1. Construct Floodwalls and Rebuild, Relocate, and Degrade Levees

Approximately 5,650 linear feet of floodwalls will be constructed along the channel at the top of levees to increase flow capacity and maintain consistency with the California Department of Transportation's (Caltrans) enlargement of the U.S. 101/East Bayshore Road Bridge over the San Francisquito Creek. On the East Palo Alto side (north bank), concrete floodwalls up to 4 feet above top of bank (up to 13 feet from channel bottom) will be constructed along approximately 500 linear feet near Friendship Bridge (pedestrian bridge crossing the creek) (STA 28+00 to STA 33+00) (Figure 4) and along 2,300 linear feet of channel between Daphne Way (STA 52+50) and U.S. Highway 101/East Bayshore Road (STA 75+50) (Figure 5). On the Palo Alto side (south bank), sheetpile floodwalls up to 4 feet above top of bank (up to 13 feet from channel bottom) will be constructed along approximately 2,850 linear feet from Geng Road (STA 47+50) to Highway 101/East Bayshore Road Bridge (STA 76+00) (Figures 4 and 5).

Downstream of the floodwalls, the SFCJPA will rebuild the East Palo Alto Levee (northern levee) in its current location and relocate the Palo Alto Levee/Palo Alto Municipal Golf Course Levee (southern levee). Approximately 3,400 linear feet of the existing levee on the north side of the channel would be rebuilt to a greater strength and/or height from just downstream of Friendship Bridge (STA 21+00) (Figure 3) to Daphne Way (STA 55+00) to increase channel capacity (100-year water surface elevation). Approximately 55,000 cubic yards (cy) of fill will be used to reinforce and increase the height of the northern levee. Approximately 2,727 linear feet of the southern levee will be relocated and/or reinforced between the area just downstream

of Friendship Bridge (STA 22+73) and the area just downstream of Geng Road (STA 50+00). A portion of the levee will be relocated up to 200 feet east into the Palo Alto Municipal Golf Course and raised to increase channel capacity. This set back of the southern levee will create space for a floodplain terrace. Approximately 84,700 cy of fill will be used for the southern levee relocation. The elevation increase of both the northern and southern levees varies by up to 4 feet based on existing conditions and the necessary modifications at each station.

The SFCJPA will build about 10,176 linear feet of maintenance roads on the newly raised and relocated levees. The maintenance roads will also serve as pedestrian/bicycle trails. The roads will be up to 16 feet wide and paved with crushed granite, except for a 2,658 section on the south bank (STA 27+50 through 54+08), that will be paved with asphalt as part of the Bay Trail.

The SFCJPA will raise and grade a portion of the currently unmaintained levee between the creek and the Faber Tract (Faber Tract Levee) closer to its original design elevation to stabilize the levee and preserve existing frequency, volume, and velocities of fluvial discharge to the Faber Tract to optimize conditions for USFWS protected species that inhabit the Faber Tract marsh. Fill will be added to reinforce and raise the Faber Tract Levee up to 2 feet along 550 linear feet (STA 21+00 to STA 26+50) to reduce concerns regarding levee erosion and the potential for mass wasting leading to levee failure. In addition, the SFCJPA will incorporate a 6H:1V levee side slope on the side sloping into the Faber Tract. The 6H:1V levee side slope will help protect the levee toe from potential erosion due to flow overtopping along a 400-foot distance as the levee transitions upstream to a higher elevation closer to the Friendship Bridge. Approximately 12,000 cy of clean imported fill will be used to reinforce and redesign the Faber Tract levee.

The SFCJPA will degrade a 600 linear foot section of the northern levee east of the Faber Tract (referred to as the Bay Levee) to restore the tidal-fluvial interface in the marsh area east of the Faber Tract and to reduce water surface elevations in the creek between Friendship Bridge and the Bay. About 2,820 cy of sediment/soil will be removed along 600 linear feet (0.73 acres) of the Bay Levee (STA 3+50 to 9+50) (Figure 3) downstream of the Faber Tract in a marsh area that is already subject to daily tides from the Bay.

1.3.2. Excavate Sediment and Install Rock Slope Protection

About 175,890 cy of sediment will be removed from along 5,775 linear feet of the creek channel and associated channel expansion area to increase creek capacity and to maximize conveyance. In-channel sediment will not be reused because it is unlikely to provide suitable material for levee embankment use.

The JPA will install approximately 4,000 linear feet (3.71 acres) of rock-slope protection (RSP) at various locations along the length of the channel side of the Project to protect the levees against erosion and to stabilize the floodwalls. The RSP on the levees will be installed from the toe of the levee up the bank approximately 10 to 15 feet.

1.3.3. Construct Friendship Bridge Boardwalk Extension

The existing Friendship Bridge will be retained and a 202 linear foot boardwalk will be constructed from the retained eastern footing of the bridge and across the newly-expanded marshplain to connect with the realigned southern levee. The boardwalk will be the same width as the Friendship Bridge (140 feet long and 10 feet wide), constructed of timber deck and concrete piles, and require twenty 18-inch diameter concrete piles. The elevation of the low mark of the boardwalk will be set above the highest anticipated flood elevation, with the lowest point of the bridge a minimum of 5 feet above the marshplain terrace beneath it.

1.3.4. Relocate or Remove Utilities

The SFCJPA will remove, abandon, or replace several utility components for electricity, gas, and sanitary sewer, and stormwater runoff present within the Project right-of-way. SFCJPA will remove various storm drain pipelines existing within the golf course and at the top of the current levees that will be under the future southern levee and widened creek channel post project. This work will be concurrent with the levee and channel work. The SFCJPA will realign a sanitary sewer line that currently crosses the creek near the Friendship Bridge (STA 32+00 at the south bank to 34+50 at the north bank). As proposed, this task will involve open trenching with a minimum depth below ground surface of 3.5 feet for the new line. The sanitary sewer line would be encased in armored steel where it crosses the creek. This work would be concurrent with the levee construction work so will not have separate impacts to waters of the San Francisquito Creek. The SFCJPA will remove about 390 linear feet of existing sanitary sewer line.

The SFCJPA will coordinate with Pacific Gas and Electric (PG&E) to perform electricity and gas transmission system work before creek channel and levee construction work begins. PG&E's work is considered part of the Project and will be covered under the Corps' 404 permit for the Project. PG&E will realign the existing electricity transmission system that currently crosses over the creek from STA 52+00 (south bank) to R-line STA 48+00 (north bank). The new line will be shifted 250 feet south and cross over the creek at STA 51+00 (south bank) to STA 52+00 on the north bank. A transmission pole will be removed from both banks; replacing two existing poles, one on each bank; and adding two new poles on the north bank for the new line. In addition, PG&E will remove wires from six towers that run north to south along the far north bank right-of-way between STA 30+00 to STA 56+00. Of these six towers, one will be raised by 15 feet. The realigned section will connect to the southern-most pole in this series. Any replacement poles will be made of light-duty steel.

PG&E will replace the foundation of an existing electric transmission tower located in the floodplain of the future channel alignment footprint at STA 48+00, approximately 2,000 feet upstream of the Friendship Bridge. PG&E will demolish the existing foundation, build a temporary shoo-fly support, and build a permanent concrete foundation at the existing foundation site. The electricity tower on the old foundation will be lifted and placed onto the permanent concrete foundation with an area of 625 square feet. An access ramp will be built on the inboard side of the levee for this tower.

PG&E will abandon in place 3,000 linear feet of the gas transmission line located in the Project right-of-way, of which about 1,350 linear feet is in the new channel realignment footprint. THE SFCJPA will remove the abandoned gas transmission lines. PG&E estimates that the old line is 4.7 feet below grade beneath the creek channel. The SFCJPA will confirm the elevation during excavation activities.

The new gas line will be aligned south to north in the golf course, then will cross east to west through the Project right-of-way upstream of the Friendship Bridge from STA 32+00 (south bank) to STA 34+00 (north bank), and will extend west to a connection in East Palo Alto. The pipeline tunnel under the Creek will be bored by horizontal direction drilling at 25 feet below ground. The other portions of the pipeline will be installed by cut and fill at a minimum of 4 feet below ground surface.

PG&E will place three trench spoils piles equidistant from south to north along the south bank. Each pile is planned to be 100 feet by 100 feet. On the north bank, PG&E will place another 100 foot by 100 foot spoils pile next to the borehole site. The suitability of the spoils for reuse to cover the new pipeline will be determined after they are appropriately assessed during the utility activities, and any unused spoils will be hauled from the site and appropriately disposed of at an approved upland facility.

1.3.5. Revegetation

The action area encompasses 4.34 acres of diked marsh wetlands, 0.33 acres of freshwater marsh wetlands, 112.26 acres of tidal salt marsh wetlands, 1.13 acres of freshwater pond, 22.39 acres of tidal channel and bay waters, and 0.37 acres of tidal pans. The project construction is anticipated to impact a total of 3.13 acres of diked marsh, 4.51 acres of tidal salt marsh habitat, and 2.43 acres of tidal channel and bay waters. The diked marsh community is found on the landward side of the levees along San Francisquito Creek and within the Golf Course; and the tidal salt marsh vegetation is found throughout the Faber Tract and along both sides of San Francisquito Creek. The Project will result in the removal of between 162 and 256 trees. Of the potential of 256 trees to be removed, 220 of these are on the south side of the creek and the remaining 36 are on the north side.

After levee construction is complete, the tidal marsh area would be terraced and revegetated with high-marsh plants appropriate to the elevation relative to tidal levels in accordance with the MMP for the Project (SCVWD 2014). The high-marsh (above mean higher high water) will be planted with include alkali weed (*Cressa truxillensis*), saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), marsh jaumea (*Jaumea carnosa*), and perennial pickleweed (*Salicornia pacifica* [*S. virginica*]). The high-marsh transition planting area will be planted with fat hen (*Atriplex patula*), alkali weed, saltgrass, alkali heath, gumweed (*Grindelia* spp.), marsh jaumea, and western marsh rosemary (*Limonium californicum*). Native marsh plants will be used to revegetate the terraced land. Plants appropriate to the high marsh will be planted near the stream channel. Plants native to marsh transition areas would be planted in areas more distant from the creek channel and in the upper half of the Project area as elevation gains. Approximately 19,600 high marsh and high marsh transition wetland plants and cuttings are planned for installation. Plants will be sourced from the San Francisquito Creek watershed and Baylands areas.

A temporary irrigation system will be installed for use during the planting and three-year establishment phase, in order to provide a back-up water supply to the newly-installed vegetation in the event of a period of drought during the winter or spring rainy season, and for irrigation as needed during the summer. Irrigation frequency is expected to be reduced as the site develops during the establishment phase. The supplemental irrigation ensures an adequate supply of moisture to the young plants until they are fully established in the site's soils.

Annual monitoring will be conducted over a 5-year period. Performance goals related to revegetation efforts will aid in determining if the site is progressing incrementally toward meeting the year-5 success criteria (SFCJPA 2015c). Year 5 monitoring will determine if the success criteria have been achieved. Monitoring will be overseen or conducted by a qualified biologist with experience in vegetation monitoring. Final success will not be considered to have been achieved until temporary irrigation has been off for at least two years. The specific performance goals and criteria that will be used to determine if all revegetation was successful will be described in a Final MMP.

1.3.6. Dewatering of the Project Area

The project area is located in a reach of San Francisquito Creek that is influenced by tides and freshwater flow from the San Francisquito Creek watershed. Therefore, both a stream flow and tidal diversion will be necessary to dewater the project area for construction purposes. Water diversion will be implemented to maintain the work site as water-free as possible for the duration of in-channel work. The full width of the channel from tops of bank will be dewatered. Water incursion is expected from Bay tides, natural and urban runoff flows from upstream, outfalls downstream from the U.S. 101/East Bayshore Road Bridge, and discharges from the O'Connor Pump Station in East Palo Alto and the Palo Alto Pump Station.

Water diversion will include cofferdams upstream (to intercept stream flows) and downstream (to block tidal Bay waters) of the work site. Stream flows upstream of the site will be pumped through pipes that bypass the work site. Discharges from the two municipal pump stations located adjacent to the creek will be pumped from the clear wells into the diversion pipes as well. In addition, water that is diverted from the channel during dewatering will be retained, tested, and treated, as necessary, in order to meet all water quality effluent limitations as specified in the SFRWQCB, San Francisco Bay Region, Basin Plan (Basin Plan). Diversion pipe flow velocity dissipaters will be installed downstream of the cofferdam on existing banks. Pumps will be used to dewater the work site. Pumps will be required to: 1) reroute water from the stream, which accumulates above the upstream cofferdam; 2) dewater the construction area above the downstream cofferdam or where ponded; and 3) to reroute outflow at each of the two municipal pump stations (see below).

The cofferdams will be installed for the in-channel construction period between June 15th and October 15th at various locations, depending on the construction element, during the two construction seasons (see Table 1). Utilities and levee construction and dewatering will be completed in one season, and floodwall construction the following season.

Table 1. Cofferdam locations (approximate).

Construction Element	Downstream Location/Cofferdam Height	Upstream Location/Cofferdam height
Utilities Downstream Levee Construction	STA 13+00/12 ft	58+00/8ft
Upstream Floodwall Construction	49+00/10 ft	Within 50 ft upstream of U.S. 101 West Bayshore Road Bridge/ 8 ft

Groundwater depths are anticipated to be in the range of 1 to 3 feet below existing channel invert, so dewatering sumps may be required for excavation and will be utilized as necessary.

Dewatering for the utility crossings, levee work, and floodwall construction will be performed with the installation of a 36-inch diameter bypass pipe from above the upstream cofferdam to below the downstream cofferdam to allow anticipated construction season streamflows to avoid contacting the work area. The downstream cofferdams will be installed first and during the lowest tide during normal construction hours. The upstream cofferdams will be installed during the minimum streamflow expected during normal working hours. Diversion pipes and pumps will be in place and operational before cofferdams are installed. Cofferdams will remain in place and functional throughout the in-stream construction periods. Cofferdams will be removed at annual cessation of in-channel work, and channel and bank will be restored to pre-construction condition.

Dewatering for the Bay Levee deconstruction will be achieved by a floating silt curtain on both sides of the Bay Levee (STA 4+50 to 10+00) to prevent sediment from entering the adjacent marshland, creek, and San Francisco Bay. The silt curtains will be resistant to wind and high water velocity.

Cofferdams will be constructed of steel sheet pile embedded no less than 15 feet below the channel invert, gravel bags, and plastic sheeting. The piles will be installed with a backhoe or hammer attached to a backhoe. Gravel bags will be stacked against the sheet piles to the desired height. Gravel material will be between 0.4 and 0.8 inch in diameter, and will be clean and free from clay balls, organic matter, and other deleterious materials. The gravel bags will be placed on top of the plastic sheeting, which will be laid upon the channel invert or bank to prevent leakage. The gravel bags will be arranged so that each layer of gravel bag placed will be staggered in pyramid-like fashion. After the final height has been reached, the original plastic sheeting will be placed on top of the sandbags. To hold the plastic sheeting in place, gravel bags will be placed above the top plastic sheeting.

Water collected from the dewatered reach between cofferdams will be discharged through municipal storm drains to the City of East Palo Alto's pump station adjacent to the channel (O'Conner Street Pump Station). Additional water from urban sources will also be routed to this pump station, which normally outflows to the work area. To prevent flows from the East Palo Alto and Palo Alto pump stations from entering the work area, outflows will be pumped from the wet wells directly to the channel downstream of the downstream cofferdam or join the pump station outflow pipe to the stream diversion pipe.

The SFCJPA will ensure SFRWQCB and State Water Resources Control Board (SWRCB) water quality standards for receiving waters will be met during creek dewatering discharges, dewatering of excavations, and diverting creek and stormwater flows. Specifically, the instantaneous discharge pH will be in the range of 6.5 to 8.5 and shall not vary from ambient pH by more than 0.5 pH units; the discharge dissolved oxygen concentration will be no less than 5.0 milligrams per liter (mg/L) as an hourly average for discharging into tidal water and 7.0 mg/L (hourly average) for discharging into non-tidal receiving waters; dissolved sulfide will not be greater than 0.1 mg/L; the receiving water turbidity measured as nephelometric turbidity units (NTU) will not be greater than 10 percent of natural conditions in areas where natural turbidity is greater than 50 NTU (daily average); and the receiving waters will not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

The SFCJPA will identify an acceptable location or locations at which to measure background turbidity. Receiving water and discharge turbidity will be monitored at least one time every 8 hours on days when discharges from excavations or any other dewatering processes may occur.

1.3.7. Fish Collection and Relocation

Because the project will require water diversion and dewatering of work sites, fish within the project area will be collected and relocated in order to minimize their risk of being harmed or killed. The fish collection and relocation activities will be conducted by a NMFS/CDFW-approved biologist. Methods used to capture and relocate fish in the project area may include dip net and seine. Due to the high conductivity of brackish waters, electrofishing will not be used. The SFCJPA will submit a fish relocation plan to NMFS and CDFW for review no less than 90 days prior to beginning these activities for each phase of construction.

1.3.8. Operation and Maintenance

The SFCJPA has entered into a Construction Management Agreement with the SCVWD to designate the SCVWD as the lead agency responsible for project construction and post-project revegetation monitoring and management. The SFCJPA has also delegated responsibility for routine operation and maintenance of the Project, outside the scope of construction-related maintenance and monitoring activities, to the City of East Palo Alto and the SCVWD. Routine operations and maintenance include providing the proper care to levee embankments, floodwalls, channels, interior drainage system, and pump stations required for the efficient operation of the Project. The only operation and maintenance activity proposed by the SFCJPA as part of the Project is levee maintenance, vegetation management, and removal of trash and debris. The primary routine maintenance activities will consist of mowing levees to facilitate inspections, removal of trash and debris from the channel and channel benches, and control of burrowing rodents. Mowing will occur on the sides of the levee, which, on the inboard side of the levee, extend to the tidal marsh. Maintenance activities will be performed in accordance with the Best Management Practices Handbook (Attachment F to the SCVWD 2014-2023 SMP).

Additional future maintenance within the completed flood channel could include sediment removal, vegetation removal, levee repair, floodwall maintenance, removal of woody debris from the channel, repair of rock slope protection, maintenance of access roads, and repair and maintenance of outfalls and culverts. These activities, within specified limits and mitigation measures, are conducted as part of the SCVWD's Stream Maintenance Program (SMP). NMFS and the Corps completed formal section 7 consultation in 2014 on a 10-year (2014-2023) SMP conducted by SCVWD within stream channels of Santa Clara County, including San Francisquito Creek. A biological opinion was issued to the Corps on April 29, 2014 (See Section 2.3.3.2 for more detail). At this time, no maintenance activities outside the actions described above and outside the purview of SCVWD's SMP are anticipated.

1.3.9. Proposed Best Management Practices and Fish Protection Measures

Based on a fish passage analysis performed by NMFS, the SFCJPA proposes to install six structures in the flood control channel that are designed to provide velocity refuge for upstream migrating adult steelhead. Five of the structures will be constructed with rock and rootwads as a "constructed log jam". The sixth structure will be a rock spur structure extending from the lower tip of the Friendship Bridge Island into the low flow channel. All six structures will be placed in or adjacent to the low flow channel at approximately 300 feet intervals in the middle reach of the project. These structures will be designed to create velocity breaks and fish resting areas during high flow events and low tide conditions.

During project construction, operation and maintenance activities, the project will implement BMPs to avoid and/or minimize potential impacts to special-status species and their designated critical habitat. All activities will be performed in accordance with Best Management Practices Handbook (Attachment F to the SCVWD 2014-2023 SMP). The BMP handbook is a comprehensive document that includes minimization measures related to hazards and hazardous materials, hydrology and water quality, bank protection, stormwater management, discharge activities, grading and excavation, sediment removal and storage, vegetation management and removal, and other topics.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

San Francisquito Creek Watershed drains approximately 47.5-square miles on the eastern side of the Santa Cruz Mountains. Major tributaries include Bear Creek, Corte Madera Creek, and Los Trancos Creek, which converge to form San Francisquito Creek. The project area has a Mediterranean climate, typical of the California's central coast, with cool, wet winters and a long, mild dry season. Rainfall in the winter averages approximately 35 inches per year, falling mainly between the months of October and March. Portions of the upper San Francisquito Creek watershed are perennial and support spawning and rearing habitat for CCC steelhead. Sections of the mainstem of San Francisquito Creek dry by late spring or early summer in most years (Launer and Spain 1998; Metzger 2002; Stokes 2006).

The action area consists of the lower 1.5 miles of San Francisquito Creek in an existing flood control channel and adjacent marsh areas. The action area encompasses 4.34 acres of diked marsh wetlands, 0.33 acres of freshwater marsh wetlands, 112.26 acres of tidal salt marsh wetlands, 1.13 acres of freshwater pond, 22.39 acres of tidal channel and bay waters, and 0.37 acres of tidal pans. The diked marsh community is found on the landward side of the levees along San Francisquito Creek and within the Golf Course; and the tidal salt marsh vegetation is found throughout the Faber Tract and along both sides of San Francisquito Creek. From upstream to downstream, the constructed channel flows southwest to northeast through the cities of East Palo Alto and Palo Alto. The proposed project is located between where U.S. Highway 101 crosses San Francisquito Creek at the border of southern San Mateo and northern Santa Clara counties and the confluence of San Francisquito Creek with San Francisco Bay. This 7700 linear foot reach of San Francisquito Creek is located in a moderately urbanized, low gradient area, historically occupied by extensive tidal marshes at the edge of San Francisco Bay. The project location experiences daily tidal fluctuations.

2. ENDANGERED SPECIES ACT CONSULTATION: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[1]

[1] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

For critical habitat, NMFS determines the range-wide status of critical habitat by examining the condition of its physical or biological features (also called "primary constituent elements" or PCEs) - which were identified when critical habitat was designated. Species and critical habitat status are discussed in section 2.2 of this biological opinion.

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources referenced in the Consultation History section. Information was also provided in electronic mail messages and telephone conversations between April 2013 and November 2015. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses

(Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

the current function of the essential physical and biological features that help to form that conservation value.

2.2.1. Species Description, Life History, and Status- CCC Steelhead

In this opinion, NMFS assesses four population viability parameters to help analyze the status of CCC steelhead and the population's ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al.* 2000). NMFS has used the best available scientific and commercial information to determine the general condition of the population and factors responsible for the current status of the DPS.

The population viability parameters are used as surrogates for numbers, reproduction, and distribution; the criteria to be analyzed pursuant to the regulatory definition of jeopardy (50 CFR §402.02). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained. This results in reduced population resilience to environmental variation at local or landscape-level scales.

2.2.1.1. CCC Steelhead General Life History

Steelhead are anadromous forms of *O. mykiss*, spending some time in both fresh- and saltwater. The older juvenile and adult life stages reside in the ocean, until the adults ascend freshwater streams to spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al.* 1996). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults.

General reviews for steelhead in California document much variation in life history (Barnhart 1986; Busby *et al.* 1996; Shapovalov and Taft 1954). Although variation occurs, in coastal California steelhead usually live in freshwater for 1 to 2 years before emigrating to the ocean. Juvenile steelhead emigration from San Francisco Bay natal streams occurs episodically during winter and spring months, and generally occurs during high flow events. Barnhart (1986) reports that peak smolt migration occurs in March and April, and steelhead smolts in California typically range in size from 140 to 210 millimeter (mm) (fork length). Steelhead of this size can withstand higher salinities than smaller fish, and are more likely to occur for longer periods in tidally influenced estuaries, such as San Francisco Bay. Steelhead smolts in most river systems must pass through estuaries prior to seawater entry. Once they leave their natal streams, steelhead will spend 1 to 3 years in the ocean before returning to spawn.

Based on the timing of adult migration from the ocean to freshwater, CCC steelhead are classified as winter-run steelhead. Adult CCC steelhead typically enter freshwater between December and April, peaking in January and February (Fukushima and Lesh 1998). Steelhead

females build redds to bury eggs for a several month-long incubation period. Redds are generally located in areas where the hydraulic conditions are such that fine sediments, for the most part, are sorted out and streamflow is constant. This is because, during the incubation period, the intragravel environment must permit a constant flow of water to deliver dissolved oxygen and to remove metabolic wastes. Other intragravel parameters such as the gravel permeability, water temperature, substrate composition, and organic material in the substrate effect the survival of eggs to fry emergence (Chapman 1988; Everest *et al.* 1987; Shapovalov and Taft 1954). Adult steelhead may spawn 1 to 4 times over their life span.

Steelhead fry rear in freshwater edgewater habitats and move gradually into pools and riffles as they grow larger. Cover, water temperature, sediment, and food items are important habitat components for juvenile steelhead. Cover in the form of woody debris, rocks, overhanging banks, and other in-water structures provide velocity refuge and a means of avoiding predation (Bjornn *et al.* 1991; Shirvell 1990). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986; Bjornn and Reiser 1991b; Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 20 degrees (°) Celsius (C) (Hokanson *et al.* 1977; Myrick and Cech 2005; Wurtsbaugh and Davis 1977). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby *et al.* 1996).

Turbidity (*i.e.*, water clarity) also can influence the behavior, distribution, and growth of steelhead (Cordone and Kelley 1961; Newcombe and Jensen 1996; Newcombe and MacDonald 1991; Redding *et al.* 1987; Sigler *et al.* 1984). The impacts of turbidity on juvenile salmonids are largely linked to factors such as background turbidity levels and the duration of turbid conditions. Bisson and Bilby (1982) found that juvenile coho salmon that were acclimated to clear water did not exhibit significant sediment avoidance until the turbidity reached 70 NTUs. Sigler *et al.* (1984) observed avoidance of turbid water by juvenile steelhead and coho when exposed to turbidities as low as 38 NTUs and 22 NTUs, respectively, for a period of 15-17 days. Sigler *et al.* (1984) also observed that fish kept in these turbid conditions had lower growth rates than fish kept in clear water for the same amount of time.

2.2.1.2. Status of CCC Steelhead DPS and Critical Habitat

Historically, approximately 70 populations[2] of steelhead existed in the CCC steelhead DPS (Spence *et al.* 2008; Spence *et al.* 2012). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt *et al.* 2005). The remaining populations were

[2] Population as defined by Bjorkstedt *et al.* 2005 and McElhaney *et al.* 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (Bjorkstedt *et al.* 2005; McElhany *et al.* 2000).

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River - the largest population within the DPS (Busby *et al.* 1996). Near the end of the 20th century the population of wild CCC steelhead in the Russian River was estimated to be between 1,700-7,000 fish (Busby *et al.* 1996; Good *et al.* 2005) . Recent estimates for the Russian River population are unavailable since monitoring data is limited. Abundance estimates for smaller coastal streams in the DPS indicate low population levels that are slowly declining, with recent estimates (2011/2012) for several streams (Redwood [Marin County], Waddell, San Vicente, Soquel, and Aptos creeks) of individual run sizes of 50 fish or less (Nature Conservancy 2013). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al.* 2005). Similar losses in genetic diversity in the Napa River may have resulted from out-of-basin and out-of-DPS releases of steelhead in the Napa River basin in the 1970s and 80s. These transfers included fish from the South Fork Eel River, San Lorenzo River, Mad River, Russian River, and the Sacramento River. In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: (Busby *et al.* 1996; Good *et al.* 2005; Spence *et al.* 2008; Williams *et al.* 2011).

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. In 2005, a status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al.* 2005). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[3] (Spence *et al.* 2008). Monitoring data from the last ten years of adult CCC steelhead returns in Lagunitas and Scott creeks show steep declines in adults in 2008/2009. In 2011/2012 population levels began to increase, but still remained lower than levels observed over the past ten years (Nature Conservancy 2013). The most recent status update found that the status of the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since Good *et al.* (2005), does not

[3] Viable populations have a high probability of long-term persistence (> 100 years).

appear to suggest a change in extinction risk. On December 7, 2011, NMFS chose to maintain the threatened status of the CCC steelhead (76 FR 76386).

Critical habitat was designated for CCC steelhead on September 2, 2005 (70 FR 52488) and includes PCEs essential for the conservation of CCC steelhead. These PCEs include estuarine areas free of obstruction and excessive predation with the following essential features: (1) water quality, water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and (3) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (70 FR 52488).

The condition of CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[4]: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation. Impacts of concern include alteration of streambank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased streambank erosion, loss of shade (higher water temperatures) and loss of nutrient inputs (70 FR 52488 ; Busby *et al.* 1996). Water development has drastically altered natural hydrologic cycles in many of the streams in the DPS. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Overall, current condition of CCC steelhead critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

2.2.2. Species Description, Life History, and Status- Southern DPS Green Sturgeon

2.2.2.1. Green Sturgeon General Life History

Green sturgeon is an anadromous, long-lived, and bottom-oriented fish species in the family Acipenseridae. Sturgeon have skeletons composed mostly of cartilage and lack scales, instead possessing five rows of characteristic bony plates on their body called "scutes." On the underside of their flattened snouts are sensory barbels and a siphon-shaped, protrusible, toothless mouth. Large adults may exceed 2 meters in length and 100 kilograms in weight (Moyle 1976). Based on genetic analyses and spawning site fidelity, NMFS determined that North American green sturgeon are comprised of at least two DPSs: a northern DPS consisting of populations originating from coastal watersheds northward of and including the Eel River ("northern DPS

[4] Other factors, such as over fishing and artificial propagation have also contributed to the current population status of steelhead. All these human induced factors have exacerbated the adverse effects of natural factors such as drought and poor ocean conditions.

green sturgeon"), with spawning confirmed in the Klamath and Rogue river systems; and a southern DPS consisting of populations originating from coastal watersheds south of the Eel River ("southern DPS green sturgeon"), with spawning confirmed in the Sacramento River system (Adams *et al.* 2002).

Green sturgeon is the most marine-oriented species of sturgeon (Moyle 2002). Along the West Coast of North America, they range in nearshore waters from Mexico to the Bering Sea (Adams *et al.* 2002), with a general tendency to head north after their out-migration from freshwater ((Lindley *et al.* 2011). While in the ocean, archival tagging indicates that green sturgeon occur in waters between 0 and 200 meters depth, but spend most of their time in waters between 20–80 meters and temperatures of 9.5–16.0°C (Huff *et al.* 2011; Nelson *et al.* 2010). Subadult and adult green sturgeon move between coastal waters and estuaries (Lindley *et al.* 2011; Lindley *et al.* 2008), but relatively little is known about how green sturgeon use these habitats. Lindley *et al.* (2011) reported multiple rivers and estuaries are visited by aggregations of green sturgeon in summer months, and larger estuaries (*e.g.*, San Francisco Bay) appear to be particularly important habitat. During the winter months, green sturgeon generally reside in the coastal ocean. Areas north of Vancouver Island are favored overwintering areas, with Queen Charlotte Sound and Hecate Strait likely destinations based on detections of acoustically-tagged green sturgeon (Lindley *et al.* 2008; Nelson *et al.* 2010).

Based on genetic analysis, (Israel *et al.* 2009) reported that almost all green sturgeon collected in the San Francisco Bay system were southern DPS. This is corroborated by tagging and tracking studies which found that no green sturgeon tagged in the Klamath or Rogue rivers (*i.e.*, Northern DPS) have yet been detected in San Francisco Bay (Lindley *et al.* 2011). However, green sturgeon inhabiting coastal waters adjacent to San Francisco Bay include northern DPS green sturgeon.

Adult southern DPS green sturgeon spawn in the Sacramento River watershed during the spring and early summer months (Moyle *et al.* 1995). Eggs are laid in turbulent areas on the river bottom and settle into the interstitial spaces between cobble and gravel (Adams *et al.* 2007). Like salmonids, green sturgeon require cool water temperatures for egg and larval development, with an upper thermal limit for developing embryos of 17˚C (Van Eenennaam *et al.* 2005). Eggs hatch after 6–8 days, and larval feeding begins 10–15 days post-hatch. Larvae grow into juveniles typically after a minimum of 45 days (post-hatch) when fish have reached 60–80 mm total length (TL) and have migrated downstream. Juveniles spend their first few years in the Delta and San Francisco estuary before entering the marine environment as subadults. Juvenile green sturgeon salvaged at the State and Federal water export facilities in the southern Delta are generally between 200 mm and 400 mm TL (Adams *et al.* 2002), which suggests southern DPS green sturgeon spend several months to a year rearing in freshwater before entering the Delta and San Francisco estuary. Laboratory studies conducted by Allen and Cech (2007) indicated juveniles approximately 6 month old were tolerant of saltwater, but approximately 1.5-year old green sturgeon appeared more capable of successful osmoregulation in salt water.

Subadult green sturgeon spend several years at sea before reaching reproductive maturity and returning to freshwater to spawn for the first time (Nakamoto *et al.* 1995). Little data are available regarding the size and age-at-maturity for the southern DPS green sturgeon, but it is

likely similar to that of the northern DPS. Male and female green sturgeon differ in age-at-maturity. Males can mature as young as 14 years and female green sturgeon mature as early as age 16 (Van Eenennaam *et al.* 2006). Adult green sturgeon are believed to spawn every two to five years. Recent telemetry studies by Heublein *et al.* (2009) indicate adults typically enter San Francisco Bay from the ocean and begin their upstream spawning migration between late February and early May. These adults on their way to spawning areas in the upper Sacramento River typically migrate rapidly through the estuary toward their upstream spawning sites. Preliminary results from tagged adult sturgeon suggest travel time from the Golden Gate to Rio Vista in the Delta is generally 1-2 weeks. Post-spawning, tagged southern DPS green sturgeon displayed two outmigration strategies (Heublein *et al.* 2009); outmigration from Sacramento River prior to September 1 and outmigration during the onset of fall/winter stream flow increases. The transit time for post-spawning adults through the San Francisco estuary appears to be very similar to their upstream migration (*i.e.*, 1-2 weeks).

During the summer and fall, an unknown proportion of the population of non-spawning adults and subadults enter the San Francisco estuary from the ocean for periods ranging from a few days to 6 months (Lindley *et al.* 2011). Some fish are detected only near the Golden Gate, while others move as far inland as Rio Vista in the Delta. The remainder of the population appear to enter bays and estuaries farther north from Humboldt Bay, California to Grays Harbor, Washington (Lindley *et al.* 2011).

Green sturgeon feed on benthic invertebrates and fish (Adams *et al.* 2002). Radtke (1966) analyzed stomach contents of juvenile green sturgeon captured in the Sacramento-San Joaquin Delta and found the majority of their diet was benthic invertebrates, such as mysid shrimp and amphipods (Corophium spp). Dumbauld *et al. (2008)* report that immature green sturgeon found in Willapa Bay, Grays Harbor, and the Columbia River Estuary, fed on a diet consisting primarily of benthic prey and fish common to these estuaries (ghost shrimp, crab, and crangonid shrimp), with burrowing thalassinid shrimp representing a significant proportion of the sturgeon diet. Dumbauld *et al.* (2008) observed feeding pits (depressions in the substrate believed to be formed when green sturgeon feed) in soft-bottom intertidal areas where green sturgeon are believed to spend a substantial amount foraging.

2.2.2.2. Status of Southern DPS Green Sturgeon and Critical Habitat

To date, little population-level data have been collected for green sturgeon. In particular, there are no published abundance estimates for either northern DPS or southern DPS green sturgeon in any of the natal rivers based on survey data. As a result, efforts to estimate green sturgeon population size have had to rely on sub-optimal data with known potential biases. Available abundance information comes mainly from four sources: 1) incidental captures in the CDFW white sturgeon (*Acipenser transmontanus*) monitoring program; 2) fish monitoring efforts associated with two diversion facilities on the upper Sacramento River; 3) fish salvage operations at the water export facilities on the Sacramento-San Joaquin Delta; and 4) dual frequency sonar identification in spawning areas of the upper Sacramento River. These data are insufficient in a variety of ways (short time series, non-target species, etc.) and do not support more than a qualitative evaluation of changes in green sturgeon abundance.

CDFW's white sturgeon monitoring program incidentally captures southern DPS green sturgeon. Trammel nets are used to capture white sturgeon and CDFW utilizes a multiple-census or Peterson mark-recapture method to estimate the size of subadult and adult sturgeon population (https://www.dfg.ca.gov/fish/Resources/Sturgeon/). By comparing ratios of white sturgeon to green sturgeon captures, estimates of southern DPS green sturgeon abundance can be calculated. Estimated abundance of green sturgeon between 1954 and 2001 ranged from 175 fish to more than 8,000 per year and averaged 1,509 fish per year. Unfortunately, there are many biases and errors associated with these data, and CDFW does not consider these estimates reliable. For larval and juvenile green sturgeon in the upper Sacramento River, information is available from salmon monitoring efforts at the Red Bluff Diversion Dam (RBDD) and the Glenn-Colusa Irrigation District (GCID). Incidental capture of larval and juvenile green sturgeon at the RBDD and GCID have ranged between 0 and 2,068 green sturgeon per year (Adams *et al.* 2002). Genetic data collected from these larval green sturgeon suggest that the number of adult green sturgeon spawning in the upper Sacramento River remained roughly constant between 2002 and 2006 in river reaches above Red Bluff (Israel and May 2010). In 2011, rotary screw traps operating in the Upper Sacramento River at RBDD captured 3,700 larval green sturgeon which represents the highest catch on record in 16 years of sampling (Poytress *et al.* 2011).

Juvenile green sturgeon are collected at water export facilities operated by the California Department of Water Resources (DWR) and the Federal Bureau of Reclamation (BOR) in the Sacramento-San Joaquin Delta. Fish collection records have been maintained by DWR from 1968 to present and by BOR from 1980 to present. The average number of southern DPS green sturgeon taken per year at the DWR facility prior to 1986 was 732; from 1986 to 2001, the average per year was 47 (70 FR 17386). For the BOR facility, the average number prior to 1986 was 889; from 1986 to 2001 the average was 32 (70 FR 17386). Direct capture in the salvage operations at these facilities is a small component of the overall effect of water export facilities on southern DPS green sturgeon; entrained juvenile green sturgeon are exposed to potential high levels of predation by non-native predators, disruption in migratory behavior, and poor habitat quality. Delta water exports have increased substantially since the 1970s and it is likely that this has contributed to negative trends in the abundance of migratory fish that utilize the Delta, including the southern DPS green sturgeon.

During the spring and summer spawning period, researchers with University of California Davis have utilized dual-frequency identification sonar (*i.e.*, DIDSON) to enumerate adult green sturgeon in the upper Sacramento River. These surveys estimated 175 to 250 sturgeon (±50) in the mainstem Sacramento River during the 2010 and 2011 spawning seasons. However, it is important to note that this estimate may include some white sturgeon, and movements of individuals in and out of the survey area confound these estimates. Given these uncertainties, caution must be taken in using these estimates to infer the spawning run size for the Sacramento River, until further analyses are completed.

The southern DPS green sturgeon was listed as threatened on April 7, 2006 (71 FR 17757). NMFS determined that the southern DPS green sturgeon was likely to become endangered in the foreseeable future due to the substantial loss of spawning habitat, the concentration of a single spawning population in one section of the Sacramento River, and multiple other risks to the species such as stream flow management, degraded water quality, and introduced species (NMFS

2005). A recent status review update concluded that there has been no significant change in the status of Southern DPS green sturgeon since they were listed as Threatened in 2006 (NMFS 2015). This was based on an evaluation of new information generated since the 2006 which indicated that some threats, such as those posed by fisheries and impassable barriers, have been reduced. It also identified an emerging threat posed by nearshore and offshore energy development that requires continued attention into the future. Overall, the new information did not provide conclusive data indicating that habitat conditions and factors have changed in severity or degree of threat since 2006, and that additional research is needed. Since many of the threats cited in the original listing still exist, on August 11, 2015, NMFS chose to maintain the threatened status of the southern DPS green sturgeon (NMFS 2015).

Critical habitat was designated for the southern DPS of green sturgeon on October 9, 2009 (74 FR 52300). Critical habitat includes coastal marine waters within 60 fathoms depth from Monterey Bay, California to Cape Flattery, Washington, and includes the Strait of Juan de Fuca to its United States boundary. Designated critical habitat also includes the Sacramento River, lower Feather River, lower Yuba River, Sacramento-San Joaquin Delta, Suisun Bay, San Pablo Bay, and San Francisco Bay in California. PCEs of designated critical habitat in estuarine areas are food resources, water flow, water quality, mitigation corridor, depth, and sediment quality. In freshwater riverine systems, PCEs of green sturgeon critical habitat are food resources, substrate type or size, water flow, water quality, migratory corridor, depth, and sediment quality. In nearshore coastal marine areas, PCEs are migratory corridor, water quality, and food resources.

The current condition of critical habitat for the southern DPS of green sturgeon is degraded over its historical conditions. It does not provide the full extent of conservation values necessary for the recovery of the species, particularly in the upstream riverine habitat of the Sacramento River. In the Sacramento River, migration corridor and water flow PCEs have been impacted by human actions, substantially altering the historical river characteristics in which the southern DPS of green sturgeon evolved. In addition, the Delta may have a particularly strong impact on the survival and recruitment of juvenile green sturgeon due to their protracted rearing time in brackish and estuarine waters.

2.2.3. Factors Responsible for Steelhead and Sturgeon Stock Declines

NMFS cites many reasons (primarily anthropogenic) for the decline of steelhead (Busby *et al.* 1996) and southern DPS of green sturgeon (Adams *et al.* 2002; National Marine Fisheries Service (NMFS) 2005). The foremost reason for the decline in these anadromous populations is the degradation and/or destruction of freshwater and estuarine habitat. Additional factors contributing to the decline of these populations include: commercial and recreational harvest, artificial propagation, natural stochastic events, marine mammal predation, and reduced marine-derived nutrient transport.

The following section details the general factors affecting the CCC steelhead and southern green sturgeon in California. The extent to which there are species specific differences in these factors is not clear; however, the freshwater and estuarine ecosystem characteristics necessary for the

maintenance of self-sustaining populations of steelhead and green sturgeon are similar. Therefore, most of these factors below affect both steelhead and green sturgeon.

2.2.3.1. Habitat Degradation and Destruction

The best scientific information presently available demonstrates a multitude of factors, past and present, have contributed to the decline of west coast salmonids by reducing and degrading habitat by adversely affecting essential habitat features. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by urban development, agriculture, poor water quality, water resource development, dams, gravel mining, forestry (Adams *et al.* 2002; Busby *et al.* 1996; Good *et al.* 2005), and lagoon management (Bond 2006; Smith 1990).

The final rule listing Southern DPS green sturgeon indicates that the principle factor for the decline in the DPS is the reduction of spawning to a limited area in the Sacramento River (71 FR 17757). The constriction of spawning areas is caused by passage impediments associated with several dams, weirs, and diversions on the Sacramento River and its tributaries. While some of these passage impediments have been improved (*e.g.*, RBDD), significant numbers of these structures continue to impede passage of green sturgeon to spawning areas.

2.2.3.2. Commercial and Recreational Harvest

Ocean salmon fisheries off California are managed to meet the conservation objectives for certain stocks of salmon listed in the Pacific Coast Salmon FMP, including any stock that is listed as threatened or endangered under the ESA. Early records did not contain quantitative data by species until the early 1950's. In addition, the confounding effects of habitat deterioration, drought, and poor ocean conditions on salmonids make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of salmonids and green sturgeon in West Coast rivers.

Since being listed in 2006, landing and sales of green sturgeon is prohibited. A recent analysis of green sturgeon bycatch (Lee et al. 2015) estimated the number of Southern DPS green sturgeon bycatch in federally managed fisheries (*e.g.*, LE groundfish bottom trawl, IFQ groundfish bottom trawl, and at-sea hake fisheries) was 20.9 in 2011, 12.1 in 2012, and 5.5 in 2013, below NMFS's authorized take level of 28 per year (NMFS 2012).

2.2.3.3. Artificial Propagation

Releasing large numbers of hatchery fish can pose a threat to wild steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991).

2.2.3.4. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected steelhead and green sturgeon populations throughout their evolutionary histories. The effects of these events are exacerbated by anthropogenic changes to watersheds such as logging, roads, and water diversions. These anthropogenic changes have limited the ability of steelhead and green sturgeon to rebound from natural stochastic events and further depressed populations to critically low levels.

2.2.3.5. Marine Mammal Predation

The population of some marine mammal species, such as the Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*), have increased along the Pacific Coast (NMFS 1999). Although predation by these mammals is not believed to be a major factor in overall population decline, there may be substantial localized impacts on steelhead particularly during the migration season (Hanson 1993). CDFW notes predation on Southern DPS green sturgeon by California sea lions in the Sacramento River, bays, and Delta[5]. Steller and California sea lion abundance has increased in recent decades (NMFS 2013).

2.2.3.6. Invasive Species

San Francisco Bay is considered one of the most invaded estuaries in the world (Cohen and Carlton 1998). Invasive species contribute up to 99 percent of the biomass of some of the communities in the Bay (Cloern and Jassby 2012). Invasive species can disrupt ecosystems that support native populations. While there have been numerous invasions in the Bay, the best documented and studied invasive is the nonnative overbite clam (*Corbula amurensis*). It is a small clam native to rivers and estuaries of East Asia that is believed to be introduced in the ballast waters of ships entering the Bay in the late 1980s. The overbite clam can utilize a broad suite of food resources and withstand a wide range of salinities, including a tolerance of salinities less than 1 part per thousand (Nichols *et al.* 1990). Its introduction has corresponded with a decline in phytoplankton and zooplankton abundance due to grazing by the overbite clam (Kimmerer *et al.* 1994). Prior to its introduction, phytoplankton biomass in the Bay was approximately three times what it is today (Cloern 1996; Cloern and Jassby 2012), and the zooplankton community has changed from one having large abundances of mysid shrimp, rotifers, and calanoid copepods to one dominated by copepods indigenous to East Asia (Winder and Jassby 2011).

Kogut (2008) noted that overbite clams passed through the gut of white sturgeon alive. NMFS assumes that this may occur with green sturgeon too. Clams passing alive through a sturgeon's gut may lead to adverse effects on calorie and nutrient intake of sturgeon and may be a mechanism to assist in distribution of overbite clams to novel areas.

[5] California Department of Fish and Wildlife submitted comments in response to NMFS' invitation to review the green sturgeon Southern DPS draft status review in 2013.

2.2.3.7. Reduced Marine-Derived Nutrient Transport

Marine-derived nutrients from adult salmon carcasses have been shown to be vital for the growth of juvenile salmonids and the surrounding terrestrial and riverine ecosystems (Bilby *et al.* 1996; Bilby *et al.* 1998; Gresh *et al.* 2000). Declining salmon and steelhead populations have resulted in decreased marine-derived nutrient transport to many watersheds. This has contributed to the further decline of ESA-listed salmonid populations (Gresh *et al.* 2000).

2.2.3.8. Ocean Conditions

Recent evidence suggests poor ocean conditions played a significant role in the low number of returning adult fall run Chinook salmon to the Sacramento River in 2007 and 2008 (Lindley *et al.* 2009). The decline in ocean conditions likely affected ocean survival of all west coast salmonid populations (Good *et al.* 2005; Spence *et al.* 2008). Changing ocean conditions could also impact Southern DPS green sturgeon since subadults and adults use ocean habitats for migration and potentially for feeding. Based on their use of coastal bay and estuarine habitats, subadults and adults can occupy habitats with a wide range of temperature, salinity, and dissolved oxygen levels, so predicting the impact of climate change in these environments is difficult (Kelly *et al.* 2007; Lindley *et al.* 2008).

2.2.3.9. Global Climate Change

One factor affecting the rangewide status of CCC steelhead and Southern DPS green sturgeon, and aquatic habitat at large is climate change. The acceptance of global climate change as a scientifically valid and human caused phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies *et al.* 2001; Oreskes 2004; UNFCCC 2014). The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. This warming is inseparably linked to the oceans, the biosphere, and the world's water cycle. Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies *et al.* 2001). In general, as the magnitude of climate fluctuations increases, the population extinction rate also increases (Good *et al.* 2005). Global warming is likely to manifest itself differently in different regions.

Modeling of climate change impacts in California suggests average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007; Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al.* 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is

expected to decline. For the California North Coast, some models show large increases (75 to 200 percent) while other models show decreases of 15 to 30 percent (Hayhoe *et al.* 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to green sturgeon. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002). The projections described above are for the mid to late 21st Century. In shorter time frames natural climate conditions are more likely to predominate (Cox and Stephenson 2007; Smith and Murphy 2007).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02).

2.3.1. Status of Critical Habitat in Action Area

Designated critical habitat for CCC steelhead includes all aquatic habitat within the action area. Within the action area, essential features of critical habitat include estuarine areas. The critical habitat designation for CCC steelhead specifies that:

> *…estuarine areas should be free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. These features are essential to conservation because without them juveniles cannot reach the ocean in a timely manner and use the variety of habitats that allow them to avoid predators, compete successfully, and complete the behavioral and physiological changes needed for life in the ocean. Similarly, these features are essential to the conservation of adults because they provide a final source of abundant forage that will provide the energy stores needed to make the physiological transition to fresh water, migrate upstream, avoid predators, and develop to maturity upon reaching spawning areas* (70 FR 52488).

These essential features of designated critical habitat for adult and juvenile steelhead within the action area are partially degraded and limited due to channelization, high water velocities, limited water depth and natural cover, lack of emergent marsh, and reduced channel complexity (*i.e.*, floodplains and side channels).

The project's action area is located within designated critical habitat for the southern DPS of green sturgeon. PCEs essential for green sturgeon critical habitat in estuarine areas include food

resources, water flow, water quality, migratory corridor, water depth, and sediment quality. These PCEs for green sturgeon critical habitat in the action area are partially degraded. NMFS believes the overall PCE for rearing of green sturgeon is degraded due to the poor overall condition of the habitat, including a lack of emergent marsh, limited depth and cover, and reduced channel complexity. Adult southern DPS green sturgeon are only known to spawn in deep, turbulent pools in the upper Sacramento River below Keswick Dam and therefore spawning would not occur in the San Francisquito Creek watershed.

2.3.2. Status of Listed Species in the Action Area

2.3.2.1. CCC Steelhead

The San Francisquito Creek watershed CCC steelhead population represents one of only a few known remaining runs in tributary streams to South San Francisco Bay. The mainstem of San Francisquito Creek provides access between the headwaters of the watershed and San Francisco Bay and, thus, is essential for the immigration of steelhead adults and the emigration of smolts. Juvenile and adult abundance data for this watershed are very limited.

Based on the limited surveys that have been conducted, adult steelhead currently occur in San Francisquito Creek and its tributaries (Launer and Spain 1998; Leidy *et al.* 2005). Most steelhead presence data are based on observations from local residents/biologists and pertain primarily to the upper watershed. Launer and Spain (1998) conducted observations of fish and amphibian communities in San Francisquito Creek through the Stanford University (approximately 6 miles upstream of the action area) property during the summer of 1997. Based on their observations, they estimated a few thousand juvenile steelhead inhabited that segment of the creek, which represents a small fraction of the total available rearing habitat available to steelhead in the watershed. In the summer of 2004, juvenile steelhead were captured and relocated at two sites on the upper mainstem of San Francisquito Creek. Juvenile steelhead densities at the two sites were approximately 17 and 12 fish per 100 feet respectively (D.W. Alley and Associates 2004).

During the course of their downstream migration, juvenile steelhead may utilize the estuarine reaches of San Francisquito Creek and San Francisco Bay for seasonal rearing, but available information suggests that fish are actively migrating and currently they do not reside in estuarine reaches or the San Francisco Bay estuary (Chapman *et al.* 2015). Historically, the tidal marshes of San Francisco Bay provided a highly productive estuarine environment for juvenile anadromous salmonids. However, loss of habitat, changes in prey communities, and water-flow alterations and reductions have degraded habitat and likely limit the ability of the Bay and the action area to support juvenile rearing. MacFarlane and Norton (2002) found that fall-run Chinook experienced little growth, depleted condition, and no accumulation of lipid energy reserves during the relatively limited time the fish spent transiting the 40-mile length of the estuary. Sandstrom *et al.* (2013) found that CCC steelhead smolts emigrated more rapidly through the Bay than the Napa River and the ocean.

Steelhead use of the action area would be primarily as migratory habitat for adults and smolts migrating in and out of the watershed during the winter and spring months. As noted earlier,

reaches upstream of the U.S. Highway 101 Bridges go dry in most years and therefore summer rearing habitat is not available at this location (Launer and Spain 1998; Leidy *et al.* 2005; Metzger 2002). In the action area, NMFS expects juvenile and smolt steelhead presence during construction activities is unlikely due to the lack of connection with upstream freshwater rearing areas in the summer months, the timing of project construction (*i.e.,* at the end of the smolt out-migration season), and the poor quality of rearing habitat described above.

2.3.2.2. Southern DPS Green Sturgeon:

Sub-adult and non-spawning adult green sturgeon are found in San Francisco Bay during the summer months; however, acoustic tagging studies suggest the duration of residence by an individual is typically 6 weeks . There are no known records of green sturgeon utilizing San Francisquito Creek. Green sturgeon have occasionally been captured by CDFW during trawl surveys in southern San Francisco Bay, and acoustic tagging studies have reported tagged green sturgeon in the vicinity of the Dumbarton Bridge, approximately 2.5 miles north of the Project (ECORP Consulting, Inc. unpublished data 2011).

While no surveys for green sturgeon have been conducted in the action area, tidal sloughs are used as foraging habitat by green sturgeon. Green sturgeon prey on demersal fish (*e.g.*, sand lance) and benthic invertebrates similar to those that green sturgeon are known to prey upon in estuaries of Washington and Oregon . Green sturgeon are known to be generalist feeders and may feed opportunistically on a variety of benthic species encountered. For example, the invasive overbite clam has become the most common food of white sturgeon, and for the green sturgeon that have been examined to date (CDFG 2002). Based on distribution data and foraging habits of green sturgeon, NMFS assumes they are present in the action area when tidal conditions permit. Based on the poor condition of habitat in the action area for green sturgeon (*i.e.,* shallow waters, poor cover, and limited foraging habitat) NMFS expects very few green sturgeon will be present in the action area during project construction.

2.3.2.3. Factors Affecting Species Environment within San Francisquito Creek and the Action Area

Factors affecting watershed reaches upstream of the action area have impacted steelhead, and to a significantly lesser degree affected green sturgeon. Jones and Stokes (2006) conducted a limiting factors analysis for steelhead in the San Francisquito Creek. Based on their conclusion, multiple factors are impacting the survival and abundance of steelhead in San Francisquito Creek. They identified poor overwintering habitat (*i.e.,* a lack of deep, complex pools) as the primary limiting factor for juvenile survival. Although the availability of summer rearing habitat was not found to be a limiting factor, they noted that summer rearing habitat was degraded due to a lack of deep pools, low abundance of large woody debris, limited coarse substrate accumulations caused by channelization, urban development, and stream flow regulation. Steelhead outmigration success is limited by seasonal drying which may be further impacted by fish passage impediments in San Francisquito Creek. In dry to average years, low spring outmigration flows severely limits passage for out-migrating smolts. Multiple dams in the upper watershed have blocked approximately 33 percent of the historic steelhead spawning habitat in the San Francisquito Creek watershed (Spence *et al.* 2008).

The lower reaches of San Francisquito Creek are heavily channelized and bordered by levees and dikes. Some areas of stream bank are armored with concrete to prevent erosion. In the action area, San Francisquito Creek is tidally influenced. The action area consists of a flood control channel with two tight curves, two long straight sections, and one soft bend. The current channel is confined by earthen levees for most of its length except in a small 300 foot long reach in the middle of the channel where the levees have partially degraded. Channel widths from the top of the northern to southern levees ranges between 110 to 200 feet. The flood control channel has an irregular v-shaped low flow channel bordered by a gentle sloping marshplain. The Palo Alto Municipal Golf Course is located on the south side of the creek within a portion of the action area.

Historically, this reach consisted of a sinuous main channel that transitioned into a distributary tidal marshland approximately 0.5 miles from the mouth of the creek (Hermstad 2009). Historical conditions supported a highly complex habitat structure with multiple entry/exit points, depth variability, more abundant woody debris in the channel, and a more expansive floodplain. All of which contributed to higher water levels at low tide, increased depth variability, and reduced stream velocities through the multichannel marsh. Major re-routing of the lower reaches took place in the late 1920s, with levees constructed on both sides of the creek for flood control and development purposes (Hermstad 2009). Constriction of the marsh within a narrow corridor has led to the current condition of a simplified channel and homogenous marshplain, with no side channels, deep pools, or large woody debris to provide natural cover for fish. Freshwater flow through the action area during the dry season is either non-existent or consists largely of urban runoff.

2.3.3. Previous Section 7 Consultations and Section 10 Permits in the Action Area

Within the past ten years, pursuant to section 7 of the ESA, NMFS conducted section 7 consultations in the action area:

2.3.3.1. Hwy 101Bridge Replacement Project

NMFS and the Caltrans completed formal section 7 consultation on Caltrans' proposal to replace the U.S. Highway 101 Bridge over San Francisquito Creek, and a biological opinion was issued on May 29, 2011. The biological opinion analyzed the effects of construction and operation of the bridge on CCC steelhead and southern DPS green sturgeon and their critical habitat. The biological opinion concluded that the project was not likely to jeopardize steelhead or green sturgeon, or adversely modify their critical habitat.

2.3.3.2. SCVWD Stream Maintenance Permit

NMFS and the Corps completed formal section 7 consultation on SCVWD's activities to be conducted between 2014 and 2023 in Santa Clara County as part of the SCVWD's SMP. A biological opinion was issued on April 29, 2014. The biological opinion analyzed the effects of maintenance activities on CCC steelhead, South-Central California Coast (S-CCC) steelhead, southern DPS green sturgeon, and their critical habitat. The biological opinion concluded that

the project was not likely to jeopardize CCC steelhead, S-CCC steelhead, or southern DPS green sturgeon, or adversely modify their critical habitat.

2.3.3.3. Stanford University's proposed Steelhead Habitat Enhancement Program (SHEP) (NMFS PCTS #SWR-2006-00892 and WCR 2014- 875; and Corps File No. 28630S)

NMFS and the Corps completed formal section 7 consultation regarding Stanford University's proposed SHEP, and a biological opinion was issued on April 21, 2008. The formal consultation evaluated modifications to Stanford's San Francisquito Pump Station and the Los Trancos Diversion. The consultation and resulting biological opinion also evaluated the future operation of the San Francisquito Pump Station and Los Trancos Diversion under the SHEP's minimum bypass flow requirements. The biological opinion concluded the project was not likely to jeopardize the continued existence of threatened CCC steelhead or adversely modify CCC steelhead designated critical habitat.

The Corps requested reinitiation of formal consultation with NMFS in June 2014, to address a bank stabilization structure that failed at the Los Trancos Diversion facility and unsuccessful riparian mitigation plantings that needed to be replanted. The formal consultation analyzed the effects of these actions on CCC steelhead and their critical habitat, and a biological opinion was issued on August 27, 2014. The biological opinion concluded the project was not likely to jeopardize the continued existence of threatened CCC steelhead or adversely modify CCC steelhead designated critical habitat.

2.3.3.4. Stanford University's Habitat Conservation Plan (HCP)

In addition to the above interagency consultation, NMFS conducted an internal section 7 consultation on the proposed issuance of an ESA section 10(a)(1)(B) Incidental Take Permit (ITP) for Stanford's 2011 HCP. NMFS completed a biological opinion on October 19, 2012, which concluded the issuance of a 50-year ITP was not likely to jeopardize the continued existence of threatened CCC steelhead or adversely modify CCC steelhead designated critical habitat. However, NMFS did not proceed with the issuance of the ITP because Stanford requested by letter dated December 6, 2012, that NMFS suspend the processing of their application until such time as the Searsville Alternative Study is complete or advanced to a point where Stanford better understands the best future for Searsville Dam and Reservoir.

2.3.3.5. Research and Enhancement Permits

Research and enhancement projects resulting from NMFS' Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the action area. Salmonid and sturgeon monitoring approved under these programs includes juvenile and adult net surveys and tagging studies. In general, these activities are closely monitored and require measures to minimize take during the research activities. As of November 2015, no research or enhancement activities requiring Section 10(a)(1)(A) research and enhancement permits or section 4(d) limits have occurred in the action area.

2.4 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

In this biological opinion, our approach to determine the effects of the action was based on institutional knowledge and a review of the ecological literature and other relevant materials. We used this information to gauge the likely effects of the proposed project via an exposure and response framework that focuses on the stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, to which CCC steelhead and southern DPS green sturgeon are likely to be exposed. Next, we evaluate the likely response of the above listed fish to these stressors in terms of changes to survival, growth, and reproduction, and changes to the ability of PCEs or physical and biological features to support the value of critical habitat in the action area. PCEs, and physical and biological features, include sites essential to support one or more life stages of the species. These sites for migration, spawning, and rearing in turn contain physical and biological features that are essential to the conservation of the species. Where data to quantitatively determine the effects of the proposed action on listed fish and their critical habitat were limited or not available, our assessment of effects focused mostly on qualitative identification of likely stressors and responses.

2.4.1. Effects on Species

2.4.1.1. Steelhead and Green Sturgeon Passage and Rearing Conditions

NMFS fish passage facility design criteria (NMFS 2011) re intended to assist with improving conditions for salmonids that must migrate past man-made structures to complete their life cycle. The criteria were developed by integrating knowledge about fish behavior, physiology, and bio-mechanics with hydraulic, hydrology, and engineering specifications of typical fish passage designs. For a structure to meet NMFS's fish passage requirements it ultimately must provide for the safe, timely, and efficient upstream and downstream passage of anadromous salmonids at impediments created by artificial structures, natural barriers, or altered instream hydraulic conditions.

There are no specific criteria for flood control channels, per se, but design criteria for similar structures (*i.e.,* fishways) can be adapted to flood control channels. NMFS assessed fish passage within the flood control channel using the hydraulic design criteria for culverts and other road crossings. The hydraulic design method is a design process that matches the hydraulic performance of a culvert with the swimming abilities of a target species and age class of fish. It is only suitable in streams with sufficiently low gradient. This method targets distinct species of fish and therefore does not account for ecosystem requirements of non-target species. There are significant errors associated with estimation of hydrology and fish swimming speeds that are resolved by making conservative assumptions in the design process. Determination of the high and low fish passage design flows, water velocity, and water depth is required for this option.

The hydraulic design method requires hydrologic data analysis, open channel flow hydraulic calculations, and information on the swimming ability and behavior of the target group of fish. This design method is intended for the design of new, replacement culverts, and retrofitted culverts. NMFS chose to use this criterion as opposed to another method that heavily relies on geomorphic attributes (*i.e.*, the active channel method or stream simulation method) since the flood control channel exhibits a very simplified geometry and more closely resembles a very long natural bottom culvert than a natural, more complex channel.

The range of fish passage flows is frequently defined by exceedance flows obtained from a flow duration curve for the site. The San Francisquito Creek stream gage, operated by the USGS from 1950 to 2015 (65 years of record), is located near the Junipero Serra Boulevard Road crossing, roughly 6 to 7 miles upstream of the flood control channel. The historic daily average streamflow data from this gaging station was used to construct a flow duration curve for the project site representing flow conditions during the period of assumed adult steelhead migration (December through March).

Design high flow for fishways is the mean daily average streamflow that is exceeded 1 percent of the time on an annual basis, or the 5 percent exceedance flow if the flow duration is based on the period of fish migration. The fish passage design high flow is the highest streamflow for which migrants are expected to be present, migrating, and dependent on the channel or fishway for safe passage. Design low flow for fishways is the mean daily average streamflow that is exceeded 50 percent of the time on an annual basis. If the 50 percent exceedance flow is less than 3 cubic feet per second (cfs), then the low flow design should be for 3 cfs. The fish passage design low flow is the lowest streamflow for which migrants are expected to be present, migrating, and dependent on the channel or fishway for safe passage.

For San Francisquito Creek, the 5 percent exceedance during November through April is approximately 160 cfs which was selected as the high fish passage design flow for upstream steelhead passage. Since this is based on a more expansive timeframe than the peak steelhead migration window (December through March) in which the majority of high flows occur, 160 cfs is likely an underestimate of the 5 percent exceedance flow during the period of migration. For San Francisquito Creek the 95 percent exceedance flow during the period of migration is less than 1 cfs, so the alternative minimum flow of 3 cfs was selected as the low fish passage design flow for upstream steelhead passage.

A different set of criteria is commonly used by NMFS to assess juvenile salmonid passage. NMFS guidance recommends assessing high flow juvenile fish passage by calculating the average water velocity within a facility at the 10 percent annual exceedance flow (NMFS 2001) or the 50 percent exceedance flow for the time period corresponding to juvenile upstream passage (March through June) (NMFS 2011). The 50 percent exceedance flow in San Francisquito Creek during the period of juvenile passage is approximately 2.6 cfs which was selected as the high fish passage design flow for juvenile passage. NMFS guidance recommends the 95 percent annual exceedance flow or 1 cfs, whichever is greater, should be used for juveniles. The 95 percent exceedance flow during the migration period in San Francisquito Creek is less than 1 cfs, so the 95percent annual exceedance is less than that, and therefore the 1 cfs alternative was selected as the low design flow for juvenile passage.

During these design flows, NMFS fish passage guidance requires structures to maintain maximum average water velocities of less than or equal to 1 foot per second (ft/s) to enable juvenile steelhead to move throughout the structure; and between 2 and 6 ft/s to enable adult steelhead passage. The velocity threshold for adult passage is dependent upon the length of the structure in which the fish is migrating through (Table 2). Since the San Francisquito Flood Project reach is approximately 7700 linear feet, NMFS fish passage guidance prescribes a maximum allowable water velocity of 2 ft/s or less to enable adult steelhead passage.

Table 2. Maximum allowable average culvert velocity prescribed for fish passage structures using the hydraulic design criteria (NMFS 2001).

Culvert Length (ft)	Velocity (fps) - Adult Salmonids
<60	6
60-100	5
100-200	4
200-300	3
>300	2

NMFS fish passage guidance prescribed a minimum water depth at the fish passage design flows of 1.0 foot for adult steelhead and 0.5 feet for juvenile steelhead, as measured in the centerline of the channel. Table 3 summarizes NMFS fish passage criteria relevant to the project.

Table 3. Fish passage criteria and design flows for the San Francisquito Creek Flood Control Project.

Steelhead Passage Design Flows	Design Exceedance Flow for migration period, unless otherwise noted (EF)	Streamflow at Design EF(cfs)	Maximum Average Water Velocity (ft/s)	Depth Criteria (ft)
Adult High	5 percent	160	2	1
Adult Low	95 percent or 3cfs, whichever is greater.	3	2	1
Juvenile High	50 percent	5	1	0.5
Juvenile Low	95 percent on annual basis or 1cfs, whichever is greater	1	1	0.5

Steelhead passage conditions at the project specific design flows were assessed by NMFS in the flood control reach using HEC-RAS model results for flows close to the design flows listed in Table 3 which were provided by the SCVWD and SFCJPA. The HEC-RAS results predict the water surface elevations, channel depths, and water velocities at various river stations throughout the project reach for the proposed design. In some instances, cross sections of the channel were

provided to illustrate water surface elevation profiles in the reach at certain flows. NMFS requested HEC-RAS results for both the Mean Lower Low Water (MLLW) and Mean Higher High Water (MHHW) tidal stages.

During the MHHW tide stage, tidal backwater extends upstream of the project reach creating suitable passage conditions for juveniles and adults. Tidal backwater also extends upstream of the project reach at the Mean Tide Level (MTL) and all the tidal stages between the MTL and MHHW. NMFS assumes the tidal backwater effect creates suitable fish passage conditions at all tidal stages between MTL and MHHW. This constitutes about 12 hours of the daily tidal cycle.

During the lower end of the tidal cycle (between MLLW and MTL) tidal backwater extent varies between STA 2+27 and the upstream end of the project. This constitutes about 12 hours of the daily tidal cycle. Based on the HEC-RAS results, high design flow stream velocities will exceed the 2 ft/s velocity threshold at some locations during the lower tidal range (MLLW to MTL). To provide hydraulic breaks and resting areas for upstream migrating adult steelhead, the project has proposed the installation of five complex rootwad and boulder structures in the low flow channel between STA 28+97 and 46+07. An additional rock spur structure will also be installed at the downstream tip of Friendship Bridge Island. The rock spur structure will extend into the low flow channel and function as a partial weir. These features have been incorporated into the channel design to function as an analog for native historic velocity refuges and would also provide cover and other habitat benefits for adult and juvenile steelhead. These structures will be strategically placed to avoid excessively long reach(es) with relatively swift water velocities and no resting opportunities. As a result, adult steelhead are expected to ascend the flood control channel at the high design fish passage flow (5 percent exceedance flow) under all tidal conditions.

For the upstream passage of juvenile steelhead, the high design flow stream velocities are anticipated to consistently exceed the 1 ft/s velocity threshold during the low tidal range. This may result in an excessively long reach(es) with relatively swift water velocities at high stream flows and no velocity refuge. Under low flow conditions during periods of low tide, water depths in the channel are not expected to meet the 0.5 ft criterion, and very shallow water depths could impede the movement of steelhead juveniles. However, at this downstream location in San Francisquito Creek, steelhead juveniles are anticipated to be primarily smolts and actively moving downstream. Upstream movement in this reach of stream is not essential since they have reached the tidally-influenced portion of San Francisquito Creek and they are generally committed at this stage to passing into San Francisco Bay, and subsequently the Pacific Ocean. The majority of smolts will likely be moving through the action area during periods of moderate and high flows in the spring when passage conditions are anticipated to be adequate for downstream passage to San Francisco Bay. Under low flow conditions, the alluvial reaches of San Francisquito Creek upstream of the action area experience very shallow depths and smolts will unlikely be descending into the project reach under these conditions. Therefore, the hydraulic and geomorphic conditions in the action area as a result of the Project are not expected to adversely affect smolt steelhead emigrating through the action area.

For green sturgeon, NMFS did not conduct a fish passage assessment because sturgeon are not expected to ascend San Francisquito Creek. Adult and juvenile green sturgeon may enter and

depart the project reach during periods of high tide when adequate water depths allow sturgeon access into the project area. No impediments to the passage of green sturgeon in the action area are anticipated by project construction.

2.4.1.2. Dewatering and Fish Relocation

To protect water quality, and avoid direct and indirect mortality of fishes from construction activities, SFCJPA will bypass stream flow around the work area and dewater the work site in areas where in-stream work occurs. The project will require channel dewatered during up to two consecutive dry seasons. A vast majority, if not all, of the water present during the summer months would be tidal waters. The SFCJPA will submit a final dewatering and fish relocation plan to NMFS and the Corps prior to construction. This plan will provide a detailed description of the methods that will be employed, individuals conducting the work, dewatering sites, and relocation sites. All construction will occur during the summer low-flow between June 15 and October 15.

Stream flow diversions and dewatering is expected to cause temporary loss, alteration, and reduction of aquatic habitat, including critical habitat, in the action area. Dewatering activities could harm individual juvenile steelhead and green sturgeon by concentrating or stranding them in residual wetted areas (Cushman 1985) before they are relocated. Juvenile steelhead and green sturgeon could be killed or injured during dewatering activities, though direct mortality is expected to be minimal due to relocation efforts prior to installation of the bypass system. The proposed bypass system, which isolates the work areas to be dewatered; will allow stream flow in the San Francisquito Creek to continue flowing downstream.

Before the project site is dewatered, a qualified biologist will capture fish and relocate them away from the project work site to avoid direct mortality and minimize possible impacts during project dewatering and construction of the work site. Fish in the immediate project area will be captured by seine and/or dip net, and then transported and released at an appropriate location. Electrofishing will not be used to capture fish due to potentially high salinity/conductivity levels in the tidal channel. Data to precisely quantify the amount of steelhead that will be relocated prior to construction are not available. However, based on the proposed timing of project construction, NMFS can narrow the life-history-stage to juvenile steelhead because in-channel work activities will occur during the summer low-flow period after emigrating steelhead smolts have left and before adult migration has been initiated. In addition, the project reach is tidally-influenced and the presence of juvenile steelhead during the summer months in this area is expected to be low. However, the areas to be de-watered for project construction are large and the project reach includes 1.5 miles of lower San Francisquito Creek. Therefore, the steelhead that are likely to be captured during relocation activities should not exceed 20 pre-smolting juveniles, each year of construction. Based on distribution data and foraging habits of green sturgeon, their occurrence in the action area is assumed to be rare. Therefore, no individual green sturgeon are anticipated to be captured during relocation activities, each year of construction.

Fish capture and relocation activities pose a risk of injury or mortality to fish species. Fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996) has some associated

risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists, direct effects to and mortality of steelhead during capture are expected to be minimized. Data from years of similar salmonid relocation activities indicate that average mortality rate is below one percent (Jeffrey Jahn, NMFS, personal communication, November 2015). Based on this information, NMFS will use 2 percent as the maximum amount of mortality likely from fish relocation for the project, or no more than one fish, each year of construction.

Fish collection is unlikely to be 100-percent effective at removing all individuals, but experienced biologists are expected to remove approximately greater than 95 percent of the fish present. Juvenile steelhead that evade capture and remain in the project area will likely be lost to desiccation or thermal stress during dewatering activities. This will result in the mortality of one steelhead, each year of construction.

Fish encountered during dewatering will be relocated to a downstream or upstream location in similarly brackish conditions. Because the project is located adjacent to the San Francisco Bay, fish relocated downstream will have direct access to ample Bay habitats and adjacent fringe marshes. Fish relocated upstream may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with resident fish for available resources such as food and habitat. Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have more habitat and a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS cannot accurately estimate the number of fish affected by competition, but does not believe this impact will affect the survival chances of individual fish or cascade through the watershed population of these species based on the small area that will likely be affected and the small number of steelhead likely to be relocated. As a result, fish are not expected to experience crowding or any reductions in fitness from relocation.

Another manner by which juvenile steelhead and green sturgeon may be harmed or killed during dewatering activities is to be entrained into pumps or discharge lines if these methods are used. To eliminate this risk, the SFCJPA will screen all pumps according to NMFS criteria, to ensure juvenile steelhead and green sturgeon will not be harmed by the pumps during dewatering events.

Juvenile steelhead and green sturgeon foraging within the action area may be inadvertently affected by the loss of benthic aquatic macroinvertebrate production associated with construction disturbance. However, effects to aquatic macroinvertebrates resulting from dewatering will be temporary because construction activities will be limited to the summer period during two consecutive years, drift from upstream will continue through the bypass pipes, and rapid recolonization (about two to three months) of disturbed areas by macroinvertebrates is expected following construction (Cushman 1985; Harvey 1986; Thomas 1985). Furthermore, the project area is located in the tidally-influenced reach of San Francisquito Creek, so benthic aquatic organisms from San Francisco Bay are likely to rapidly recolonize the action area from sources downstream of the project area. Based on the foregoing, the temporary loss of aquatic

macroinvertebrates as a result of dewatering activities and channel disturbances is not expected to adversely affect juvenile steelhead or green sturgeon.

2.4.1.3. Construction Related Impacts on Water Quality

Water Quality. In-stream and near-stream construction activities may cause temporary increases in turbidity (reviewed in Furniss *et al.* 1991, Everest *et al.* 1991, and Spence *et al.* 1996), reductions in dissolved oxygen, changes to pH, and other alterations in water quality. NMFS anticipates only short-term changes to ambient water quality conditions will occur during proposed activities (*e.g.,* construction and removal of cofferdams and the initial re-wetting of the channel following the removal of the diversion). High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Berg and Northcote 1985; Bjornn *et al.* 1977; Cordone and Kelley 1961), reduce growth rates (Crouse *et al.* 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality (Berg and Northcote 1985; Gregory and Northcote 1993; Sigler *et al.* 1984; Waters 1995). Even small pulses of turbid water will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival.

The SFCJPA will ensure water quality during construction will meet RWQCB and SWRCB water quality standards by monitoring water quality at reference sites and works sites at regular time intervals and implementing BMPs (see Sections 1.3.6 and 1.3.9). Water quality will remain close to ambient conditions. These slight alterations to water quality may cause minor behavioral changes (Henley *et al.* 2000), but are not expected to result in injury or mortality (immediate or latent) of fish. Behavioral changes will likely materialize as fish temporarily vacating preferred habitat or temporarily reduced feeding efficiency. These temporary changes in behavior, may reduce growth rates, but are not likely to reduce the survival chances of individual juveniles. Water quality alteration is expected to be limited to the immediate area of construction activities plus varying distances up and downstream (depending on the tidal stage). Fish will be able to move from the areas where degraded water quality may occur to the ample Bay habitats and fringing tidal marshes nearby. Therefore, any short-term impacts associated with changes in water quality during implementation of this project are expected to be insignificant.

Toxic Chemicals. Equipment refueling, fluid leakage, equipment maintenance, and road surfacing activities near the stream channel pose some risk of contamination of aquatic habitat and subsequent injury or death to listed salmonids. The SFCJPA and its contractors propose to maintain any and all fuel storage and refueling site in an upland location well away from the stream channel; that vehicles and construction equipment be in good working condition, showing no signs of fuel or oil leaks, and that any and all servicing of equipment be conducted in an upland location. For instream construction activities, NMFS does not anticipate any localized or appreciable water quality degradation from toxic chemicals or adverse effects to steelhead or green sturgeon associated with the proposed project, as the stream will be dewatered, giving the SFCJPA and its contractors ample opportunity to attend to any spill prior to toxic chemicals reaching the waters of San Francisquito Creek. NMFS anticipates proposed BMPs and responses

by the SFCJPA and its contractors to any accidental spill of toxic materials should be sufficient to restrict the effects to the immediate area and not enter the waterway. Therefore, any short-term impacts associated toxic chemicals during implementation of this project are expected to be insignificant.

2.4.2. Effects on Critical Habitat

Designated critical habitat for Southern DPS green sturgeon and CCC steelhead occurs in the action area. The Project may impact designated critical habitat for these species by maintaining the existing condition of minimal natural cover, altering water quality, and temporarily reducing foraging habitat.

2.4.2.1. Natural Cover

Tidal salt marsh vegetation is found throughout the action area. Tidal salt marsh habitat is primarily supported by tidal exchange. Dominant plant species in the tidal salt marsh community include Pacific cordgrass (*Spartina foliosa*), pickleweed, perennial peppergrass (*Lepidium latifolium*), gumplant (*Grindelia stricta*), and alkali heath (*Frankenia salina*). Narrow bands of brackish tidal marsh are present along a few-hundred-foot section of San Francisquito Creek downstream of East Bayshore Road. In the brackish marsh, bulrush (*Schoenoplectus* sp.) is the dominant species rather than cordgrass and pickleweed. Ruderal vegetation intergrades with salt marsh species along the levee banks.

A total of 4.51 acres of tidal salt marsh vegetation will be impacted by construction of the Project. Impacts to tidal salt marsh are primarily from excavation of accumulated sediments on both sides of the channel and the relocation of approximately 1,100 feet of tidal channel. Excavation of sediments will result in the removal of 2.82 acres of tidal salt marsh vegetation. Additional tidal salt marsh vegetation will be removed for: creating roads for construction access (1.33 acres); filling in the low spot of the Faber Tract levee and improving the slope of the levee (0.35 acres); and degrading the Bay Levee (0.01 acres). After project construction is complete, the tidal marsh area would be terraced and revegetated with high-marsh plants appropriate to the elevation relative to tidal levels in accordance with the MMP for the Project (SFCJPA 2015c). Approximately 19,600 native wetland plants and cuttings are planned for installation. Plants will be sourced from the San Francisquito Creek watershed and Baylands areas. The SFCJPA also proposes to install 5 large debris jam structures within the channel to improve adult steelhead passage. These structures are anticipated to provide cover in the form of large woody debris and depth.

Removal of tidal salt marsh vegetation during construction could temporarily reduce the amount of cover utilized by steelhead for protection from predators. The reduction of in-channel vegetation may also temporarily reduce invertebrates in the channel by limiting their food source or substrate in which they live. Similarly, by disturbing the bed and banks of the channel, sediment removal may bury aquatic insects that steelhead and green sturgeon feed on. Overhanging and submerged vegetation provides hiding cover (protection from predators) and disturbance for adult salmonids during their migrations (Bisson *et al.* 1987; Bjornn and Reiser 1991a). Removal of this vegetation exposes them to predation and disturbance. Furthermore,

removing vegetation has the potential to reduce the amount of velocity refuges available for adults and juveniles during high stream flow events.

NMFS expects the impacts on natural cover from construction of the Project will significantly reduce the already limited amount of natural cover for steelhead or green sturgeon until re-establishment of vegetation occurs. Installation of the debris jams will improve natural cover for fish within an approximate 2000 linear foot section of the channel. NMFS expects the impacts on natural cover will adversely affect PCEs of steelhead and green sturgeon for the short-term due to the large size of the construction area. Following vegetation reestablishment, PCEs and physical and biological features of critical habitat will be restored to near their current degraded state, and is expected to improve because of the increase in natural cover that will be provided by the debris jams.

The Project proposes to construct the levees, channel, and marshplains to resemble its current condition which is degraded from its historical condition described in Section 2.3.1. Major re-routing of the lower reaches took place in the late 1920s, with levees constructed on both sides of the creek for flood control and development purposes (Hermstad 2009). Constriction of the marsh within a narrow corridor has led to the current condition of a simplified channel and homogenous marshplain, with no side channels, deep pools, or large woody debris to provide natural cover for fish. Installation of five debris jams will improve habitat complexity in the channel. Overall, NMFS believes the proposed Project will improve the current degraded condition of natural cover for steelhead and green sturgeon in the action area.

Future maintenance activities will be limited to levee maintenance, vegetation management, and removal of trash and debris. Maintenance of the levee will employ best management practices to avoid impacts to the surrounding areas and channel. Ongoing maintenance that will be covered by the Project is expected to have minimal impacts on natural cover for steelhead and green sturgeon since the Project only proposes to remove vegetation along the levees. These activities will be located away from the channel, where steelhead and green sturgeon are expected to occur the majority of the time. Therefore, ongoing maintenance in the form of mowing vegetation along the levees is not expected to affect natural cover for steelhead or green sturgeon in the action area.

2.4.2.2. Water Quality

The effects of the Project on water quality were discussed above in section 2.4.1.3 of this opinion and also apply to the critical habitat within the action area. As described above, the effects of the proposed project may result in increased levels of turbidity, reductions in dissolved oxygen, changes to pH, and other water quality alterations. NMFS does not expect the impacts on water quality will adversely affect PCEs and physical and biological features of steelhead or green sturgeon because alterations to water quality will be associated with construction activities which will be temporary. Water quality is expected to remain near ambient levels as a result of the SFCJPA implementing BMPs and monitoring water quality during construction.

2.4.2.3. Foraging

The Project proposes to remove a significant amount of sediment and vegetation during excavation of the channel. Disturbance to benthic habitat from excavation will result in the direct removal of prey resources (*e.g.*, entrained with sediment and vegetation) or the displacement of preferred forage species due to habitat disturbances. These impacts are expected to persist throughout the two-year construction timeframe and extend up to five years beyond the completion of the Project while vegetation is re-establishing.

As described in Section 2.3.2.1 of this opinion, habitat in the action area is degraded and does not contain attributes that would likely support extended foraging by steelhead or green sturgeon. NMFS does not consider the action area a primary foraging site for green sturgeon or steelhead and the impacts incurred from the Project will not likely have a substantial impact on the current value of this habitat to steelhead or green sturgeon. Sturgeon and steelhead likely already use other areas in South San Francisco Bay as preferred foraging sites, and will continue to do so when project construction is completed. Nonetheless, the Project will result in significant alterations to marsh vegetation and the channel benthos for up to two years during construction and five years during marsh vegetation re-establishment. This is expected to reduce the amount of already degraded forage opportunities for green sturgeon during this time. After construction is complete and vegetation re-establishes, forage will likely return to current levels, and may slightly improve as a result of the Project's channel widening in some locations and vegetation management and monitoring activities. Based on this information, NMFS concludes that Project is likely to reduce the quality of the PCEs and physical and biological features for green sturgeon and steelhead critical habitat within the action area over the short-term (seven years), with the potential for minor improvements to the quality of PCEs in the long-term.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR §402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

2.5.1. Searsville Dam and Reservoir

Searsville Dam and Reservoir are owned and operated by Stanford University on lower Corte Madera Creek approximately 12 mile upstream of the action area. Construction of Searsville Dam on lower Corte Madera Creek was completed in 1892 by Spring Valley Water Company, and in 1919 the reservoir and some surrounding property became part of the Stanford University. Searsville is a year-round water storage and diversion facility.

Although Searsville Dam is upstream of the action area, sediment transported over the dam is predicted to affect the channel within the action area of this Project. Searsville Reservoir is rapidly filling with sediment due to historical and current episodes of erosion. Stanford is currently reviewing their potential future management options for Searsville Dam and Reservoir,

but Stanford has not identified a future course of action. In the absence of future actions by Stanford, the natural filling of Searsville Reservoir will continue until equilibrium between sediment inflow and sediment outflow is reached (Northwest Hydraulic Consultants *et al.* 2002). 2002). Once Searsville Reservoir fills with sediment, Northwest Hydraulic Consultants, Inc. (Northwest Hydraulic Consultants *et al.* 2002) predict bedload consisting primarily of sand will be transported over the dam for the first time in more than 100 years.

The San Francisco District Corps of Engineers Water Resources Section evaluated what specific changes are expected to occur within the action area as a result of Searsville Dam filling with sediment (Corps 2011). The study used the predicted channel bed elevation changes from the (Northwest Hydraulic Consultants *et al.* 2002) study to model a "with-sediment" flow scenario in the action area. Northwest Hydraulic Consultants *et al.* (2002) predicted an average channel bed change of 1.24 feet from sediment deposition over a 70-year period. The Corps' study results predict sediment deposition in the action area may increase flood flow depths by up to 1.5 feet in some locations of the action area during the 100-year flood event (Corps 2011). Deposition of sediment at this volume will not require sediment removal since the project has been designed to accommodate flow elevation increases associated with the predicted 1.24 foot average bed elevation increase.

Periodic sediment removal at current baseline volumes is anticipated as a future maintenance need and will be conducted under the auspices of the SCVWD SMP. Information from SCVWD maintenance records shows removal of approximately 1,200 to 5,300 cubic yards of sediment from the project reach at variable intervals (1- 4 years) between 2000 and 2013. The cumulative effect of sediment originating from Searsville Reservoir could increase, from the current baseline, the frequency and volume of material periodically removed. However, per SCVWD's SMP, sediment removal in San Francisquito Creek will not exceed 300 linear feet along the channel bed and will not exceed the maintenance baseline established by the relevant Maintenance Guidelines. If additional sediment is deposited with the flood channel reach during high flow events, additional sediment removal may be required to maintain the Project's design flow conveyance capacity, yet it would not be covered under the Corps permit for this Project.

Sediment removed by excavation of the channel per the SCVWD SMP is expected to disturb benthic habitat and result in the direct removal of prey resources (*e.g.*, entrained with sediment and vegetation) or the displacement of preferred forage species due to habitat disturbances. However, excavation would occur in relatively small sections of the channel (300 linear feet or less) and be restricted to volumes similar to baseline excavation volumes. Since the project area is located in the tidally-influenced reach of San Francisquito Creek, benthic aquatic organisms from San Francisco Bay are expected to rapidly recolonize the action area from sources downstream following sediment excavation events. Juvenile steelhead and green sturgeon foraging within the action area may be inadvertently affected by the temporary loss of benthic aquatic macroinvertebrate production associated with disturbance by sediment removal activities; however the effect is not expected to be significant due to the localized and short-term nature of the impact, and that adequate foraging areas adjacent to the action area remain available and undisturbed.

2.5.2. Climate Change

The long-term effects of climate change have been presented in the Section 2.3.2.3 - Factors Affecting Species Environment within San Francisquito Creek and the Action Area of this biological opinion. These include changes in streamflow regimes, water temperatures, and rainfall patterns. Climate change poses a threat to CCC steelhead and Southern DPS green sturgeon within the action area. The current climate in the action area is generally warm, and modeled regional average air temperatures show an increase in summer (Lindley *et al.* 2007) and greater heat waves (Hayhoe *et al.* 2004). The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75 to 200 percent) in precipitation while other models show decreases of 15 to 30 percent (Hayhoe *et al.* 2004). Sea level rise of 16 inches in San Francisco Bay could extend the area of tidal-influence in lower San Francisquito Creek upstream by approximately one mile and (BCDC 2007) convert portions of high marsh habitat (elevations of 0.2 to 0.3 meters) in the lower 0.5 mile of stream to mid marsh habitat (elevations of -0.2 to 0.1 meters) (Point Reyes Bird Observatory Conservation Science 2012).

Steelhead rearing and migratory habitat are most at risk to climate change. Increasing water temperatures and changes in the amount and timing of precipitation will impact water quality, streamflow levels, and steelhead migration. Low and warm summer flow conditions will negatively affect juvenile steelhead growth and survival. The upstream migration of adult steelhead will be impeded by low stream conditions during winter months, as well as, excessively high streamflows during large winter precipitation events. Smolt outmigration may be constrained by fewer or lower spring high flow events. Climate change is also anticipated to result in further ocean acidification and changes in ocean prey availability (Feely *et al.* 2008; Portner and Knust 2007) which would also negatively impact adult steelhead in the marine environment. Overall, the range and degree of variability in ambient temperature and precipitation are likely to increase due to climate change, and these predictions further highlight the importance of providing suitable instream habitat diversity/complexity in the streams and estuaries where CCC steelhead DPS and southern DPS green sturgeon occur.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (section 2.4) to the environmental baseline (section 2.3) and the cumulative effects (section 2.5), taking into account the status of the species and critical habitat (section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

CCC steelhead and southern DPS green sturgeon have experienced serious declines in abundance, and long-term population trends suggest a negative growth rate. Human-induced factors have reduced populations and degraded habitat, which in turn has reduced the

population's resilience to natural events, such as droughts, floods, and variable ocean conditions. Global climate change presents another real threat to the long-term persistence of these populations, especially when combined with the current depressed population status and human caused impacts. Within the project's action area in the effects of channelization and urban development are evident. These activities have contributed the lack of emergent marsh and reduced channel complexity (*i.e.*, floodplain extent and side channels) in the action area. As a result, forage species that listed salmonids and green sturgeon depend on have been reduced, stream hydrology and hydraulics have been altered, and natural cover characteristic of intact complex tidal salt marshes (*e.g.*, deep pools, side channels, and woody debris) have been eliminated.

Construction of the Project will occur during two consecutive construction seasons between June 15 and October 15, when CCC steelhead juveniles may be present within the action area. Based on distribution data and foraging habits of green sturgeon, their occurrence in the action area is assumed to be rare. Therefore, no individual green sturgeon are anticipated to be encountered during dewatering and fish relocation activities. The Project has the potential to affect juvenile steelhead during construction through injury or mortality during fish capture and relocation, desiccation during dewatering, and degradation of water quality. The project has the potential to adversely impact natural cover, water quality, and forage features of CCC steelhead and southern DPS green sturgeon critical habitat.

The Project proposes to build one simplified channel, with relatively narrow floodplains. Although most of the project reach will contain minimal structural complexity, the Project has proposed to construct six structures in the channel for the purpose of creating hydraulic velocity breaks which will serve as both resting areas for upstream migrating steelhead and provide instream cover. The general lack of channel complexity will resemble the current channel configuration, which is a product of historical flood control and development activities in the action area. The Project will slightly widen the flood control channel and recreate marshplains throughout the action area. These actions are expected to provide minor improvements to the current degraded habitat condition within the action area.

The Project proposes to dewater and relocate juveniles steelhead from the action area prior to construction each season. Experienced fish biologists are expected to work effectively to collect and relocate juvenile steelhead. Based on the low mortality rates for similar dewatering and fish relocation efforts, NMFS anticipates few juvenile steelhead will be harmed or killed during implementation of this project. The maximum number of individuals likely to be encountered by the project over the two year construction window is 40 pre-smolting juvenile steelhead. Anticipated mortality from relocation activities are expected to not exceed two (2) percent of the total likely to be encountered each construction season (*i.e.*, one individual juvenile steelhead each year). Fish that elude capture and remain in the project area during construction activities will likely be lost to thermal stress or crushed by heavy equipment, but this number is not expected to exceed five (5) percent of the fish within the area dewatered each construction season (*i.e.*, one individual juvenile steelhead each year). In total, NMFS expects no more than four (4) juvenile steelhead will be harmed or killed by this project's fish relocation and dewatering. Due to the relatively large number of juveniles produced by each spawning pair, steelhead spawning in the San Francisquito Creek watershed in future years are expected to

produce enough juveniles to replace the few that may be lost at the project site due to relocation and dewatering. It is unlikely that the small potential loss of juveniles by this project will impact future adult returns.

During construction, water quality in the action area may be degraded through temporary increases in turbidity, reductions in dissolved oxygen, changes to pH, introduction of toxic chemicals, and other alterations to ambient water conditions. However, due to the implementation of BMPs these water quality alterations are not expected to occur at levels known to cause reductions in fitness to listed fish. Alterations to water quality during construction will be temporary and similar to the natural conditions typically encountered by listed fish (close to ambient conditions). Furthermore, steelhead will have been relocated from work sites and green sturgeon are not expected to be present during construction so their exposure to altered water quality conditions is unlikely. If fish do encounter water quality alterations, they will likely result in minor and temporary changes to fish behavior (*i.e.*, avoidance), and are not expected to adversely affect green sturgeon or steelhead.

The action area experienced major re-routing in the late 1920s, with levees constructed on both sides of the creek for flood control and development purposes (Hermstad 2009). Constriction of the marsh within a narrow corridor has led to the current condition of a simplified channel and homogenous marshplain, with no side channels, deep pools, or large woody debris to provide natural cover for fish. This has led to an overall degraded condition of PCEs and physical and biological features of green sturgeon and steelhead critical habitat. Construction of the Project will have short-term (two years) adverse impacts on critical habitat through the direct disturbance of benthic prey items, natural cover, water quality, and passage conditions. After project construction is complete, the tidal marsh area would be terraced and revegetated so construction impacts will dissipate within the five year vegetation reestablishment period. The SFCJPA also proposes to install five large debris jam structures within the channel to improve adult steelhead passage. These structures are anticipated to provide cover in the form of large woody debris and depth. Installation of the debris jams will improve natural cover for fish within an approximate 2000 linear foot section of the channel. Following vegetation reestablishment, PCEs and physical and biological features of critical habitat will be restored to near their current degraded state, and is expected to improve because of the increase in natural cover that will be provided by the debris jams.

For steelhead, the action area serves as an essential migration corridor to and from one of the few remaining steelhead populations in tributaries to South San Francisco Bay. Migration for steelhead through the completed Project will be adequate, and may improve over current conditions by the addition of the instream wood structures. Also, the project will not reduce the ability of green sturgeon to move into and out of lower San Francisquito Creek. The Project's impacts on forage, and cover features in the action area will result in temporary reduction in steelhead critical habitat value in the action area, yet because of its limited scope and duration, the impacts to critical habitat in the action area will not appreciably reduce the critical habitat value for CCC steelhead.

The current ecological distribution of green sturgeon in the Bay suggests that the action area is not of prime importance for this species. NMFS anticipates no direct impact to green sturgeon

during construction of this project. The Project's impacts to aquatic habitat will not result in an appreciable reduction in critical habitat value in the action area or at entire critical habitat designation scale for southern DPS green sturgeon.

The cumulative effects of the operation of Searsville Dam and Reservoir are anticipated to affect CCC steelhead and designated critical habitat in the future in a manner similar to the present day impacts on steelhead and critical habitat in the action area. Sedimentation rates in the action area are only expected to increase slightly once Searsville Reservoir fills with sediment and the annual sediment loads from the upper watershed move past the reservoir to downstream reaches. The predicted changes in bed elevations (plus 1.24 feet) and flood elevations (plus 1.5 feet) within the action area as a result of the filling of Searsville Reservoir (Corps 2011) are not expected to appreciably reduce steelhead or green sturgeon critical habitat value within the action area.

Regarding future climate change effects in the action area, California could be subject to higher average summer air temperatures and lower total precipitation levels. The Sierra Nevada snow pack may decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled. Reductions in the amount of precipitation would reduce streamflow levels in Northern and Central Coastal rivers. Estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this project, construction would be completed no later than 2020 and the above effects of climate change are unlikely to be detected within that time frame. The short-term effects of project construction will have completely elapsed prior to these climate change effects.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of threatened CCC steelhead and threatened southern DPS green sturgeon or destroy or adversely modify their designated critical habitat.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR §222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be

prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1. Amount or Extent of Take

The number of threatened CCC steelhead that may be incidentally taken during project activities is expected to be small, and limited to the juvenile (pre-smolt) life stage. Take is anticipated to occur during fish relocation and dewatering of construction reaches within the action area between June 15 and October 15 over two years of construction. The number of juvenile steelhead relocated during project construction is anticipated to be no more than 20 per year (40 for the entire two years of construction), and no more than two juvenile steelhead are expected to be injured or killed each year (4 for the entire two years of construction) during fish relocation and dewatering activities.

If more than 40 juvenile steelhead are captured, or more than 4 juvenile steelhead are injured or killed, incidental take will have been exceeded.

Based on distribution data and foraging habits of green sturgeon, their occurrence in the action area is assumed to be rare and no take of southern DPS green sturgeon is anticipated from the Project.

2.8.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Ensure construction methods, minimization measures, operations and maintenance, and monitoring are properly implemented within the action area.

2. Ensure the steelhead habitat complexity features are designed in a manner that provide adequate resting and holding areas for steelhead migrants.

3. Undertake measures to ensure that harm and mortality to steelhead resulting from fish relocation and dewatering activities is low.

4. Prepare and submit a report to document effects of construction and relocation activities and performance.

5. Monitor and evaluate the performance of the habitat elements (RPM #2), revegetation, and channel morphology components of the project.

6. Prepare and submit reports to document the performance of habitat elements (RPM #2), revegetation, and channel morphology components of the project.

2.8.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR §402.14). The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR §402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

All plans and reports mentioned below must be submitted to: NMFS North-Central Coast Office Attention: San Francisco Bay Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California 95404-6528.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. The permittees must submit the Project's Final Operations and Maintenance Manual and Mitigation and Monitoring Plan for review and approval at least 90 days prior to construction of the Project.

    b. The SFCJPA will allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the project sites during construction activities described in this biological opinion.

    c. If any ESA-listed fish are found dead or injured, the biologist shall contact NMFS biologist Amanda Morrison to review the activities resulting in take and to determine if additional protective measures are required. All ESA-listed fish mortalities shall be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length measured, and be frozen as soon as possible. Frozen samples shall be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS North-Central Coast Office without obtaining prior written approval from the North-Central Coast Office, San Francisco Bay Branch Chief. Any such transfer will be subject to such conditions as NMFS deems appropriate.

2. The following terms and conditions implement reasonable and prudent measure 2:

    a. The permittees must submit the Project's 60 percent and 90 percent design plans for steelhead habitat features (*i.e.,* debris jams and rock weir) to NMFS for review and approval at least 90 days prior to the initiation of construction of the Project.

3. The following terms and conditions implement reasonable and prudent measure 3:

a. The permittees must submit the Project's Final Dewatering and Fish Relocation Plan(s) for review and approval at least 90 days prior to construction of each phase. The Plan(s) must clearly identify the proposed cofferdam locations and fish relocation methods.

b. All screens used on equipment meant to divert flows must be screened in accordance with the NMFS Fish Screening Criteria for Anadromous Salmonids [available at: http://swr.nmfs.noaa.gov/hcd/fishscrn.pdf] and the Addendum for Juvenile Fish Screen Criteria for Pump Intakes [available at: http://swr.nmfs.noaa.gov/hcd/pumpcrit.pdf].

c. The SFCJPA shall retain a qualified biologist with expertise in the areas of anadromous fish biology, including handling, collecting, and relocating salmonids and green sturgeon; salmonid and green sturgeon habitat relationships; and biological monitoring of salmonids and green sturgeon. The Corps shall ensure that all biologists working on this project be qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed fish.

d. A qualified biologist shall monitor the construction site during placement and removal of flow diversions and cofferdams to ensure that any adverse effects to steelhead and green sturgeon are minimized. The biologist shall be on site during all dewatering events to ensure that all ESA-listed fish are captured, handled, and relocated safely. The biologist shall notify NMFS biologist Amanda Morrison at (707) 575-6083 or Amanda.Morrison@noaa.gov one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities.

e. ESA-listed fish shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream and fish shall not be removed from this water except when released. To avoid predation, the biologist shall have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured steelhead and green sturgeon must be relocated, as soon as possible, to a suitable in-stream or estuary location in which suitable habitat conditions are present and similar to capture sites to allow for adequate survival of transported fish and fish already present.

f. If any ESA-listed fish are found dead or injured, the SFCJPA must implement Term and Condition 1.c. listed above.

4. The following terms and conditions implement reasonable and prudent measure 4:

   a. The Corps and SFCJPA must provide a written report to NMFS by January 15 of each year following completion of the previous year's construction and fish relocation activities. The report must contain, at a minimum, the following information:

      (1) *Construction related activities.* The report must include the dates construction began and was completed; photographs taken before, during, and after the activity from photo reference points; a discussion of any unanticipated effects or unanticipated levels of effects on ESA-listed fish and their habitat, a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish or designated critical habitat; and, the number of ESA-listed fish killed or injured during the project action.

      (2) *Fish Relocation.* The report must include a description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; a description of water quality at release sites at the time of release, including, at a minimum, water temperature and dissolved oxygen levels; a description of the equipment and methods used to collect, hold, and transport ESA-listed fish; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

5. The following terms and conditions implement reasonable and prudent measure 5:

   a. The SFCJPA must conduct annual inspections of the Project by November of each year that evaluate the performance of fish habitat elements, vegetation re-establishment, and channel design performance as it relates to fish passage conditions, in addition to other elements inspected per the Project's Mitigation and Monitoring and Operations and Maintenance Plans.

6. The following terms and conditions implement reasonable and prudent measure 6:

   a. The Corps and SFCJPA must provide a written report to NMFS by February 1 of each year on the results of annual inspections. The report must include a discussion on the performance of fish habitat elements and channel design performance as it relates to fish passage conditions; a discussion of any unanticipated effects to fish passage or critical habitat; and a description of potential measures that will be taken to mitigate those effects.

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

NMFS has no Conservation Recommendations.

2.10 Reinitiation of Consultation

This concludes formal consultation for San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide effects, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Pacific coast salmon (PFMC 1999) contained in the fishery management plans (FMP) developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Effects of the proposed project will effect EFH for various federally managed fish species within the Pacific Coast Groundfish (PFMC 2005), Pacific Coast Salmon (PFMC 1999), and Coastal

Pelagic Species (PFMC 1998) FMPs. Furthermore, the project area is located in a Habitat Area of Particular Concern for various federally managed fish species within the Pacific Coast Groundfish FMP.

3.2 Adverse Effects on Essential Fish Habitat

Adverse effects to EFH for coastal pelagic species and Pacific groundfish will occur through (1) altered water quality, and (2) disturbance of benthic biological community, including removal of prey, and physical habitat. No adverse effects to EFH for Pacific salmon are anticipated.

3.2.1. Water Quality

As described in sections 2.4.1.3 and 2.4.2.2 of the biological opinion, in-stream and near-stream construction activities may cause temporary increases in turbidity (reviewed in Everest *et al.* 1991; Furniss *et al.* 1991; Spence *et al.* 1996), reductions in dissolved oxygen, changes to pH, and other alterations in water quality. NMFS anticipates only short-term changes to ambient water quality conditions will occur during proposed activities (*e.g.,* construction and removal of cofferdams and the initial re-wetting of the channel following the removal of the diversion). The SFCJPA will ensure water quality during construction will meet SFRWQCB and SWRCB water quality standards through monitoring and implementing BMPs (see Sections 1.3.6 and 1.3.9). Water quality will remain close to ambient conditions. Water quality alteration is expected to be limited to the immediate area of construction activities plus varying distances up and downstream (depending on the tidal stage). It is expected that fish species encountering the altered water quality conditions will react behaviorally and either move away from or avoid them. These effects are expected to be temporary and there is ample area for fish to move to near the action area.

3.2.2. Benthic disturbance

As described in Section 2.4.2.3 of the opinion, the Project proposes to remove a significant amount of sediment and vegetation during project construction. Disturbance to benthic habitat from excavation will result in the direct removal of prey resources (*e.g.*, entrained with sediment and vegetation) or the displacement of preferred forage species due to habitat disturbances. These impacts are expected to persist throughout the two-year construction timeframe and extend up to five years beyond the completion of the Project while vegetation is re-establishing.

The Project would result in benthic disturbance and potential removal of invertebrate prey within 4.5 acres of tidal salt marsh habitat from sediment removal and 2.4 acres of bay waters from channel realignment, for a total of 6.9 acres of soft substrate habitat. EFH species managed under the Coastal Pelagics and Pacific Groundfish FMPs forage on infaunal and bottom-dwelling organisms, such as polychaete worms and crustaceans. Excavation and dredging activities can adversely affect the benthic invertebrate community by directly removing or burying these organisms (Newell 2002; Van der Veer *et al.* 1985). The Project is likely to result in the temporary loss of EFH prey organisms due to construction activities.

Recolonization studies suggest that recovery (generally meaning the later phase of benthic community development after disturbance when species that inhabited the area prior to disturbance begin to re-establish) may not be quite as straightforward, and can be regulated by physical factors including particle size distribution, currents, and compaction/stabilization processes following disturbance. Rates of recovery listed in the literature range from several months to several years for estuarine muds (Currie and Parry 1996; McCauley *et al.* 1977; Tuck *et al.* 1998; Watling *et al.* 2001) to up to 2 to 3 years for sands and gravels (Gilkinson *et al.* 2005; Oliver *et al.* 1977; Reish 1961; Thrush 2002; Thrush *et al.* 1995; Watling *et al.* 2001). Thus, forage resources for fish that feed on the benthos may be substantially reduced before recovery is achieved. Based on available literature, NMFS will assume full recovery of prey resources will exceed one year following construction.

Additionally, the act of removing sediments and the associated biotic assemblages during construction of the Project creates an area of disturbance that is extremely susceptible to recolonization by invasive species, often resulting in the displacement of native species. As a result, the Project may result in the increased distribution and abundance of invasive species in the action area, which in turn would reduce the amount of native prey resources available to coastal pelagic species and groundfish in the action area.

3.3 Essential Fish Habitat Conservation Recommendation

To compensate for the temporal effects of benthic disturbance on 6.9 acres of soft bottom substrate during two years of construction and for an additional period of year or longer following construction, NMFS recommends the SFCJPA: (1) provide funding to an ongoing restoration project; (2) purchase credits from a conservation/mitigation bank; and/or (3) implement a new restoration project.

For any compensatory mitigation, the habitat replacement should be "in-kind", such that the replacement habitat value is equal to, or greater than, pre-project habitat value. Determination of habitat replacement value should be based on the contribution of that habitat to the support of species and vegetation affected by the proposed project and be determined in coordination with NMFS.

Compensatory mitigation should occur on-site at an one-to-one mitigation ratio (*e.g.*, 15 acres restored:15 acres impacted) or off-site at a three-to-one mitigation ratio (*e.g.*, 45 acres restored:15 acres impacted) and should be habitat replacement in-kind. Ratios greater than one-to-one to account for temporal losses, uncertainty of performance, and differences in functions or values in replacement habitats outside of the action area.

The amount of credits purchased from a conservation/mitigation bank should be equal to a three-to-one ratio, or greater, and should result in habitat replacement in-kind. If the credit system for a bank is not expressed and measured in the same manner as the impacts of proposed project, the SFCJPA should confer with NMFS to determine an acceptable amount of credits to be purchased. The amount of monies provided to a restoration project should be sufficient to fund one-to-one habitat restoration for projects in South San Francisco Bay, or three-to-one at off-site restoration sites.

Fully implementing this EFH conservation recommendation would avoid, minimize, or offset the adverse effects described in section 3.2, above, to approximately 6.9 acres of designated EFH for Pacific coast groundfish, and coastal pelagic species.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Corps must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR §600.920 (k)(l)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR §600.920 (l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include the SFCJPA, SCVWD, USFWS, BCDC, and the SWQCB. Individual copies of this opinion were provided to the Corps. This opinion will be

posted on the Public Consultation Tracking System web site (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

5. FIGURES

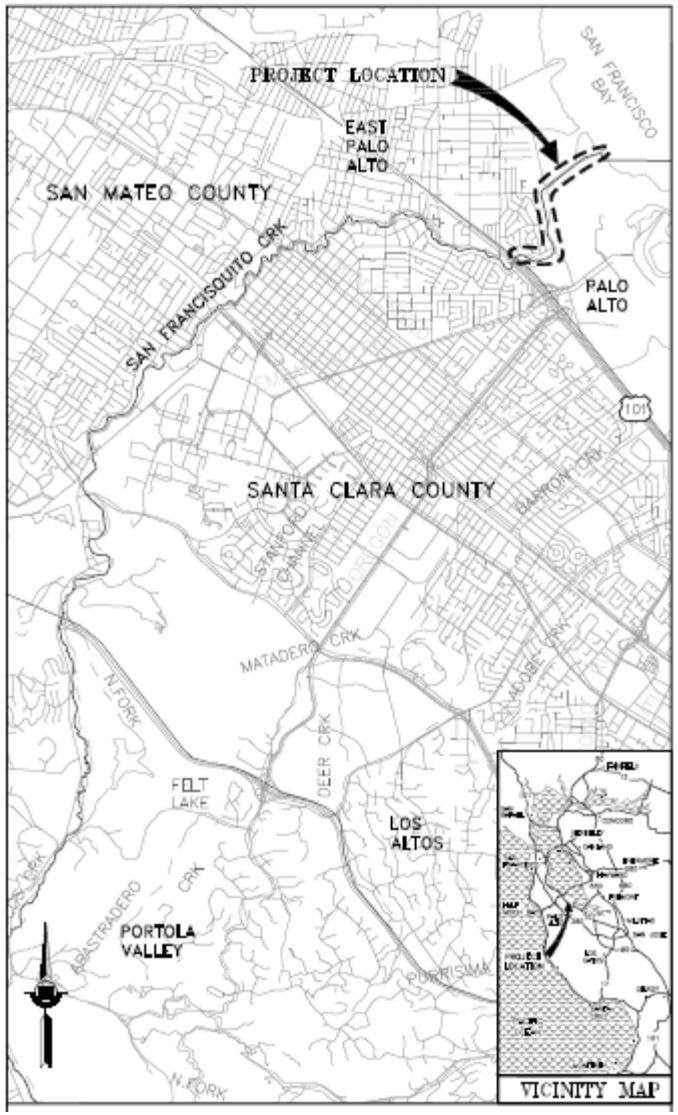

Figure 1. Map showing general location of the Project.

Figure 2. Map of entire project area.

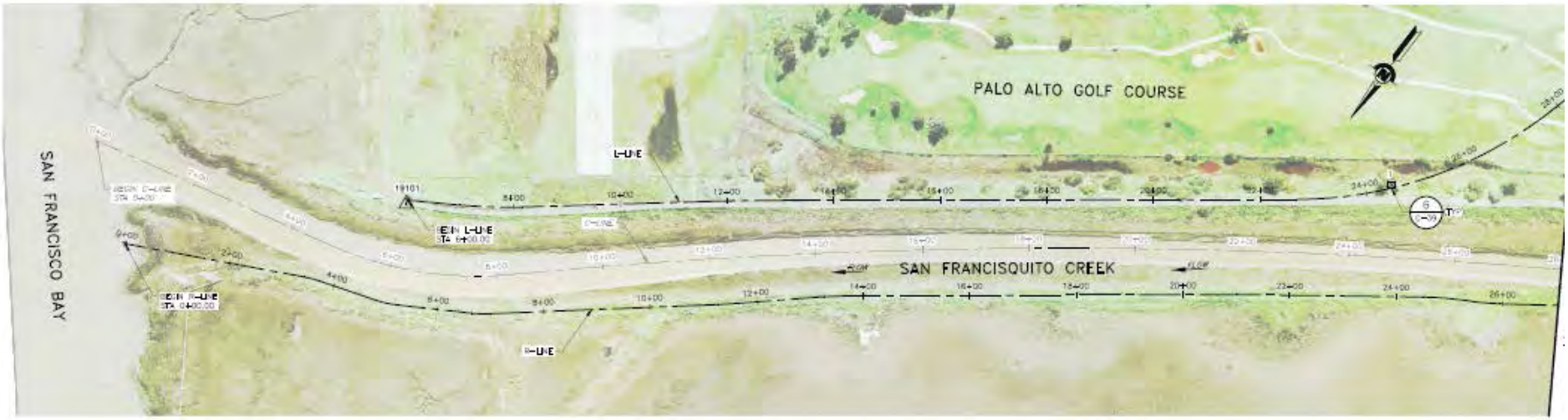

Figure 3. Map of project area from center line STA 0+00 to STA 28+00.

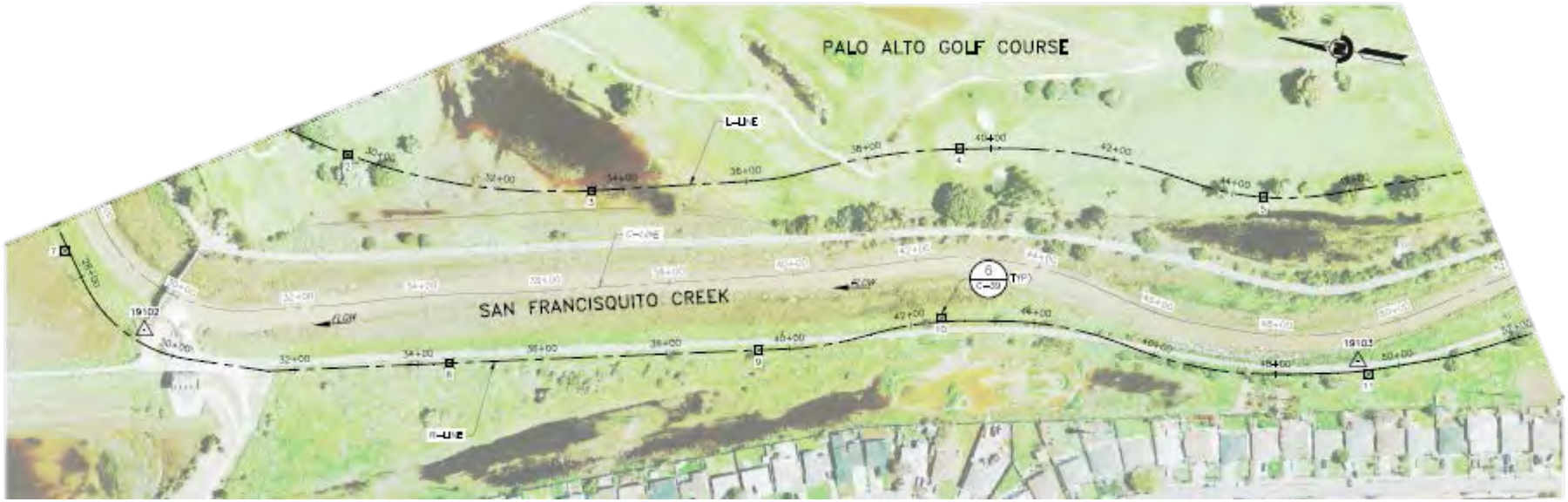

Figure 4. Map of project area from center line STA 28+00 to STA 52+00.

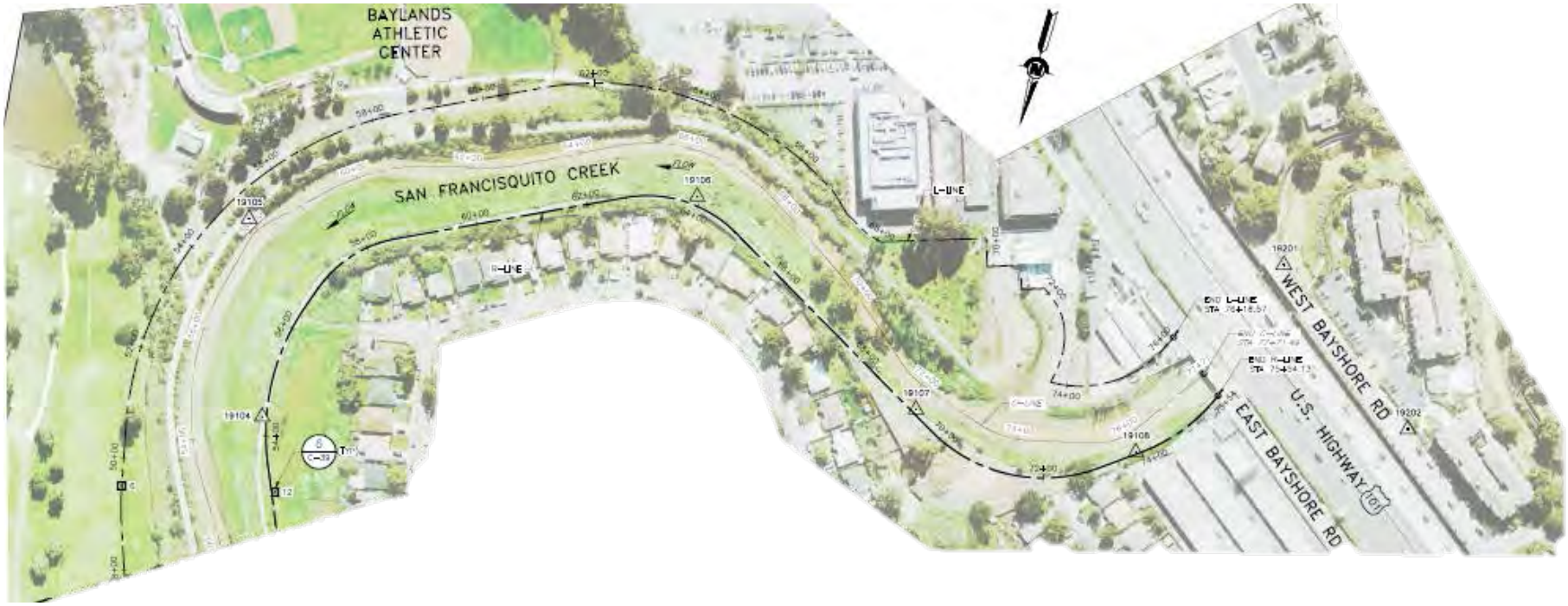

Figure 5. Map of project area from center line STA 52+00 to STA 77+71.

6. REFERENCES

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer to:
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JAN 1 5 2016

Ms. Tori White
Attn: Greg Brown
Department of the Army
San Francisco District, U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Subject: Formal Consultation on the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, from San Francisco Bay to Highway 101, in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California (U.S. Army Corps of Engineers (Corps) file number 2013-00030S)

Dear Ms. White:

This letter is in response to the Corps' April 25, 2013, request for initiation of consultation for the San Francisquito Creek Joint Powers Authority's (SFCJPA) proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project (proposed project), from San Francisco Bay to Highway 101, in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California (Corps file number 2013-00030S). Your request for consultation was received in our office on April 29, 2013. At issue are the proposed project's effects on the federally threatened California red-legged frog (*Rana draytonii*), endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), threatened Pacific Coast population of the western snowy plover (western snowy plover) (*Charadrius alexandrinus nivosus*), endangered California clapper rail (*Rallus longirostris obsoletus*), endangered salt marsh harvest mouse (*Reithrodontomys raviventris*), endangered California least tern (*Sternula antillarum browni*), and endangered California seablite (*Suaeda californica*). Critical habitat has been designated for the California red-legged frog and western snowy plover but does not occur within the action area for the proposed project. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

Recent genetic analyses of rail species resulted in a change in the common name and taxonomy of the large, "clapper-type" rails (*Rallus longirostris*) of the west coast of North America to Ridgway's rail (*Rallus obsoletus*) (Maley and Brumfield 2013, Chesser *et al.* 2014). Thus the California clapper rail is now referred to in the scientific community as the California Ridgway's rail (*Rallus obsoletus obsoletus*). The change in the common name and taxonomy of the California clapper rail, however, does not change the listing status of the species.

The Federal action we are consulting on is the Corps' issuance of a permit to SFCJPA pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C Section 403) and Section 404 of the

Clean Water Act of 1973 (33 U.S.C. Section 1344) to reduce flooding risks and increase ecosystem functionality by widening the floodplain of San Francisquito Creek through levee de-construction and construction of floodwalls, degrading the Bay levee between Outer Faber Marsh and the creek's mouth, filling in low spots in portions of the unmaintained Faber Tract (Main Faber Marsh) southern levee, and sediment excavation of the creek channel. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is likely to adversely affect the salt marsh harvest mouse and California clapper rail. These findings conclude that the proposed project may affect, but is not likely to adversely affect the California red-legged frog, San Francisco garter snake, western snowy plover, California least tern, and California seablite.

In considering your request, we based our evaluation on the following: (1) your letter requesting consultation on the proposed project dated April 25, 2013; (2) the November 2012 *Draft Biological and Essential Fish Habitat Assessment for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project San Francisco Bay to Highway 101* (ICF International 2012); (3) the January 17, 2013 letter from ICF International responding to the Service's July 3, 2013, request for additional information (M. Jones, ICF International, *in litt.* 2013); (4) the August 27, 2014, *Amended Biological Assessment for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, from San Francisco Bay to Highway 101 in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California* (L. Materman, SFCJPA, *in litt.* 2014); (5) the December 2015 *San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Mitigation and Monitoring Plan* (MMP) (SCVWD 2015); (6) protocol-level surveys for the California clapper rail (PRBO Conservation Science 2012; Point Blue Conservation Science 2014; Point Blue Conservation Science, *in litt.* 2014); (7) the March 5, 2015, memorandum from the Santa Clara Valley Water District (SCVWD) summarizing listed species habitat impacts (SCVWD, *in litt.* 2015); (8) the July 24, 2015, September 9, 2015, October 5, 2015, and October 26, 2015, memoranda from SFCJPA responding to the Service's requests for additional information (K. Murray, SFCJPA, *in litt.* 2015a, 2015b, 2015c, 2015d, 2015e); (9) the October 6, 2015, *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a); (10) electronic mail and conversations among the SFCJPA, ICF International, SCVWD, the Corps, California Department of Fish and Wildlife (CDFW), the San Francisco Bay Regional Water Quality Control Board (SFRWQCB), Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS), the City of Palo Alto, the City of East Palo Alto, Bay Conservation and Development Commission (BCDC), H.T Harvey & Associates, U.S. Geological Survey, and the Service; (11) site visits conducted on February 28, 2013, April 16, 2013, and October 22, 2014; and (12) other information available to the Service.

The Service has determined that the proposed project is not likely to adversely affect the California red-legged frog and San Francisco garter snake because: (1) the portion of San Francisquito Creek within the action area is predominately tidally influenced and thus less suitable for the California red-legged frog and San Francisco garter snake; (2) the nearest known occurrences of the California red-legged frog and San Francisco garter snake are more than five miles upstream from the action area; (3) the potential for injuring or killing a California red-legged frog and San Francisco garter snake will be minimized by having a qualified biologist onsite during project construction; (4) all proposed project construction staff will be trained in identifying the California red-legged frog and San Francisco garter snake and their habitats and the avoidance and minimization measures; and (5) the potential for degrading aquatic habitat for the California red-legged frog and San Francisco garter

snake will be minimized by implementing water quality best management practices, a Storm Water Pollution Prevention Plan, and a hazardous material/spill prevention plan.

The Service has determined that the proposed project is not likely to adversely affect the western snowy plover and California least tern because: (1) the western snowy plover and California least tern are not known to breed within the action area; (2) the potential for injuring or killing a western snowy plover and California least tern will be minimized by having a qualified biologist onsite during project construction; (4) all proposed project construction staff will be trained in identifying the western snowy plover and California least tern; and (5) the potential for degrading foraging habitat for the western snowy plover and California least tern will be minimized by implementing water quality best management practices, a Storm Water Pollution Prevention Plan, and a hazardous material/spill prevention plan.

The Service has determined that the proposed project is not likely to adversely affect the California seablite because: (1) the listed plant is thought to have been extirpated from the action area; and (2) the California seablite was not seen during protocol-level surveys within the action area in August 2013.

The remainder of this document provides our biological opinion on the effects of the proposed project on the salt marsh harvest mouse and California clapper rail.

CONSULTATION HISTORY

October 24, 2012:	The Service participated in a conference call among staff from the Refuge, SFCJPA, and ICF International discussing the proposed project.
February 28, 2013:	The Service attended a site visit along with staff from SFCJPA, ICF International, SCVWD, CDFW, and SFRWQCB.
April, 16, 2013:	The Service attended a second site visit along with staff from SFCJPA, ICF International, and the Refuge.
April 29, 2013:	The Service received from the Corps the Biological Assessment (ICF International 2012) and the request for consultation on the proposed project.
July 3, 2013:	The Service sent a letter to the Corps commenting on the Biological Assessment and requesting additional information on the proposed project. The letter mentioned the Service's major concerns regarding the loss of high tide refugia habitat and increased flooding of tidal marsh habitat for the salt marsh harvest mouse and California clapper rail within Faber Marsh if the levee between San Francisquito Creek and Main Faber Marsh were degraded.
September – December 2013:	The Service attended multiple interagency meetings among staff from SFCJPA, ICF International, SCVWD, CDFW, SFRWQCB,

BCDC, NMFS, and the Refuge discussing the Service's concerns about the effects of the proposed project on the large population of California clapper rails within Faber Marsh due to the proposed lowering of the levee along the southern edge of Main Faber Marsh. At the December 12, 2013, meeting, ICF International and SFCJPA proposed revising the proposed project to avoid lowering the levee along Main Faber Marsh.

January 23, 2014: The Service received the letter from ICF International responding to the Service's July 3, 2013, request for additional information on the proposed project.

February – July 2014: The Service attended multiple interagency meetings for the proposed project among staff from the Refuge, the Corps, SCVWD, SFCJPA, CDFW, SFRWQCB, NMFS, and BCDC discussing the various alternatives for the proposed project including filling in low spots in the Main Faber Marsh levee, degrading the Bay levee adjacent to Outer Faber Marsh near the mouth of San Francisquito Creek, and further setting back the levee into the Palo Alto Municipal Golf Course.

August 28, 2014: The Service received the amended Biological Assessment from the Corps and SFCJPA for the proposed project (L. Materman, SFCJPA, *in litt.* 2014).

September 3, 2014: The Service responded via electronic email to the Corps and SFCJPA that the proposed project should include additional avoidance and minimization measures to address predation on salt marsh harvest mice and California clapper rails and the loss of high tide refugia cover (*e.g.*, avian and mammalian predator management, transition zone habitat enhancement, and installation of high-tide refuge islands in Faber Marsh).

October 20, 2014: The Service submitted via electronic mail to SFCJPA and the Corps comments on the draft MMP (SCVWD 2014) and the Draft Operations and Maintenance (O&M) Plan (SFCJPA 2014) for the proposed project.

October 22, 2014: The Service attended a site visit with staff from SFCJPA, the Refuge, CDFW, SFRWQCB, and U.S. Geological Survey to discuss measures to enhance habitat for salt marsh harvest mice and California clapper rails and minimize the levels of predation within Faber Marsh.

December 2, 2014: The Service sent a letter to the Corps and SFCJPA commenting on the August 2014 amended Biological Assessment (L. Materman, SFCJPA, *in litt.* 2014), the draft MMP (SCVWD

	2014), and the Draft O&M Plan (SFCJPA 2014) and requesting additional information on the proposed project.
April 15, 2015:	The Service received from SFCJPA and SCVWD the revised estimates of habitat disturbance (SCVWD *in litt.* 2015).
April 29, 2015:	The Service attended a meeting with staff from SFCJPA, the Corps, CDFW, and the Refuge to discuss avoidance and minimization measures.
July - December 2015:	The Service participated in biweekly conference calls with staff from SFCJPA, the Corps, the Refuge, NMFS, CDFW, and SCVWD to discuss the information needed to initiate formal consultation.
July 24, 2015:	The Service received via electronic mail from SFCJPA the memoranda responding to the Service's December 2, 2014, request for information on the proposed project (K. Murray, SFCJPA, *in litt.* 2015a, 2015b).
July 27, 2015:	The Service provided via electronic mail to SFCJPA and the Corps comments on the July 24, 2015, memoranda from SFCJPA.
August 20, 2015:	The Service attended a meeting with staff from H.T. Harvey & Associates, the Refuge, SFCJPA, CDFW, and the U.S. Geological Survey to discuss the restoration actions for the proposed project (*e.g.*, permanent high-tide refuge islands in Outer Faber Marsh, transition zone habitat enhancement along the Faber Marsh levees, invasive plant species control).
September 9, 2015:	The Service received via electronic mail from SFCJPA (K. Murray, SFCJPA, *in litt.* 2015c) the responses to the Service's comments on the July 24, 2015, memoranda from SFCJPA (*e.g.*, revised estimates of habitat disturbance and restoration; the predator management plan; the draft MMP; the revised Draft O&M Plan (SFCJPA 2015); the description of the proposed levee mowing activities for O&M; and the draft proposal for installation of high-tide refuge islands in Outer Faber Marsh).
September 15 and 24, 2015:	The Service provided via electronic mail to SFCJPA and the Corps comments on and requests for clarification of the information provided by SFCJPA on September 9, 2015 (*e.g.*, clarification of California clapper rail habitat disturbance estimates and habitat restoration/creation estimates within the widened San Francisquito Creek channel; clarification of proposed project levee mowing O&M activities; and a request for

	information on the cumulative effects of other levee mowing O&M activities within the action area).
October 5, 2015:	The Service received via electronic mail from SFCJPA the responses to the Service's September 15 and 24, 2015, comments and request for clarification.
October 7, 2015:	The Service received via electronic mail from SFCJPA the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a).
October 26, 2015:	The Service received via electronic mail from SFCJPA (K. Murray, SFCJPA, *in litt.* 2015e) responses to the Service's October 19, 2015, comments on the information provided by SFCJPA on October 5 and 7, 2015 (K. Murray, SFCJPA, *in litt.* 2015d; H.T. Harvey & Associates 2015a).
November 18, 2015:	The Service, the Refuge, and U.S. Geological Survey provided via electronic mail to SFCJPA, the Corps, SCVWD, NMFS, CDFW, H.T. Harvey & Associates, and SFRWQCB comments on the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a).
December 3, 2015:	The Service received from SFCJPA the draft plan for the installation of steelhead passage features within the proposed project footprint in San Francisquito Creek.
December 17, 2015:	The Service received from SFCJPA the final project description and the revised MMP for proposed project revegetation and monitoring activities (SCVWD 2015).

BIOLOGICAL OPINION

Description of the Proposed Project

Location of the Proposed Project

The San Francisquito Creek watershed encompasses a 45-square-mile basin, extending from Skyline Boulevard to San Francisco Bay. San Francisquito Creek represents the boundary between San Mateo and Santa Clara counties, California, in the lower watershed. Figure 1 below shows the location of the proposed project. The proposed project area as a whole extends about 7,450 feet along San Francisquito Creek from San Francisco Bay upstream to the U.S. Highway 101/East Bayshore Road Bridge. The right bank refers to the San Mateo County (City of East Palo Alto) side of San Francisquito Creek, and the left bank refers to the Santa Clara County (City of Palo Alto) side of San Francisquito Creek. The lower reach of the proposed project extends about 2,850 feet from San Francisco Bay upstream to the Friendship Bridge; the tidal marshes of the Refuge-managed Main Faber Marsh and Outer Faber Marsh (the triangular-shaped tidal marsh downstream (east) of Main Faber Marsh) occur on the right bank, and the Palo Alto Municipal Golf Course and Palo Alto

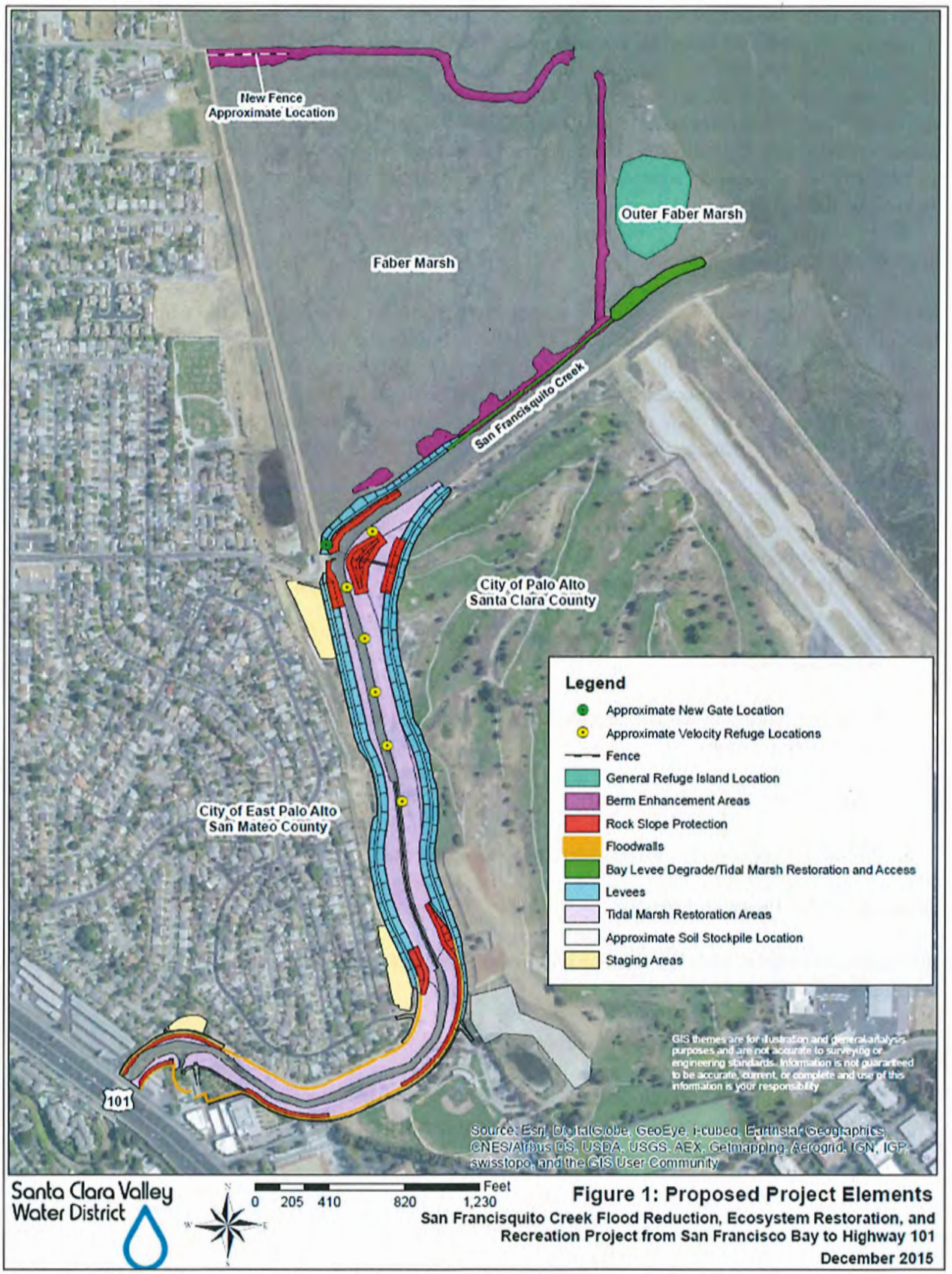

Figure 1. Action area and proposed project elements.

Airport occur on the left bank of the lower reach. The middle reach of the proposed project extends about 2,600 feet from the Friendship Bridge upstream to Daphne Way; a residential neighborhood of the City of East Palo Alto occurs on the right bank, and the Palo Alto Municipal Golf Course occurs on the left bank of the middle reach. The upper reach of the proposed project extends about 2,000 feet upstream from Daphne Way to the U.S. Highway 101/East Bayshore Road Bridge; a residential neighborhood of the City of East Palo Alto occurs on the right bank, and a baseball field, an elementary school, and commercial, Federal, and municipal buildings occur on the left bank of the upper reach.

Goals of the Proposed Project

The SFCJPA is a regional government agency whose members include the Cities of Palo Alto, Menlo Park, and East Palo Alto; the San Mateo County Flood Control District, and the SCVWD. The SFCJPA was formed in 1999 following the flood of 1998 to implement flood management, ecosystem restoration and recreational enhancements throughout the San Francisquito Creek watershed and floodplain. The proposed project's goals are to improve flood protection, habitat, and recreational opportunities within the proposed project reach with the following specific objectives:

1. Protect properties and infrastructure between San Francisco Bay and Highway 101 from a 100-year San Francisquito Creek fluvial flood flow occurring at the same time as a 10-year extreme high tide that includes projected sea level rise through 2065;

2. Accommodate future flood protection measures that might be constructed upstream of the proposed project;

3. Enhance habitat along the proposed project reach, particularly habitat for threatened and endangered species;

4. Enhance recreational uses; and

5. Minimize operational and maintenance requirements.

Elements of the Proposed Project

Increasing San Francisquito Creek's capacity from San Francisco Bay to East Bayshore Road would be achieved by:

1. Excavating sediment deposits within the channel to maximize conveyance;

2. Rebuilding levees and relocating a portion of the southern levee to widen the channel to reduce influence of tides and increase channel capacity; and

3. Constructing floodwalls in the upper reach to increase capacity and maintain consistency with the California Department of Transportation's (Caltrans) enlargement of the U.S. Highway 101/East Bayshore Road Bridge over San Francisquito Creek (Caltrans facility).

Major proposed project elements include:

1. Levee setback and improvements to widen the channel and increase levee height and stability between the City of East Palo Alto and the Palo Alto Municipal Golf Course;

2. Floodwalls in the upper reach downstream of East Bayshore Road;

3. Extension of Friendship Bridge via a boardwalk across new marshland within the widened channel;

4. Improving the stability of the Main Faber Marsh levee;

5. Degrading the Bay levee (levee on the right (north) bank of San Francisquito Creek along the southern edge Outer Faber Marsh near the creek's mouth); and

6. Rock-slope protection.

The majority of the proposed project elements would occur on properties in the cities of Palo Alto and East Palo Alto and owned by the City of Palo Alto or within SCVWD or City of East Palo Alto rights-of-way. The project elements proposed to improve management of flood flows along San Francisquito Creek from East Bayshore Road to San Francisco Bay include reconfiguring levees, creating a marsh plain terrace to convey high flows, installing floodwalls, widening of the creek channel, and constructing access roads for maintenance purposes. Proposed project levee and flood wall construction elements are summarized below in Table 1. Marshplain restoration elements are summarized in Table 2. A detailed overview of each project component is provided in the sections that follow.

The proposed project includes:

1. Excavation. Excavating about 106,000 cubic yards of sediment deposits within the channel to maximize conveyance including about 29,800 cubic yards of stripping, 18,700 cubic yards of rubble mound excavation, 11,600 cubic yards of off-haul material, and 46,600 cubic yards of material re-used from excavation.

2. Fill. Total fill of about 185,300 cubic yards consisting of about 46,600 cubic yards of material re-used from excavation and importing about 138,700 cubic yards from Stevens Creek Quarry.

3. Rebuilding and Setting Back Levees. Rebuilding levees and setting back a portion of the levee adjacent to the Palo Alto Municipal Golf Course by 50-100 feet to widen the channel, increase levee height and stability, reduce influence of tides, increase channel capacity, and restore tidal marsh along San Francisquito Creek.

4. Floodwalls. Constructing floodwalls in the upper reach downstream of East Bayshore Road to increase capacity.

Table 1. Summary of proposed levee and floodwall construction elements.

Project Component	Description
Levee and floodwall construction	
Levee raising on right bank	From the O'Connor Pump Station tie-in near Friendship Bridge to the floodwall.
Floodwall on right bank	The right floodwall would extend from just downstream of Daphne Way to the end of the project reach where it would connect with the Caltrans U.S. Highway 101/East Bayshore Road facility (Caltrans facility).
Levee raising on left bank and levee relocation	Levee relocation of the middle reach and a small portion of the upper and lower reaches. The levee would be relocated inland (currently occupied by the Golf Course), creating space on the left bank for a marshplain terrace. Except for a section around the eastern footings of Friendship Bridge, the existing levee along this stretch would be removed.
Floodwall on left bank	The left floodwall would extend from the end of the left levee, along the streambed, around the Palo Alto Pump Station, to the end of the project reach where it would connect with the Caltrans facility.
Downstream access road on right bank	The right bank downstream access road would be approximately 16 feet wide and extend from the crown of the right levee to street level to just downstream of Daphne Way.
Upstream access road on right bank	The right bank upstream access road would be approximately 12 feet wide and would extend from just downstream of Verbena Drive to the Caltrans facility at East Bayshore Road.
Access road on left bank	The left bank access road would be generally 12 feet wide and would extend from a point downstream of the International School of the Peninsula to the Palo Alto Pump Station. The access road would also be used as a public trail within the City of Palo Alto and would connect to the Baylands Athletic Center.
Friendship Bridge	The existing Friendship Bridge would be retained and extended as a boardwalk from the retained eastern footing across the new marshplain terrace to the relocated left bank levee.
Stabilize Main Faber Marsh levee	Fill in a low spot along about 400 feet of the Main Faber Marsh levee by raising the lowest levee crest elevation downstream of Friendship Bridge from a minimum elevation of 11 feet to 13 feet, and incorporating a 6H:1V (horizontal : vertical) levee side slope into Main Faber Marsh.
Degrade Bay levee	Removing about 600 feet of the existing right bank levee (STA 3+50 to 9+50) along Outer Faber Marsh near the mouth of San Francisquito Creek.
Rock slope protection	Installation of about 3.71 acres of rock-slope levee protection.

Table 2. Summary of proposed marshplain restoration elements.

Marshplain restoration	
Downstream of Friendship Bridge on right bank	High-marsh and transitional vegetation will be planted from the edge of the San Francisquito Creek channel to the toe of the levee from just upstream of San Francisco Bay to just downstream of Friendship Bridge.
Upstream of Friendship Bridge on right bank	High-marsh and transitional vegetation will be planted from the edge of the San Francisquito Creek channel to the toe of the levee from just upstream of Friendship Bridge to East Bayshore Road.
Left bank	High-marsh and transitional vegetation will be planted from the edge of the San Francisquito Creek channel to the base of the floodwall or the toe of the levee. In this area the marsh will be planted adjacent to the toe of the cut-and-fill area. The marsh will extend from the point at which the new levee would diverge inland from the existing levee to East Bayshore Road.

5. Overflow Terrace and Tidal Marsh Creation. Creating/restoring a total of about 15.14 acres of riparian, tidal marsh, and transition zone habitat along San Francisquito Creek and revegetating with native high marsh plantings, high marsh/transition zone plantings, and high marsh/ transition zone seed mix. This will create an overflow terrace at marsh elevation upstream and adjacent to Main Faber Marsh.

6. Extension of Friendship Bridge. Extension of the Friendship Bridge via a boardwalk across new marshland within the widened channel.

7. Relocating Utilities. Relocation of Pacific Gas and Electric Company (PG&E) electricity transmission lines and towers and gas transmission lines and the East Palo Alto Sanitary District sewer main.

8. Rodent Control. Controlling burrowing rodents on flood control levees within the proposed project area by use of rodenticides in areas outside of known and potential habitat for the salt marsh harvest mouse and California clapper rail. Only live trapping would be used to control burrowing rodents in areas near suitable habitat for the salt marsh harvest mouse and California clapper rail. The live traps will have openings measuring no smaller than two inches by one inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

9. Stabilize Main Faber Marsh Levee. Add fill to the levee separating San Francisquito Creek from Main Faber Marsh in order to reduce concerns regarding levee erosion and the potential for substantial levee failure. Raising the lowest levee crest elevation downstream of Friendship Bridge from a minimum elevation of 11 feet to 13 feet and incorporating a 6 horizontal (H):1 vertical (V) levee side slope into Main Faber Marsh. The 6H:1V levee side slope will help protect the levee toe from erosion due to flow overtopping over a 400-foot distance as the levee transitions upstream to a higher elevation (as part of the Original Application) closer to the

bridge. About 0.30 acre of tidal marsh within Main Faber Marsh will be permanently lost with the installation of the wider levee toe slope. The stabilized levee will be planted with high marsh and transitional vegetation that is consistent with the levee's location adjacent to bayland marsh.

10. Bay Levee Degrade. Downstream of Main Faber Marsh, in a marsh area (Outer Faber Marsh) that is subject to daily tides from San Francisco Bay, a levee separating San Francisquito Creek from San Francisco Bay will be degraded, removing approximately 600 feet of the existing levee (STA 3+50 to 9+50). This will improve the connection between Outer Faber Marsh and San Francisquito Creek and decrease the water surface elevation during large flow events, allowing the channel to expand out over the marsh area at a point further upstream than under existing conditions.

11. Rock-Slope Protection. Installation of about 3.71 acres of rock-slope protection along the San Francisquito Creek channel.

12. Levee Mowing for O&M. SCVWD will mow approximately 6.49 acres of grassland habitat along the San Francisquito Creek levee slopes one to three times per year (see map in Figure 2 for areas that will be mowed by the proposed project). In order to maintain acceptable channel roughness and comply with "Guidelines for . . . Vegetation Management at Levees" and County of Santa Clara Fire Marshal requirements for preventing fire hazards, the SCVWD will mow plants to a height of 3 to 4 inches, one to three times per year. The levees will remain vegetated and plants will grow between mowing cycles. Mowing is rarely necessary or conducted during the wet season, so higher amounts of more suitable habitat will be available during those four to six months. Project O&M may be transferred to the SCVWD Stream Maintenance Program in the future depending on agreements for work in San Mateo County (Service file number 08ESMF00-2012-F-0398, Service 2014).

13. Steelhead Passage Features. SFCJPA will install six velocity refuge features within the proposed project footprint in the San Francisquito Creek channel to improve steelhead passage including five rock and rootwad structures (constructed features including wood logs with and without rootwads and large rocks for anchoring) in the middle reach (upstream of Friendship Bridge) and one rock spur (partial weir) in the lower reach (immediately downstream of Friendship Bridge).

San Francisquito Creek Marshplain Restoration

The proposed project will restore approximately 11.41 acres of tidal marsh/transition zone habitat along San Francisquito Creek, and adjacent areas, in areas that have been identified as potentially supporting salt marsh harvest mouse and/or California clapper rail, effectively restoring tidal influence in the proposed project reach. The proposed marshplain restoration and monitoring is described in more detail in the SCVWD's MMP (SCVWD 2015). Marshplain restoration will span the entire proposed project extent on both banks from East Bayshore Road to San Francisco Bay. Habitat for salt marsh harvest mouse will be restored downstream of a line approximately corresponding to the southwest border of the Palo Alto Golf Course and the end of Geng Road and Daphne Way. Habitat for California clapper rail will be restored downstream of Friendship Bridge. After levee construction is complete, the tidal marsh area will be terraced and revegetated with high-marsh plants appropriate to the elevation relative to tidal levels. The high-marsh planting area will include alkali weed, saltgrass, alkali heath, marsh jaumea, and perennial pickleweed. The high-marsh

Figure 2. San Francisquito Creek proposed areas of levee mowing for O&M (not including existing mowing for the San Francisco Bay Trail) (copied from K. Murray, SFCJPA, *in litt.* 2015c).

transition planting area will include fat hen, alkali weed, saltgrass, alkali heath, gumweed, marsh jaumea, and western marsh rosemary. The high marsh transition seed mix area will include fat hen, marsh baccharis, alkali weed, hybrid wheatgrass, alkali heath, gumweed, salt heliotrope, meadow barley, alkali barley, western marsh rosemary, and pickleweed. Native marsh plants will be used to revegetate the terraced land. Plants appropriate to the high marsh will be planted near the stream channel. Plants native to marsh transition areas will be planted in areas more distant from the creek channel and in the upper half of the proposed project area as elevation gains.

Approximately 19,500 high marsh and high marsh transition wetland plants and cuttings are planned for installation. Plants will be sourced from the San Francisquito Creek watershed and Baylands areas. A temporary irrigation system will be installed for use during the planting and three-year establishment phase, in order to provide a back-up water supply to the newly-installed vegetation in the event of a period of drought during the winter or spring rainy season, and for irrigation as needed during the summer. Irrigation frequency is expected to be reduced as the site develops during the establishment phase.

The successful implementation of the marshplain restoration will mitigate for permanent and temporary impacts to diked marsh, tidal salt marsh habitat, tidal channel and bay waters, and riparian habitat, and enhance the habitat surrounding the lower reach of San Francisquito Creek. To ensure these goals are met, annual monitoring will be conducted over a five-year period. Performance goals will aid in determining if the site is progressing incrementally toward meeting the Year 5 success criteria. Year 5 monitoring will determine if the success criteria have been achieved. Monitoring will be overseen or conducted by a qualified biologist with experience in mitigation monitoring. Final success will not be considered to have been achieved until temporary irrigation has been off for at least two years.

The performance criteria for restoration of the marshplain are:

1. Vegetative cover increases continuously throughout the period monitored for mitigation compliance;

2. Plant species composition consists of native tidal marsh species appropriate to the salinity regime; and

3. Net increase of waters and wetlands as shown in a Corps wetland delineation.

Qualitative monitoring will provide an opportunity to assess general site conditions and year to year trends based on reconnaissance-level field observations and photo-documentation. Qualitative monitoring will occur annually during the same time frame as specified for quantitative monitoring, and occur at low tide to enable the best viewing of the marsh vegetation. Observations will include impressions of overall plant health, apparent differences in conditions within and between planting zones, prevalence or particular locations of invasive weeds, any visible problems or damage to the site and potential causes. Photo-documentation of the site will be conducted annually from at least six fixed locations showing each planting zone and the overall site. Photo points and directions will be selected during the first year of monitoring and documented on a site planting plan. Observations from the qualitative monitoring will be presented in the form of a short narrative paragraph with photographs attached.

The success of the marsh vegetation mitigation will be quantitatively evaluated by measuring the following:

1. Final success criteria consist of achieving at least 13.67 acres of tidal marsh/transition zone habitat with at least 60 percent cover of wetland indicator species by Year 5; and

2. Invasive species shall not exceed a maximum of 5 percent cover.

A formal delineation of the created jurisdictional areas will be undertaken at the site five years following mitigation site construction. The mitigation will be considered a success if the wetland delineation reveals that at least 13.67 acres of tidal salt marsh, 0.80 acre of diked marsh, and 2.32 acres of tidal channel are restored. Percent cover will be used as the primary indicator of successful establishment of wetland habitat. The final goal is 60 percent cover of wetland indicator species by the end of the monitoring period (SCVWD 2014). Invasive species shall not exceed a maximum of 5 percent cover and shall be removed prior to going to seed. Weeds will be removed by hand tools, mechanical equipment, or herbicides that are approved by the U.S. Environmental Protection Agency for use in aquatic environments. Weed management activities will be conducted in accordance with the SCVWD's Stream Maintenance Program's current accepted practices at the time of the control work (Service file number 08ESMF00-2012-F-0398, Service 2014). Under the Stream Maintenance Program, use of herbicides is part of an integrated pest management approach targeting the use of proper tools to reach project objectives. The SFCJPA will be the permit holder and responsible for compliance monitoring.

Construction Schedule

Proposed project construction is expected to last two years with work estimated to begin in the spring of 2016. Post-construction monitoring will continue for at least five years.

Conservation Measures

As part of the proposed project, SFCJPA, SCVWD, and their contractors will implement the following conservation measures to avoid and minimize potential effects on the salt marsh harvest mouse and California clapper rail and their habitats.

General Construction Site Housekeeping

The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains or waterways. Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site. To prevent mosquito breeding on construction sites, the SFCJPA will require the construction contractor to ensure that surface water is gone within four days (96 hours). All outdoor grounds will be examined and unnecessary water that may stand longer than 96 hours will be drained. Construction personnel will properly dispose of unwanted or unused artificial containers and tires. If possible, any container or object that holds standing water that must remain outdoors will be covered, inverted, or have drainage holes drilled.

The following general construction site housekeeping measures will be implemented as necessary within staging areas.

1. Staging areas that are not already paved or covered with compacted aggregate base, and that are used for parking vehicles, trailers, workshops, maintenance areas, or equipment, piping, formwork, rebar, storing masonry on pallets, and metal product storage, will be graded as required, and surfaced with a minimum of three inches of compacted aggregate base rock over a high modulus, woven, and soil separation geo-textile. Areas storing aggregate base or other rock products will also be placed on this same geo-textile. The objective is to maintain separation between native and construction materials. Areas storing soils and sand are not required to be surfaced with aggregate base course.

2. Aggregate base will be removed from all staging areas prior to proposed project completion, and the surfaces will be re-graded to their original grades or matching surrounding conditions as directed by the Engineer.

3. Any soils contaminated with petroleum product or other hazardous materials by the contractor will be removed by the contractor and disposed of in accordance with local, State, and Federal laws.

4. The contractor is responsible for weed control in staging areas and material storage areas.

The spread of invasive nonnative plant species and plant pathogens will be avoided or minimized by implementing the following measures:

1. Construction equipment will arrive at the proposed project site clean and free of soil, seed, and plant parts to reduce the likelihood of introducing new weed species.

2. Any imported fill material, soil amendments, gravel, etc., required for construction and/or restoration activities that will be placed within the upper 12 inches of the ground surface will be free of vegetation and plant material.

3. Certified weed-free imported erosion control materials (or rice straw in upland areas) will be used exclusively.

4. To reduce the movement of invasive weeds into uninfested areas, the contractor will stockpile topsoil removed during excavation and will subsequently reuse the stockpiled soil for re-establishment of disturbed project areas.

<u>Water Quality Protection</u>

1. The following measures will be implemented as necessary to reduce and minimize storm water pollution during ground disturbing maintenance activities:

    a. Soils exposed due to maintenance activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized and water quality protected prior to significant rainfall.

b. The preference for erosion control fabrics will be to consist of natural fibers. No plastic monofilament or similar material will be used.

c. Appropriate measures include, but are not limited to, the following: silt fences, straw bale barriers, brush or rock filters, storm drain inlet protection, sediment traps, sediment basins, erosion control blankets and mats, soil stabilization (*i.e.* tackified straw with seed, jute or geotextile blankets, etc.), wood chips, and straw mulch.

2. All temporary construction-related erosion control methods will be removed at the completion of the proposed project (*e.g.*, silt fences).

3. Sediments will be stored and transported in a manner that minimizes water quality effects.

   a. Wet sediments may be stockpiled outside of a live stream or may be stockpiled within a dewatered stream so water can drain or evaporate before removal.

   b. This measure applies to saturated, not damp, sediments and depends on the availability of a stockpile site.

   c. For those stockpiles located outside the channel, water draining from them will not be allowed to flow back into the creek or into local storm drains that enter the creek, unless water quality protection measures recommended by SFRWQCB are implemented.

   d. Trucks may be lined with an impervious material (*e.g.*, plastic), or the tailgate blocked with dry dirt or hay bales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out.

   e. Water will not drain directly into channels (outside of the work area) or onto public streets without providing water quality control measures.

   f. Streets and affected public parking lots will be cleared of mud and/or dirt by street sweeping (with a vacuum-powered street sweeper), as necessary, and not by hosing down the street.

4. Oily, greasy, or sediment-laden substances or other material that originate from the proposed project operations and may degrade the quality of surface water or adversely affect aquatic life, fish, or wildlife will not be allowed to enter, or be placed where they may later enter, any waterway.

5. The proposed project will not increase the turbidity of any watercourse flowing past the construction site by taking all necessary precautions to limit the increase in turbidity as follows.

   a. Where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases will not exceed 5 percent.

   b. Where natural turbidity is greater than 50 NTU, increases will not exceed 10 percent.

c. Where the receiving water body is a dry creek bed or storm drain, waters in excess of 50 NTU will not be discharged from the proposed project.

d. Water turbidity changes will be monitored. The discharge water measurements will be made at the point where the discharge water exits the water control system for tidal sites and 100 feet downstream of the discharge point for non-tidal sites. Natural watercourse turbidity measurements will be made in the receiving water 100 feet upstream of the discharge site. Natural watercourse turbidity measurements will be made prior to initiation of proposed project discharges, preferably at least two days prior to commencement of operations.

6. No washing of vehicles will occur at job sites.

7. No fueling will be done in a waterway or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (*i.e.*, pumps, generators).

   a. For stationary equipment that must be fueled on the site, containment will be provided in such a manner that any accidental spill of fuel will not be able to enter the water or contaminate sediments that may come in contact with water.

   b. Any equipment that is readily moved out of the waterway will not be fueled in the waterway or immediate floodplain.

   c. All fueling done at the job site will provide containment to the degree that any spill will be unable to enter any waterway or damage riparian vegetation.

8. No equipment servicing will be done in a stream channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (*i.e.*, pumps, generators).

   a. Any equipment that can be readily moved out of the channel will not be serviced in the channel or immediate floodplain.

   b. All servicing of equipment done at the job site will provide containment to the degree that any spill will be unable to enter any channel or damage stream vegetation.

   c. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location will be done in a channel or floodplain.

   d. If emergency repairs are required, containment will be provided equivalent to that done for fueling or servicing.

9. Measures will be implemented to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means.

   a. Prior to entering the work site, all field personnel will know how to respond when toxic materials are discovered.
   b. The discharge of any hazardous or nonhazardous waste as defined in Division 2,

Subdivision 1, Chapter 2 of the California Code of Regulations will be conducted in accordance with applicable State and Federal regulations.

c. In the event of any hazardous material emergencies or spills, personnel will call the Chemical Emergencies/Spills Hotline at 1-800-510-5151.

10. Prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water.

    a. Field personnel will be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills.

    b. No fueling, repair, cleaning, maintenance, or vehicle washing will be performed in a creek channel or in areas at the top of a channel bank that may flow into a creek channel.

11. Spill prevention kits appropriate to the hazard will always be in close proximity when using hazardous materials (*e.g.*, crew trucks and other logical locations).

    a. Prior to entering the work site, all field personnel will know the location of spill kits on crew trucks and at other locations within SCVWD facilities.

    b. All field personnel will be advised of these locations and trained in their appropriate use.

12. Runoff from soil stockpiles will be avoided. If soil is to be stockpiled, no runoff will be allowed to flow to a creek.

13. Cofferdams will be used for tidal work areas. For tidal areas, a downstream cofferdam will be constructed to prevent the work area from being inundated by tidal flows. By isolating the work area from tidal flows, water quality effects are minimized. Downstream flows will continue through the work area and through pipes within the cofferdam.

    a. Installation of coffer dams will begin at low tide.

    b. Waters discharged through tidal cofferdam bypass pipes will not exceed 50 NTU over the background levels of the tidal waters into which they are discharged.

    c. Cofferdams shall not be constructed of earthen fill due to potential adverse water quality impacts in the event of a failure.

    d. Cofferdams constructed of gravel shall be covered by a protective covering (*e.g.*, plastic or fabric) to prevent seepage.

14. Groundwater will be managed at work sites. If high levels of groundwater in a work area are encountered, the water will be pumped out of the work site. If necessary to protect water quality, the water will be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment prior to the water re-entering a

receiving water body. Water pumped into vegetated areas will be pumped in a manner that will not create erosion around vegetation.

15. Sanitary/septic waste will be managed. Temporary sanitary facilities will be located on jobs that last multiple days in compliance with California Division of Occupational Safety and Health regulation 8 California Code of Regulations 1526. All temporary sanitary facilities will be placed outside of the creek channel and floodplain and removed when no longer necessary.

In addition, as part of the Santa Clara Valley Urban Runoff Pollution Prevention Program and the San Mateo Countywide Stormwater Pollution Prevention Program, required under Waste Discharge Requirements and National Pollutant Discharge Elimination System permits for the discharge of storm water runoff from the municipal separate storm sewer systems (MS4s) overseen by the SFRWQCB, all construction sites are required to have site-specific and seasonally and phase-appropriate effective best management practices (BMPs) (SFRWQCB 2009). SFCJPA will be responsible for ensuring compliance with all local and State regulations, including the SFRWQCB National Pollutant Discharge Elimination System permits and local BMPs for jurisdictions adjoining the proposed project site. The proposed project specifications require that the proposed project construction contractor prepare a Storm Water Pollution Prevention Plan (SWPPP) and erosion control and sedimentation plan showing placement of BMPs at various stages of construction in conformance with requirements, and all SWPPP documents and plans will be stamped by a State-certified Qualified SWPPP Developer. The proposed project will implement measures to accomplish objectives specified in SFCJPA's *San Francisquito Creek Watershed Analysis and Sediment Reduction Plan*, which fulfills National Pollutant Discharge Elimination System permit provisions that require the co-permittees of the Santa Clara Valley Urban Runoff Pollution Prevention Program and San Mateo Countywide Stormwater Pollution Prevention Program within the San Francisquito Creek watershed to assess and implement sediment management measures in the watershed (SFCJPA 2004). Water quality protection standards during construction will comply with the most protective BMPs of the local jurisdictions and the State of California.

<u>Safe Use of Herbicides and Pesticides</u>

1. Pesticides products are to be used only after an assessment has been made regarding environmental, economical, and public health aspects of each of the alternatives. The following types of pesticides are used by the SCVWD.

    a. Herbicides are used to: control algae, weeds, and undesirable vegetation; to minimize fire hazards; to maintain flood conveyance of waterways; and to maintain compliance with State and Federal requirements.

    b. Insecticides are used only in and around SCVWD buildings, or in the case of a serious pest outbreak, on landscape and re-vegetation facilities; only after all other methods, such as prevention or natural nontoxic control methods, have proven ineffective; and where required, the lowest toxicity will be used in accordance with the label and the details of this policy.

    c. No rodenticides or fumigants will be used within or near suitable habitat for the salt marsh harvest mouse or California clapper rail. Methods of rodent control within or

near salt marsh harvest mouse or California clapper rail habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than two inches by one inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line. In areas where rodenticides are used, carcass retrieval surveys will be conducted daily for acute toxins and weekly for anticoagulants to minimize secondary poisoning impacts during the use period. Any spilled bait will be cleaned up immediately. Alternatives such as trapping and smoke bombs are used wherever practical prior to rodenticide use.

2. All herbicide use will be consistent with approved product specifications and according to their labels. Applications will be made by, or under the direct supervision of, State-certified applicators under the direction of a licensed Pest Control Advisor.

3. Only herbicides and surfactants registered for aquatic use will be applied within the banks of channels within 20 feet of any water present. Aquatic herbicide use will be limited to July 1 through October 15. If rain is forecasted for the day, then application of aquatic herbicide will be rescheduled.

<u>Construction Dust Control</u>

1. Bay Area Air Quality Management District Basic Control Measures for construction emissions of particulate matter (PM10) will be implemented at all construction sites. Current measures stipulated by the Bay Area Air Quality Management District California Environmental Quality Act Guidelines include the following (Bay Area Air Quality Management District 2010):

    a. All exposed surfaces (*e.g.*, parking areas, staging areas, soil piles, graded areas, and unpaved access roads) will be watered two times per day under normal conditions. Watering periodicity can be increased or decreased as necessitated by site specific conditions as determined by the SFCJPA's designated construction manager and with the SFCJPA's approval.

    b. All haul trucks transporting soil, sand, or other loose material off the site will be covered.

    c. All visible mud or dirt track-out onto adjacent public roads will be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

    d. All vehicle speeds on unpaved roads will be limited to 15 miles per hour.

    e. All roadways, driveways, and sidewalks to be paved will be completed as soon as possible. Building pads will be laid as soon as possible after grading unless seeding or soil binders are used.

    f. Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California

airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage will be provided for construction workers at all access points.

g. All construction equipment will be maintained and properly tuned in accordance with manufacturer's specifications. All equipment will be checked by a certified mechanic and determined to be running in proper condition prior to operation.

2. A publicly visible sign will be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person will respond and take corrective action as soon as is feasible and no later than 24 hours after the complaint is made. The Bay Area Air Quality Management District's phone number, as well as the contact numbers for the SFCJPA Project Manager, Designated Construction Manager, and a designated contact with the City of East Palo Alto will also be visible to ensure compliance with applicable regulations.

Biological Resources Protection

1. Prior to construction, worker awareness training must be conducted to inform proposed project construction workers of their responsibilities regarding sensitive environmental resources. The training will include environmental education about the salt marsh harvest mouse and California clapper rail and other special-status species and sensitive habitats (*e.g.*, in-stream habitat, riparian habitat, wetlands). The training will include visual aids to assist in identification of regulated biological resources, actions to take should protected wildlife be observed within the action area, and possible legal repercussions of affecting such regulated resources.

2. Existing access ramps and roads to waterways will be used where possible. If temporary access points are necessary, they will be constructed in a manner that minimizes effects on waterways:

    a. Temporary proposed project access points will be created as close to the work area as possible to minimize running equipment in waterways and will be constructed so as to minimize adverse effects.

    b. Any temporary fill used for access will be removed upon completion of the proposed project. Site topography and geometry will be restored to pre-project conditions to the extent possible.

3. Migratory bird nesting surveys will be performed prior to any proposed project-related activity that could pose the potential to affect migratory birds during the nesting season.

4. Nesting exclusion devices may be installed to prevent potential establishment or occurrence of nests in areas where construction activities would occur. All nesting exclusion devices will be maintained throughout the nesting season or until completion of work in an area makes the devices unnecessary. All exclusion devices will be removed and disposed of when work in the area is complete.

5. Effects on native aquatic vertebrates will be avoided or minimized. If native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, an evaluation of the project site and the native aquatic vertebrates will be conducted by a qualified biologist. The qualified biologist will consider:

    a. Native aquatic species present at the site.

    b. The ability of the species to naturally recolonize the stream reach.

    c. The life stages of the native aquatic vertebrates present.

    d. The flow, depth, topography, substrate, chemistry, and temperature of the stream reach.

    e. The feasibility of relocating the aquatic species present.

    f. The likelihood the stream reach will naturally dry up during the work season. Based on consideration of these factors, the qualified biologist may make a decision to relocate native aquatic vertebrates. The qualified biologist will document in writing the reasons to relocate native aquatic species, or not to relocate native aquatic species, prior to installation of cofferdams, water bypass structures, or silt barriers. If the decision is made to relocate the native aquatic species, then the operation will be based on the SCVWD's Fish Relocation Guidelines.

6. Local ecotypes of native plants will be planted and appropriate erosion-control seed mixes will be chosen. Whenever native species are prescribed for installation on SCVWD fee properties or easements, the following steps will be taken by a qualified biologist or vegetation specialist:

    a. Evaluate whether the plant species currently grows wild in Santa Clara County.

    b. If the plant species currently grows wild in Santa Clara County, the qualified biologist or vegetation specialist will determine whether the plant installation must include local natives, *i.e.* grown from propagules collected in the same or adjacent watershed, and as close to the proposed project site as feasible.

    c. A qualified biologist or vegetation specialist will be consulted to determine which seeding option is ecologically appropriate and effective. The following guidelines will inform the biologist or vegetation specialist's determination.

    d. For areas that are disturbed, an erosion control seed mix may be used consistent with the SCVWD's Guidelines and Standards for Land Use Near Streams, Design Guide 5, "Temporary Erosion Control Options."

    e. In areas with remnant native plants, the qualified biologist or vegetation specialist may choose an abiotic application instead, such as an erosion control blanket or seedless hydro-mulch and tackifier to facilitate passive revegetation of native species.

f. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable.

g. If a gravel or wood mulch has been used to prevent soil compaction, this material may be left in place (if ecologically appropriate) instead of seeding.

h. Seed selection will be ecologically appropriate as determined by a qualified biologist, per *Guidelines and Standards for Land Use Near Streams, Design Guide 2: Use of Local Native Species; and, Supplemental Landscaping/Revegetation Guidelines* (ISO document WQ71001).

7. Animal entry and entrapment will be avoided.

a. All pipes, hoses, or similar structures less than 12 inches diameter will be closed or covered to prevent animal entry. All construction pipes, culverts, or similar structures, greater than 2 inches diameter, stored at a construction site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained construction personnel before the pipe is buried, capped, used, or moved.

b. If inspection indicates presence of sensitive or State- or federally-listed species inside stored materials or equipment, work on those materials will cease until a qualified biologist determines the appropriate course of action.

c. To prevent entrapment of animals, all excavations, steep-walled holes or trenches more than 6 inches deep will be secured against animal entry at the close of each day. Any of the following measures may be employed, depending on the size of the hole and method feasibility.

d. Holes will be securely covered (no gaps) with plywood or similar materials at the close of each working day, or any time the opening will be left unattended for more than one hour.

e. In the absence of covers, the excavation will be provided with escape ramps constructed of earth or untreated wood, sloped no steeper than 2:1, and located no farther than 15 feet apart.

f. In situations where escape ramps are infeasible, the hole or trench will be surrounded by filter fabric fencing or a similar barrier with the bottom edge buried to prevent entry.

8. <u>Identify and protect riparian habitats</u>. To avoid unnecessary damage to or removal of riparian habitat, the SFCJPA will retain a qualified biologist or ecologist to survey and demarcate riparian habitat on or adjacent to the proposed areas of construction in the upper reach of San Francisquito Creek. Riparian areas not slated for trimming or removal to accommodate proposed project construction will be protected from encroachment and damage during construction by installing temporary construction fencing to create a no-activity exclusion zone. Fencing will be brightly colored and highly visible, and installed under the supervision of a qualified biologist to prevent damage to riparian habitat during installation. The fencing will protect all potentially affected riparian habitat consistent with

International Society of Arboriculture tree protection zone recommendations and any additional requirements of the resource agencies with jurisdiction. Fencing will be installed before any site preparation or construction work begins and will remain in place for the duration of construction. Riparian vegetation that must be trimmed will be trimmed by an International Society of Arboriculture certified arborist who will minimize stress and potential damage to trees and shrubs. Construction personnel will be prohibited from entering the exclusion zone for the duration of proposed project construction. Access and surface-disturbing activities will be prohibited within the exclusion zone.

9. Replace riparian habitat. The SFCJPA will be responsible for replacing permanently affected riparian habitat at a mitigation-to-effect ratio of 2:1 and temporarily affected riparian habitat at a minimum mitigation-to-effect ratio of 1:1 through the restoration or creation of marsh habitats consistent with the historical ecology of the project area. The SFCJPA will develop a MMP that describes this habitat replacement. The MMP will be developed in the context of the Federal and State permitting processes under the Clean Water Act and California Department of Fish and Game Code, and will include success criteria as specified by the permitting agencies. The MMP will also include adaptive management guidelines for actions to be taken if the success criteria are not met.

California Clapper Rail Measures

1. Work activities within 50 feet of California clapper rail habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local high tides) or when the marsh plain is inundated, which could prevent individuals from reaching available cover.

2. If work is to be conducted during the California clapper rail's breeding season (February 1 – August 31) within 700 feet of suitable habitat, a permitted biologist will be retained to conduct California clapper rail protocol-level surveys at the proposed project site in appropriate habitat for the California clapper rail. The surveys will be conducted following the Service's June 2015 survey protocol during the appropriate protocol-level survey period (*i.e.*, late January – April) prior to commencement of construction and maintenance activities (http://www.fws.gov/sfbaydelta/documents/June_2015__Final_CCR_protocol.pdf). Proposed project activities occurring within 700 feet of California clapper rail activity centers will occur only between September 1 and January 31 outside of the California clapper rail's breeding season.

3. Outside of the California clapper rail breeding season, a permitted biologist will be retained to conduct surveys of appropriate habitat for California clapper rails within the work area, including all staging and access routes, no more than seven days prior to initiation of work within suitable habitat. If California clapper rails are observed during this survey, a biologist will conduct an additional survey immediately prior to initiation of construction activities. If California clapper rails are observed within or near the work area, a no-disturbance buffer (minimum 50 feet) will be implemented. If the daily work area is expanded, then a qualified biologist will survey the suitable habitat prior to initiation of work and movement of equipment that day. No work will occur within the buffer until the biologist verifies that California clapper rail individuals have left the area.

4. If California clapper rails are routinely observed in the work area, a species avoidance plan will be developed in coordination with the Service and CDFW. If no California clapper rails are observed in accordance with the survey protocols, no buffers will be required. All vegetation removal within suitable California clapper rail habitat, as determined by a biologist, will be done by hand to the extent possible. If movement of heavy equipment is necessary in suitable habitat or within 50 feet of habitat, then a Service-approved biological monitor will observe the area in front of the equipment from a safe vantage point. If California clapper rails are detected within the area in front of the equipment, then the equipment will stop and the biologist will direct the equipment on an alternative path. If this is not possible, then equipment will stop until a clear path can be identified.

5. Additional conservation measures during the construction period will include:

    a. An annual search for and subsequent destruction of any cat feeding stations along public walkways shall be conducted.

    b. Before the onset of winter high tides, an annual capture and removal effort of feral cats and rats in the surrounding disturbed areas shall be conducted.

6. The SFCJPA will conduct protocol-level surveys for California clapper rail where potential impacts to rail habitat occur along the Faber Marsh levee and in San Francisquito Creek for the duration of mitigation monitoring, which is a minimum of five years. The purpose of the surveys will be to evaluate the effectiveness of the measures to support the California clapper rail population.

<u>Salt Marsh Harvest Mouse Measures</u>

1. Since the salt marsh harvest mouse can breed year-round, a species avoidance plan will be developed in consultation with the Service and CDFW and implemented. The avoidance plan, at a minimum, will include the following.

    a. Hand removal of vegetation shall start at the edge farthest from the largest contiguous salt marsh area and work its way towards the salt marsh, providing cover for salt marsh harvest mice and allowing them to move towards the salt marsh as vegetation is being removed.

    b. In consultation with CDFW and the Service, salt marsh harvest mouse-proof exclusion fencing shall be placed around a defined work area immediately following vegetation removal and before proposed project activities begin. All supports for the exclusion fencing will be placed on the inside of the work area to prevent salt marsh harvest mice from climbing the stakes into the work area. The salt marsh harvest mouse-proof exclusion fencing shall be at least two feet high but no higher than four feet. The fencing will be made of a heavy plastic sheeting material that is too smooth for salt marsh harvest mice to climb. The toe of the fence will be buried approximately four inches in the ground to prevent salt marsh harvest mice from crawling or burrowing underneath it. A four-foot buffer will be maintained free of vegetation around the exclusion fencing and work areas. The final design and

proposed location of the fencing shall be reviewed and approved by CDFW and the Service prior to placement.

c. Prior to initiation of work each day within 300 feet of tidal or pickleweed habitats, a qualified biologist shall thoroughly inspect the work area and adjacent habitat areas to determine if salt marsh harvest mice are present. The biologist shall ensure the exclusion fencing has no holes or rips, and the base remains buried. The fenced area will be inspected daily to ensure that no mice are trapped.

2. Prior to initiation of work within suitable habitat, a Service-approved biologist will be retained to monitor the hand removal of pickleweed to avoid the injury or mortality of the salt marsh harvest mouse. Monitoring will occur for the duration of all clearing work within suitable habitat. If a salt marsh harvest mouse is observed during clearing activities, clearing will cease and workers will move to a new area. Clearing work may begin in the area of the observation one day or more after the observation date.

3. During the survey, if salt marsh harvest mouse individuals are observed, or if active nests of this species are observed, proposed project activities within 100 feet of the observation will be postponed and a no-disturbance buffer will be established. The buffer will remain in place until the biologist determines that the individuals have left the area (or if an active nest is found that all the salt marsh harvest mice have weaned) and are not present in or near (100 feet) of the work area. If no individuals are observed in accordance with the survey protocols, no buffers will be required.

4. Work activities within 50 feet of salt marsh harvest mouse habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local high tides) or when the marsh plain is inundated, which could prevent individuals from reaching available cover.

<u>Avoidance Measures during O&M Activities including Levee Mowing and Vegetation Management</u>

The following avoidance measures will be implemented during O&M activities including vegetation management and annual levee mowing to avoid the potential for injury and mortality of salt marsh harvest mice and California clapper rails.

1. Within seven days prior to work within the range of salt marsh harvest mouse or California clapper rail habitat, the proposed project area will be surveyed by a qualified biologist to identify specific habitat areas. Surveyed areas will include work locations and access routes.

2. To minimize or avoid the loss of individuals, activities within or adjacent to salt marsh harvest mouse and California clapper rail habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local high tides) when the marsh plain is inundated, because protective cover for those species is limited and activities could prevent them from reaching available cover.

3. Mowing will not occur at night.

4. Specific habitat areas are vegetated areas of cordgass, marsh gumplant, pickleweed, alkali heath, and other high marsh vegetation, brackish marsh reaches of creek with heavy accumulations of bulrush thatch (old stands), and high water refugia habitat that may include annual grasses, and shrubs immediately adjacent to channels. Within the identified specific habitat areas, vegetation will be removed by hand from areas to be directly impacted by the work activities if possible (hand removal of vegetation in some channels may not be possible). If within the mapped range of the salt marsh harvest mouse, but outside of areas identified as specific habitat areas, then other methods may be possible.

5. Prior to the initiation of work each day for all vegetation management work, ground or vegetation disturbance, operation of large equipment, grading, sediment removal, and bank stabilization work and prior to expanding the work area, if suitable habitat occurs within the immediate work area, a qualified biologist will conduct a preconstruction survey of all suitable habitat that may be directly or indirectly impacted by the day's activities (work area, access routes, staging areas).

    a. If during the initial daily survey or during work activities a California clapper rail is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until the California clapper rail leaves the work area.

    b. If during the initial daily survey or during work activities a salt marsh harvest mouse or similar rodent is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until a *Site Specific Species Protection Form* to protect the salt marsh harvest mouse or similar rodent is developed and implemented by the qualified biologist. Acceptable plan activities may include one or more of the following activities: (1) establishment of a buffer zone at least 50 feet in radius from the rodent; (2) ongoing active monitoring; and (3) delay of work activity until the qualified biologist can provide CDFW and the Service a suggested course of action and seek concurrence.

6. If mowing with hand equipment is necessary within 50 feet of habitat areas, an on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. If salt marsh harvest mice are detected within the area to be mowed, no mowing will occur in that area. If a California clapper rail is detected within the area to be mowed, the mowing will stop until the individual(s) have left the work area.

7. If visual observation cannot confirm California clapper rails have left the work area, then it is assumed that the individual(s) remains in the work area and the work will not resume until the area has been thoroughly surveyed (and absence confirmed) or the Service has been contacted for guidance.

8. No rodenticides or fumigants will be used within the range of the salt marsh harvest mouse or California clapper rail as identified on SCVWD range maps. Methods of rodent control within salt marsh harvest mouse or California clapper rail habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

Predator Management

The SFCJPA will take the following actions to assist the Refuge and U.S. Department of Agriculture Wildlife Services in its efforts towards predator management at Faber Marsh and the adjacent Laumeister Marsh as follows:

1. Predator Trapping Assistance

    a. Financial contributions towards predator management activities. Since predation is believed to represent the greatest threat and in order to provide the maximum benefit possible to the salt marsh harvest mouse and California clapper rail, the SFCJPA will provide funding to augment current predator trapping activities, so that the desired activities in and around Faber and Laumeister Tract marshes are fully funded. The SFCJPA will enter in to a formal agreement with U.S. Department of Agriculture Wildlife Services for the provision of $8,000 per year with a 5 percent annual increase, the first payment to be made within 30 days after a Clean Water Act Section 404 permit is issued for the proposed project, for a total of five years.

    b. Install features to deter the public from entering trapping areas. Currently, trapping activities are limited along the levee that separates the Faber and Laumeister Tracts because of human activity. This levee is open to the public, and U.S. Department of Agriculture Wildlife Services is reluctant to place traps in areas where people may tamper with them, or be harmed by them. To provide for greater trapping opportunities, the SFCJPA will install a pole and cable feature, subject to municipal and regional access codes, to designate a trail location and alignment for the public. This will provide some "off-trail" space between the pole and cable in the Laumeister Tract marsh for trapping activities and reduce the likelihood of accidental human/trap interface. Installation will take place at the time of revegetation of the Main Faber Marsh northern perimeter levee.

    c. Provide access to new areas for trapping activities. Currently, U.S. Department of Agriculture Wildlife Services is limited in its trapping activities to areas within the Refuge. Trapping would likely be more effective if these activities could also take place in known predator access areas to the Refuge, but lie outside of the Refuge. There are certain parcels along and adjacent to the levee separating the Faber and Laumeister Tract marshes from developed areas in East Palo Alto that are owned by the City of East Palo Alto or the City of Palo Alto. The SFCJPA will work with its municipal partners to provide access agreements between the Cities and U.S. Department of Agriculture Wildlife Services to allow for trapping activities in these areas. Discussions with the Cities will begin at the time that formal Section 7 consultation on the proposed project is initiated with the Service.

2. Exclusionary Fencing. The SFCJPA will install a chain-link fence and gate across the levee that separates San Francisquito Creek and Main Faber Marsh to inhibit predator and human access to the marsh. In addition to inhibiting predator access, the fence will allow for more aggressive trapping activities along this levee and the levee that separates Main Faber Marsh and Outer Faber Marsh. The fencing will be installed upon completion of construction of the project features along the southern Main Faber Marsh levee beyond the proposed fence

location. The fence and gate will have the following features: 1-inch mesh chain link; 8 feet tall; vehicular gate with chained lock to allow access to multiple agencies; anti-perching feature on top; the fence shall extend on the marsh (north) side to the outboard toe of the high marsh transition zone; and the fence shall connect on the creek (south) side to the rail structure of the Friendship Bridge.

3. Raptor Perching Deterrents. The SFCJPA will modify 12 bridge marker poles to deter raptor perching. A cone-shaped cap will be placed at the top of each pole, and the capped poles will be maintained in a condition that deters predator access and raptor perching. Caps will be placed on the poles at the time of construction of the boardwalk project feature.

4. Trail Signage. The SFCJPA will coordinate with staff from the Palo Alto Baylands Preserve to install signs informing the public of the need to keep dogs leashed, with applicable municipal code citations, and establish a local enforcement strategy. Signage will be installed upon completion of the proposed project.

High Tide Refuge Islands

The SFCJPA will install five high-tide refuge islands in Outer Faber Marsh near the San Francisco Bay. These islands will be similar to those installed as part of the Invasive Spartina Project effort, which have successfully provided refuge during king tides throughout San Francisco Bay (H.T. Harvey & Associates 2015b). Each island will have a footprint of 0.007 acre (300 square feet, 10 feet by 30 feet). The islands will be planted with marsh gumplant and/or other native marsh species, and placed at an elevation that retains wetlands in the marsh. The SFCJPA and its partners will develop final design and dimensions, and determine final location of these islands in coordination with the Service, the Refuge, and H.T. Harvey & Associates (the consultant for the Invasive Spartina Project). Further details on the high-tide refuge islands installation will be provided in the proposed project's MMP and are available in the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a). An example plan view and cross-section of a high-tide refuge island installed for the Invasive Spartina Project is illustrated in Figures 3 and 4 below. The approximate locations of the five high tide refuge islands to be installed in Outer Faber Marsh are shown in Figure 5 below.

Each of the five high-tide refuge island sites proposed for construction in Outer Faber Marsh will consist of one excavation area (if necessary), one refuge island, and an elevation control stake. Prior to construction, a restoration ecologist will ground-truth the location of refuge islands selected during the stakeholder meeting. Refuge island sites will be accessed on foot outside of the California clapper rail's breeding season (*i.e.*, after September 1). The restoration ecologist may adjust the location of refuge island sites based on field conditions in order to maximize the benefit of island sites for California clapper rail and facilitate construction.

During pre-construction ground-truthing, a white polyvinyl chloride (PVC) pipe will be installed at each island site so that the top of the PVC pipe is at Mean Higher High Water (MHHW). During refuge island construction, the elevation of each island and the maximum depth of the excavation area will be determined via measurement (with a laser level) to the elevation control stake.
The refuge islands will be built to be approximately 25-foot long by 10-foot wide with island tops approximately 2-3 feet above the marsh plain and located adjacent to a tidal marsh slough channel.

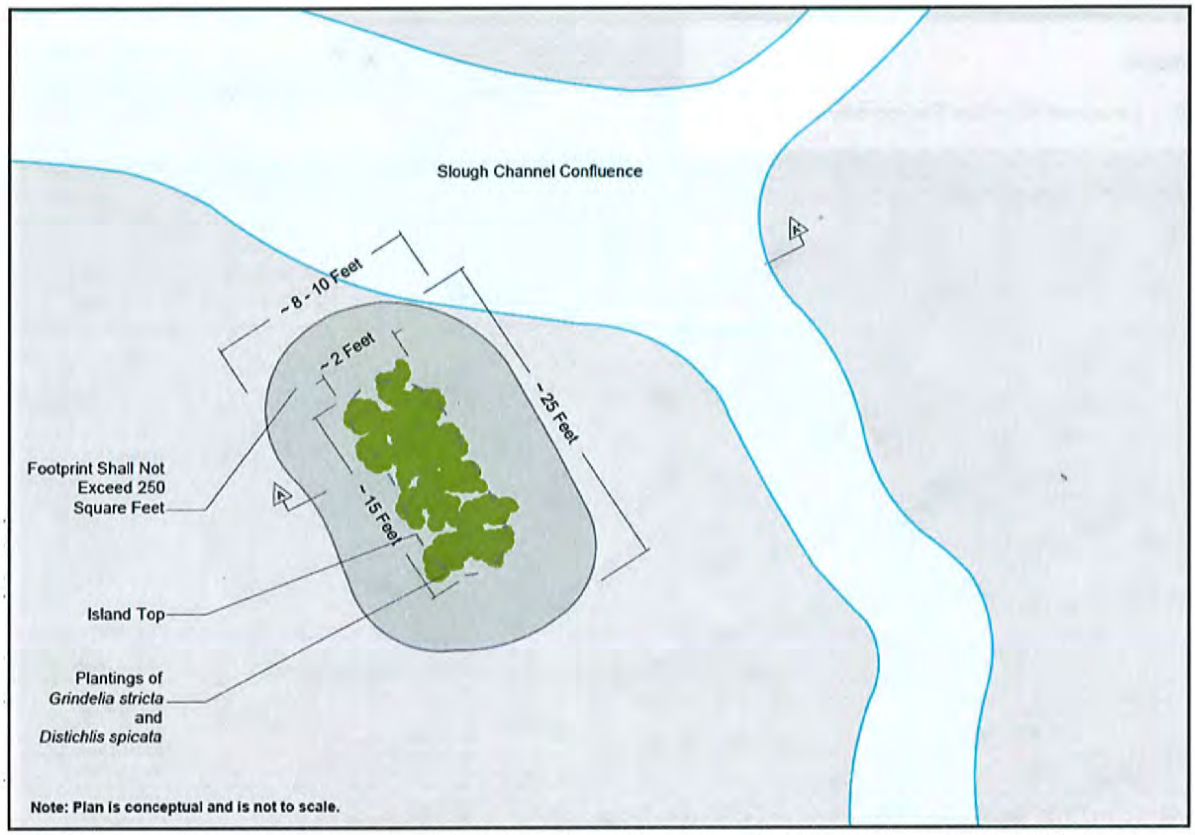

Figure 3. Typical plan view of a high-tide refuge island (copied from Figure 7 in H.T. Harvey & Associates (2015a)).

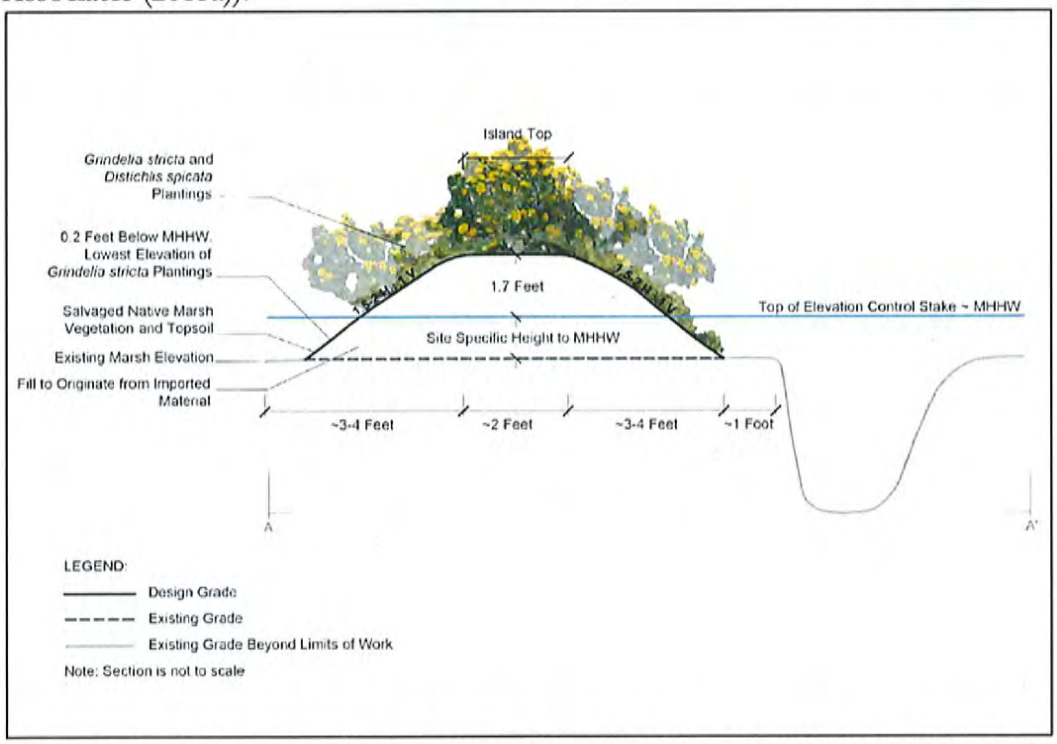

Figure 4. Typical cross-section of a high-tide refuge island (copied from Figure 8 in H.T. Harvey & Associates (2015a)).

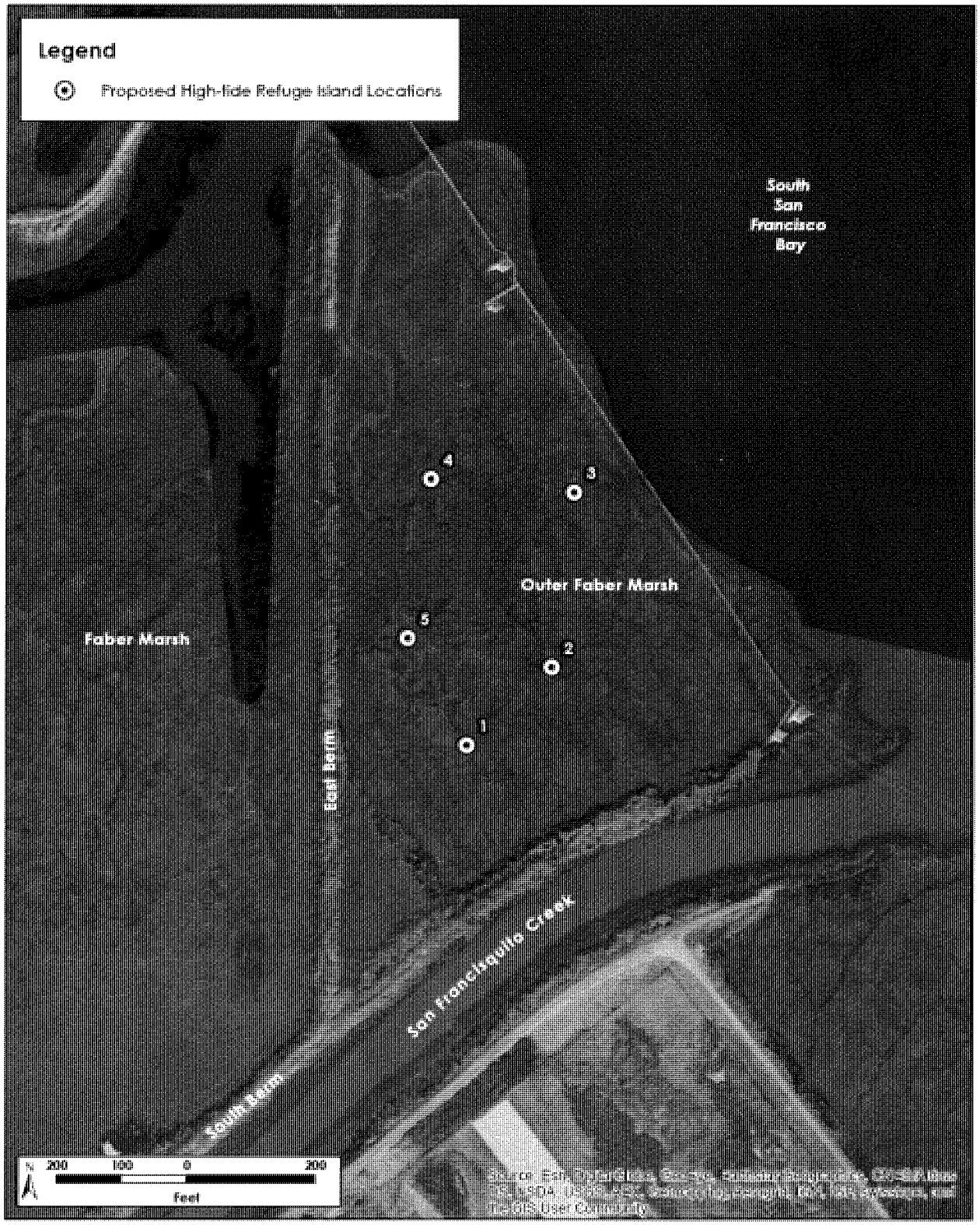

Figure 5. Approximate locations where high-tide refuge islands will be installed in Outer Faber Marsh (copied from Figure 6 in H.T. Harvey & Associates (2015a)).

There are two general methods that may be used for refuge island construction: the use of in-situ bay mud collected from the marsh or via the import of terrestrial soil. The construction methods will be determined based on soil conditions (particularly moisture content) and logistical considerations. If it is infeasible to use bay mud, clean terrestrial soil will be imported to each island site using hand-tools. The fill may be transported to the marsh by dump truck to the nearest feasible access point, but no vehicles will enter marsh habitats. The contractor may also use boats (*e.g.*, airboats) to import soil to Outer Faber Marsh, if that method is more logistically suitable. Ecologists for H.T. Harvey & Associates found that marsh mud in the footprint of the proposed refuge island locations in Outer Faber Marsh is too saturated and unconsolidated and therefore, not recommended for refuge island construction (H.T. Harvey & Associates 2015a). Instead, the ecologists for H.T. Harvey & Associates recommend that refuge islands be constructed using imported terrestrial fill. Use of terrestrial fill for construction will also reduce temporary impacts to Outer Faber Marsh which would have been caused by excavating in-situ marsh mud (H.T. Harvey & Associates 2015a).

Crews of approximately five to eight people will access and construct each refuge island over a one to two day period, during low tides. Refuge islands will be constructed by hand using shovels and other hand tools, from approximately 11 to 22 cubic yards of imported clean terrestrial fill meeting the specifications provided in Table 4 of H.T. Harvey & Associates (2015a). Terrestrial fill will be transported to island sites across the marsh from an adjacent berm using wheelbarrows (either hand operated or gas powered). A temporary plywood path will be laid down on the day of construction from the berm to the island site to protect marsh vegetation during transport of fill material. The surface area of fill at each refuge island site will be a maximum of 250 square feet (see Figures 4 and 5 for typical dimensions).

Prior to construction, approximately 4-6 vertical inches of the existing marsh vegetation, root structure, and sediment (hereafter, marsh sod) will be salvaged from the surface of the refuge island construction footprint. Following marsh sod removal, terrestrial fill will be placed in the island footprint, elevating an area of approximately 12 square feet (the island crest) to an elevation of approximately 1.7 feet above MHHW. Island tops will settle to approximately 1.3 feet above MHHW over a five-year period. Island tops will be flooded periodically during spring tides. Crews will make an effort to complete excavation and construction of each island during one low-tide cycle. However, if refuge island construction is not completed before the tide rises, measures such as tarping the excavated and salvaged materials will be employed to protect water quality until construction is completed during the following low-tide cycle. A total of about 8,250 square feet (0.19 acre) of tidal marsh habitat will be temporarily disturbed during construction of the five high-tide refuge islands in Outer Faber Marsh.

After the refuge island substrate is manually constructed and graded, salvaged marsh sod will then be placed on the top and side slopes of the constructed island to facilitate habitat establishment and erosion control. Moreover, the upper portion of each island will be densely planted with gumplant and saltgrass from container stock to facilitate establishment of refuge habitat. Marsh gumplant container stock (50, 1 gallon container plants per island) will be installed on 2-foot centers. Saltgrass will also be installed from container stock at all islands, next to each of the marsh gumplant plantings (50 saltgrass treeband container plants per island). Container plants will be purchased from a qualified plant nursery and collected from source populations located around the margins of southern San Francisco Bay (South Bay) (south of the San Mateo Bridge). An 8-12 month lead time prior to plant installation is typically necessary to contract grow the plants. Saltgrass planting is

intended to facilitate establishment of increased cover for refugia because saltgrass grows vertically into marsh gumplant canopies. Once mature, the planted marsh gumplant will provide high-tide refuge canopy extending approximately 2-3 feet above the highest predicted spring tides.

A qualified biologist will work with the contractor to reduce and minimize the impacts on wetlands from island construction access. Access to and from all refuge island sites will be conducted by foot from the nearest levee access point. During island construction, marsh vegetation roots and substrate will be thoroughly protected from damage. Protective materials such as plywood sheets (or equivalent) will be temporarily installed (for a maximum of two to three days) to completely cover all vegetated marsh areas that will be regularly accessed by workers and biologists during island construction, including the access pathways to construction sites and vegetation immediately surrounding the refuge island construction sites.

All dead marsh gumplant individuals will be replaced during the first two years of the plant establishment period. Additional plant replacement may occur in the third year if the Year 3 marsh gumplant performance criteria are not met. During the three year plant establishment period trash deposited within the planting areas will be removed when maintenance activities are performed.

The high-tide refuge islands will be monitored annually for five years. Monitoring will occur between September 1 and December 1 so that monitoring falls outside of the California clapper rail's breeding season (February 1 – August 31) and before mid-winter when high marsh vegetation has typically senesced. The first annual monitoring event will occur at the end of the first growing season following plant installation. High quality high-tide refuge habitat for California clapper rail and salt marsh harvest mouse should be at an appropriate elevation and sufficiently covered by native salt marsh vegetation to provide protection from flooding and predators during extreme high-tide events. Therefore, the final success criteria among high-tide refuge islands after five growing seasons will be as follows:

1. The average foliar cover among the refuge islands will be at least 70 percent provided by native plant species.

2. The average marsh gumplant canopy cover among the refuge islands will be at least 30 percent.

3. The average marsh gumplant height among the refuge islands will be at least 1.5 feet.

4. The average invasive plant foliar cover on each island will be less than 5 percent.

5. The average crest elevation of the ground surface among the refuge islands will be at least +0.8 feet above MHHW.

An Annual Monitoring Report will be submitted to the permitting agencies by February 1 following each monitoring year. Monitoring Reports will present the findings of the annual field surveys relative to the performance standards in the monitoring plan described above.

Transition Zone Habitat Enhancement along Faber Marsh Levees and Berms

The SFCJPA will remove invasive species from the levees and berms surrounding and within Main Faber Marsh and Outer Faber Marsh (with the exception of the western levee of Main Faber Marsh, which is being enhanced by the City of East Palo Alto as part of the habitat compensation requirements in the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project (Service file number 81420-2011-F-0103-2, Service 2013b)) and revegetate them with appropriate marsh transition zone vegetation. The planting plan and plant palette will be designed to restore vegetation structure and composition that will provide high tide refuge habitat for the California clapper rail and salt marsh harvest mouse and will be subject to review and approval by the Service and the Refuge. The approximate areas and lengths of Faber Marsh levees where transition zone habitat will be enhanced are: northern levee 2.44 acres, 2,210 linear feet; southern levee 1.87 acres, 1,530 linear feet; and eastern levee 1.35 acres, 1,380 linear feet (Figure 6) (note the original estimate of 2.77 acres of north levee enhancement shown in Figure 6 has been revised by SFCJPA to 2.44 acres based on recent field data provided by H.T. Harvey & Associates) (K. Murray, SFCJPA, *in litt.* 2015e). The 1,530 linear feet of south levee enhancement is parallel to construction impacts on top of the levee as shown in Figure 6. The total amount of high tide refuge habitat enhancement on the Faber Marsh levees proposed by the proposed project is about 5.66 acres and approximately 5,120 linear feet. Functions and values of the native plant patches existing on the levees and the adjacent tidal marsh will be enhanced by habitat connectivity. More details on the transition zone habitat enhancement are available in the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a).

The three plant palettes for transition zone habitat enhancement are Upland Plant Palette, Ecotone Plant Palette, and High Marsh Plant Palette and are described below and in H.T. Harvey & Associates (2015a):

1. Upland Plant Palette. These species will be installed in the Upland Planting Zone. This zone is commonly located on the tops of berms beyond the reach of tides. The graminoid and shrub species selected are either salt-sensitive or moderately salt tolerant. The soils in this zone are generally non-saline. Forb and grass species to be planted in the Upland Plant Palette include western ragweed, saltgrass, creeping wild rye, western goldenrod, bee-plant, and Pacific aster. Shrub species to be planted in the Upland Plant Palette include California sagebrush, marsh baccharis, lizard tail, and marsh gumplant.

2. Ecotone Plant Palette. These species will be installed in the Ecotone Planting Zone. This zone is located above the pickleweed-dominated high marsh and below the Upland Planting Zone and is occasionally inundated by the tides. These species consist of tidal salt marsh upland ecotone specialists such as saltgrass and marsh gumplant but also include high marsh and upland plants. The soils in this zone are moderately saline. Forb and grass species to be planted in the Ecotone Plant Palette include western ragweed, saltgrass, creeping wild rye, alkali heath, and perennial pickleweed. Shrub species to be planted in the Upland Plant Palette include California sagebrush, marsh baccharis, lizard tail, and marsh gumplant.

3. High Marsh Plant Palette. These species will be installed in the High Marsh Planting Zone. This planting palette consists of marsh gumplant interplanted into the existing native

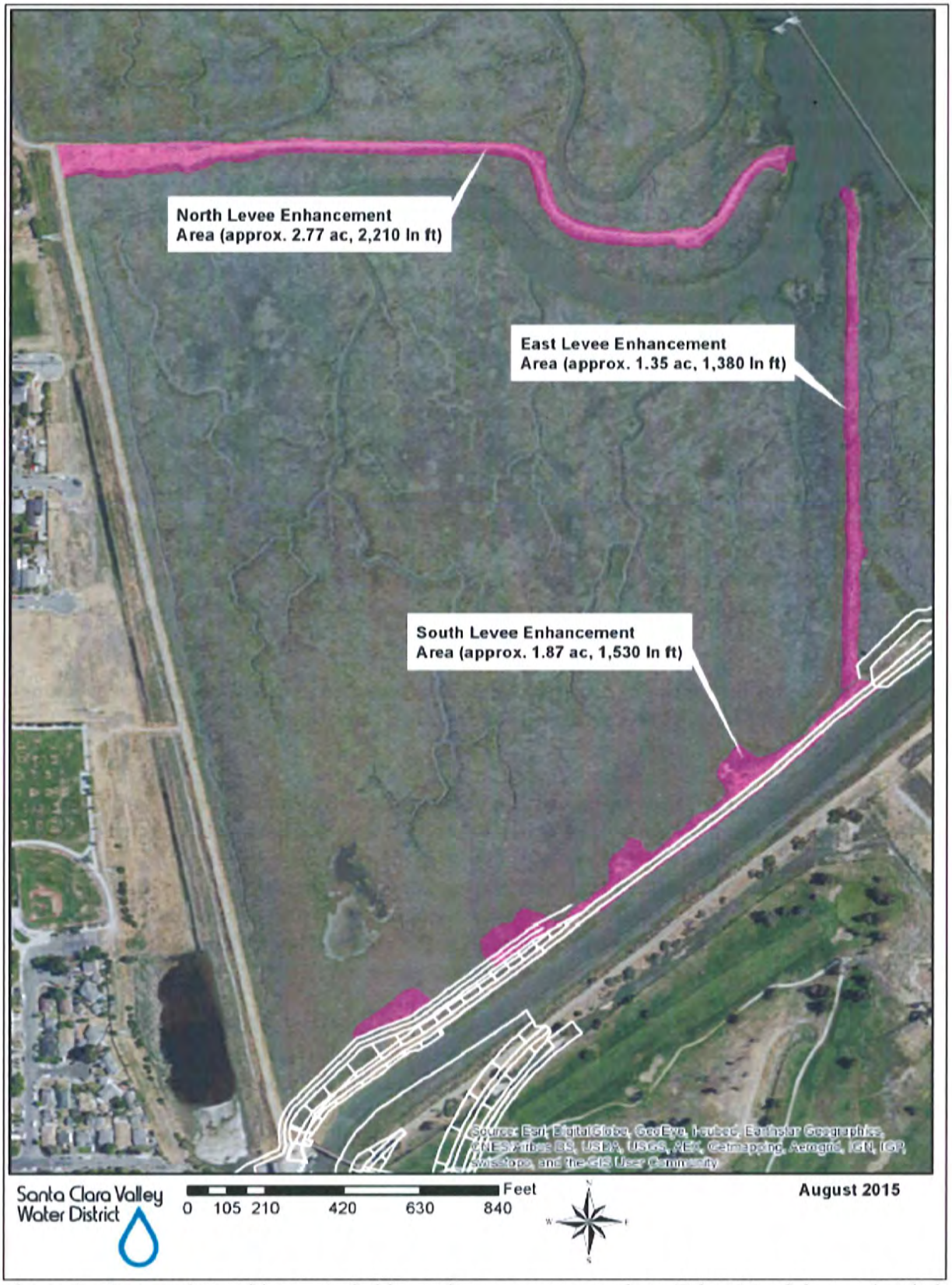

Figure 6. Proposed transition zone habitat enhancement areas along Faber Marsh levees (copied from Figure 1 in K. Murray, SFCJPA, *in litt.* 2015c).

pickleweed marsh to enhance high-tide refuge habitat. The soils in this zone are highly saline.

Plants will be installed between November 1 and January 31, during the rainy season and outside of the California clapper rail's breeding season. Plantings will require initial maintenance during a three-year plant establishment period following installation to become self-sustaining. The goal of habitat enhancement site maintenance is to facilitate the establishment of the target vegetation in the planting areas. Planting area maintenance during the three-year period will include dead plant replacement, irrigation, weed control, and trash removal. Irrigation will be placed that minimizes the access required to water the plants. A Service-approved biologist will be present if access is required during the California clapper rail's breeding season to the eastern berm of Main Faber Marsh.

In addition to this maintenance plan, annual site observations and data collected by a qualified restoration ecologist may be used to further specify maintenance actions necessary to establish the planting areas. All dead woody plants will be replaced during the first two years of the plant establishment period. Additional plant replacement may occur in the third year if the Year 3 percent shrub cover criterion is not met. Berm revegetation areas will require invasive plant control during the three-year plant establishment period. Potential weed removal treatments include hand-pulling and herbicide use. All herbicides used will be approved by the U.S. Environmental Protection Agency and the Refuge (*i.e.*, through a Refuge-approved Pesticide Use Proposal). Herbicide application will be guided by the Refuge's Comprehensive Conservation Plan for weed management (Service 2012c; Service, in prep.). Herbicides approved by the Refuge for terrestrial use include: Round-up, Glypro Plus, Roundup Pro, KleenUp Pro, Aquamaster and Rodeo (glyphosate), Garlon 4 Ultra (triclopyr), Habitat and Polaris (imazapyr), Milestone VM Plus and Capstone (aminopyralid and triclopyr), Telar (chlorsulfuron) and Transline (clopyralid). Herbicides approved by the Refuge for aquatic use include Habitat and Polaris (imazapyr) and Aquamaster, Roundup Custom, and Rodeo (glyphosate). The application of any pesticide, including herbicides, will be conducted in accordance with a Refuge-approved Pesticide Use Proposal. An annual pesticide use report will be completed for every Pesticide Use Proposal by January 31 each year for the previous year's activities. A qualified biologist will assess the type, distribution, and abundance of invasive plant species during annual monitoring and, when warranted, recommend effective control measures.

Non-native plant removal in breeding habitat during the California clapper rail's breeding season will be minimized to the maximum extent feasible. The eastern berm of Main Faber Marsh will not be accessed during the California clapper rail's breeding season unless a Service-approved biologist is present. Access to northern and southern berms of Main Faber Marsh during the California clapper rail's breeding season will be limited to the trail on the northern berm and the middle seeded area on the southern berm.

The transition zone habitat enhancement areas will be monitored for at least five years to ensure success criteria are met for the establishment of suitable native transition zone vegetation and the removal of invasive plant species. The forthcoming levee revegetation plan (to be included in the MMP) will be subject to the review and approval of the Service and the Refuge and will include the following vegetation success criteria to determine whether the revegetated levee(s) are on a trajectory to successfully establish high tide refuge habitat for California clapper rail and salt marsh harvest mice. The berm enhancement area should be sufficiently covered by a scattered patchwork of dense native shrubs within a matrix of non-invasive forb/grass-dominated vegetation to provide protection from flooding and predators for the California clapper rail and salt marsh harvest mouse

during extreme high-tide events. The shrub patches are intended to provide escape cover for California clapper rails and the intervening forb/grass vegetation between the shrub patches is intended to provide escape cover for salt marsh harvest mice. The shrub patches are also intended to remain discrete patches (rather than long, contiguous shrub habitat) to minimize use by mammalian predators. Therefore, the final success criteria among the upland, ecotone, and high marsh planting zones after five growing seasons will be as follows (H.T. Harvey & Associates 2015a; K. Murray, SFCJPA, *in litt.* 2015c):

1. Native shrub patches will be 20-80 feet long, at least 4 feet wide (as measured from the widest portions of the plant canopies), and have a minimum of 60 percent average canopy cover provided by native shrubs. Canopy cover includes the area within the general perimeter of the shrub canopy.

2. The distance between the outer boundaries of native shrub patches (with the characteristics described above) will be 25-200 feet; 200 feet is selected as a maximum as it equals the approximate radius of the California clapper rail's home range.

3. The forb/grass revegetation areas (located between the native shrub patches) will have at least 60 percent average foliar cover (all forb/grass areas combined) provided by non-invasive, herbaceous vegetation; non-invasive herbaceous species are those that are not listed as "high" negative ecological impact by the California Invasive Plant Council (Cal-IPC) (Cal-IPC 2015) and are also not listed as weed species with "highest priority" and "high priority" rankings for control by the Service's *South San Francisco Bay Weed Management Plan* (Marriott *et al.* 2013). Foliar cover is the absolute area of ground covered by plant species.

4. The berm enhancement area (shrub patches and forb/grass areas) will have less than 5 percent average foliar cover of invasive plant species. Invasive species are those that have "high" negative ecological impact as rated by Cal-IPC (Cal-IPC 2015) and weed species with "highest priority" and "high priority" rankings for control by the *South San Francisco Bay Weed Management Plan* (Marriott *et al.* 2013).

An Annual Monitoring Report will be submitted to the permitting agencies by February 1 following each monitoring year. Monitoring Reports will present the findings of the annual field surveys relative to the performance standards in the monitoring plan described above.

Revegetation and Monitoring and Invasive Plant Species Control

The SFCJPA will monitor the re-vegetation in the channel and on levees for a minimum of five years to ensure they are successfully established with suitable native plant species and meet the success criteria under a Service-approved MMP. Monitoring will include the removal of any invasive plants.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses all suitable tidal marsh, transition zone, and upland refugia habitat for the salt marsh harvest mouse and California clapper rail along the 7,450-foot length of San

Francisquito Creek between San Francisco Bay and the East Bayshore Road/Highway 101 Bridge. The action area also includes all suitable upland foraging/dispersal habitat and diked marsh habitat for the salt marsh harvest mouse contiguous with and within 328 feet of suitable tidal marsh habitat along San Francisquito Creek between San Francisco Bay and the East Bayshore Road/Highway 101 Bridge. The action area also includes all suitable tidal marsh, transition zone, and upland refugia habitat within the approximately 81.5-acre Refuge-managed Main Faber Marsh and the adjacent approximately 13.8-acre Outer Faber Marsh (*i.e.*, the triangle-shaped marsh between Main Faber Marsh and San Francisco Bay) that would be indirectly affected by altered hydrology and predator management. The action area also includes the adjacent 91-acre Refuge-managed Laumeister Marsh where predator management would be implemented for the benefit of the salt marsh harvest mouse and California clapper rail.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analyses in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the salt marsh harvest mouse's and California clapper rail's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the salt marsh harvest mouse and California clapper rail in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the salt marsh harvest mouse and California clapper rail; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the salt marsh harvest mouse and California clapper rail; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the salt marsh harvest mouse and California clapper rail.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the salt marsh harvest mouse's and California clapper rail's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the salt marsh harvest mouse and California clapper rail and the role of the action area in the survival and recovery of salt marsh harvest mouse and California clapper rail as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

Salt Marsh Harvest Mouse

There are two subspecies of the salt marsh harvest mouse: the northern subspecies (*R. r. halicoetes*) and the southern subspecies (*R. r. raviventris*). Both subspecies are listed as endangered. The status of the salt marsh harvest mouse and information about its biology, ecology, distribution, and current threats is available in the *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Recovery Plan) (http://ecos.fws.gov/docs/recovery_plan/TMRP_Final.pdf; Service 2013a). Critical habitat has not been designated for this species. No change in the species' listing status was

recommended in the February 2010 5-year review (Service 2010). Threats evaluated during that review and discussed in the Recovery Plan have continued to act on the species since the February 2010 5-year review and the August 27, 2013 Recovery Plan were finalized, with loss of habitat being the most significant effect. While there have been continued losses of salt marsh harvest mouse habitat throughout the various recovery units, including the Central/South San Francisco Bay Recovery Unit where the proposed project is located, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

California Clapper Rail

The status of the California clapper rail and information about its biology, ecology, distribution, and current threats is available in the Recovery Plan (http://ecos.fws.gov/docs/recovery_plan/TMRP_Final.pdf; Service 2013a). Critical habitat has not been designated for this species. Threats evaluated in the Recovery Plan have continued to act on the species since the August 27, 2013 Recovery Plan was finalized, with loss of habitat and predation being the most significant effects. While there have been continued losses of California clapper rail habitat throughout the various recovery units, including the Central/South San Francisco Bay Recovery Unit where the proposed project is located, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

Environmental Baseline

<u>San Francisquito Creek</u>

San Francisquito Creek is a perennial stream that drains a 45-square-mile basin. There are about 7,450 linear feet of San Francisquito Creek within the action area for the proposed project between San Francisco Bay and the East Bayshore Road/Highway 101 Bridge. The 2,850-foot-long lower reach of San Francisquito Creek (San Francisco Bay to Friendship Bridge) is located between the tidal marshes of Main Faber Marsh and Outer Faber Marsh to the north (right bank) and the Palo Alto Municipal Golf Course to the south (left bank) (Figure 1). The lower reach of San Francisquito Creek contains tidal marsh dominated by tule, marsh gumplant, alkali heath, and saltgrass and provides suitable breeding, foraging, and dispersal habitat for salt marsh harvest mice and California clapper rails. The middle and upper reaches of San Francisquito Creek (upstream of Friendship Bridge) within the action area are less tidally influenced and transition from brackish to freshwater riparian habitat; the middle and upper reaches are less suitable for salt marsh harvest mouse and California clapper rail foraging and dispersal. The quality of the tidal and brackish marsh within the middle and upper reaches of the creek is degraded due to the relatively sparse vegetative cover, frequent inundation during winter storms, the marsh is highly fragmented and located within a highly urbanized environment, and the presence of ruderal and invasive plant species (*e.g.*, perennial pepperweed) and avian and mammal predators (*e.g.*, raptors, feral cats, skunks, red foxes, opossums, crows, and western scrub-jays).

<u>Main Faber Marsh</u>

Main Faber Marsh is a very high quality approximately 81.5-acre restored tidal marsh managed by the Refuge that supports one of the highest density populations of the California clapper rail range-

wide (Liu *et al.* 2012; L. Liu, Point Blue Conservation Science, pers. comm. 2014) and a population of the salt marsh harvest mouse. Main Faber Marsh is located immediately north of the lower reach of San Francisquito Creek, east of a residential neighborhood of the City of East Palo Alto, south of the Refuge-managed native tidal marsh of Laumeister Marsh, and west of Outer Faber Marsh and San Francisco Bay. The tidal marsh of Main Faber Marsh is dominated by pickleweed, cordgrass, and salt grass.

Levees and berms surrounding the majority of Main Faber Marsh reduce the frequency of fluvial and tidal flooding of the tidal marsh which benefits the salt marsh harvest mouse and California clapper rail. Salt marsh harvest mice and California clapper rails are more vulnerable to predation during flooding events when suitable unsubmerged cover is limited (Albertson 1995, Overton *et al.* 2014, Service 2013a). Salt marsh harvest mouse nests may be inundated during flooding events resulting in the loss of all mice within the nest (R. Perrera, Huffman-Broadway Group, Inc., pers. comm. 2012). Therefore, the levees and berms around Main Faber Marsh provide some benefit to the salt marsh harvest mouse and California clapper rail by reducing the frequency of flooding of the tidal marsh. However, the levees and berms also provide pathways for mammal predators into the marsh which increases the risk of predation on salt marsh harvest mice and California clapper rails in Main Faber Marsh.

Vegetation within the transition zone habitat along the levees and berms of Main Faber Marsh also provides important upland refugia cover for salt marsh harvest mice and California clapper rails during extreme high tide and flooding events by providing shelter for the mice and the rails from avian and mammalian predators. However, the quality of the vegetation along the levees and berms around Main Faber Marsh is degraded due to the presence of invasive plant species like perennial pepperweed and mustard that provide poor quality high-tide refugia cover because these plants are leafless in the winter when the salt marsh harvest mouse and California clapper rail are in most need of suitable high-tide refugia cover during the more frequent storm and extreme high tide events. The existing berms provide poor quality high tide refuge habitat for salt marsh harvest mouse and California clapper rail due to a lack of suitable canopy structure because the existing vegetation is dominated by low-growing perennials, frequent bare patches, and monotypic patches of annual plants (*e.g.*, black mustard) (H.T. Harvey & Associates 2015a). Pickleweed cover on berm side slopes provides good cover for the salt marsh harvest mouse, but does not provide sufficient escape cover from predators for California clapper rail during extreme high-tides (H.T. Harvey & Associates 2015a). H.T. Harvey & Associates (2015a) reports that refuge habitat for the California clapper rail could be substantially improved on berm side-slopes at Main Faber Marsh if native shrub patches were planted.

Without suitable high-tide refugia cover, the salt marsh harvest mouse and California clapper rail are vulnerable to predation during extreme high tide and flooding events when suitable unsubmerged cover is limited. The tops of the north and east berms of Main Faber Marsh are largely dominated by low growing non-native plants such as slenderleaf iceplant, ripgut brome, and highway iceplant, monotypic stands of annual black mustard, and small isolated patches of perennial pepperweed (H.T. Harvey & Associates 2015a). Low-growing native plants such as alkali heath and saltgrass also occur at relatively low abundance compared to non-native species (H.T. Harvey & Associates 2015a). Along the tops of the southern berm and the western end of the northern berm of Main Faber Marsh (where soils are non-saline), annual non-native plants such as wild oats, black mustard, and ripgut brome are dominant (H.T. Harvey & Associates 2015a). Berm side-slopes are primarily

covered with native perennial pickleweed with scattered patches of marsh gumplant and other high marsh vegetation.

A levee on the western side of Main Faber Marsh contains a pedestrian trail (the San Francisco Bay Trail) which separates the tidal marsh of Main Faber Marsh from the residential neighborhood of the City of East Palo Alto to the west. The City of East Palo Alto is currently enhancing transition zone habitat for the salt marsh harvest mouse and California clapper rail along about 2,100 linear feet (0.58 acre) of the outboard (Main Faber Marsh) side of this levee between Runnymede Street and San Francisquito Creek (WRA Environmental Consultants 2013). The transition zone habitat enhancement being conducted by the City of East Palo Alto is compensation for the effects of the temporary disturbance of about 3.6 acres of salt marsh harvest mouse and California clapper rail habitat along the inboard (City of East Palo Alto) side of this levee in the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project (Service file number 81420-2011-F-0103-2, Service 2013b).

A berm along the southern edge of Main Faber Marsh separates the tidal marsh of Main Faber Marsh from the San Francisquito Creek channel. The quality of transition zone habitat along the southern berm of Main Faber Marsh is also low due to dominance of invasive mustard. An approximately 400-foot-long low spot in this berm downstream of the Friendship Bridge allows the five-year flood event to overtop the berm and flood Main Faber Marsh (20 percent chance of happening once in any given year) during average tidal conditions. The potential for flood flows spilling from San Francisquito Creek into Main Faber Marsh are currently limited by flow constrictions upstream (such as the Pope-Chaucer Bridge, Highway 101, and the channel near Highway 101) that reduce the amount of flows able to reach the lower reach of San Francisquito Creek and spill over into Main Faber Marsh. However, in 2015, Caltrans initiated construction of the enlargement of the U.S. Highway 101/East Bayshore Road Bridge (Caltrans facility) over San Francisquito Creek to increase the channel capacity to 9,400 cubic feet per second (cfs), the 100-year flood event for San Francisquito Creek. Once the enlargement of the Caltrans facility is completed, the maximum fluvial flood flow that could reach the lower reach of San Francisquito Creek adjacent to Main Faber Marsh will increase to 7,400 cfs. A 7,400 cfs fluvial flood flow in the lower reach of San Francisquito Creek would result in about 1,025 cfs of flow spilling into Main Faber Marsh during the 100-year flood event under average high tide conditions (an increase of 715 cfs over the 310 cfs of flow spilling into Main Faber Marsh during the 100-year flood flow under existing conditions) (M. Jones, ICF International, *in litt.* 2014). Flow constrictions further upstream (*e.g.*, Middlefield Road Bridge) will still limit the ability of the San Francisquito Creek channel to pass the 9,400 cfs 100-year flood event. The flow constriction at the Middlefield Road Bridge only allows 6,700 cfs to pass through the San Francisquito Creek channel. Pump stations downstream of Middlefield Road Bridge contribute an additional 700 cfs of flood flows to the San Francisquito Creek channel resulting in a total maximum flood flow of 7,400 cfs that could pass through the lower reach of San Francisquito Creek and the spilling of 1,025 cfs of flows into Main Faber Marsh once construction of the Caltrans facility is completed. Thus, once construction of the Caltrans facility is completed, the volume and frequency of flood flows entering Main Faber Marsh will increase resulting in an increased risk of predation on California clapper rails and salt marsh harvest mice and the flooding of salt marsh harvest mouse nests.

Outer Faber Marsh

Outer Faber Marsh is an approximately 13.8-acre triangle-shaped, low-elevation tidal marsh area located between Main Faber Marsh to the west, San Francisco Bay to the east, and immediately north of the mouth of San Francisquito Creek. Outer Faber Marsh is at a lower elevation than Main Faber Marsh and is dominated primarily by Pacific cordgrass with perennial pickleweed primarily located adjacent to the eastern and southern perimeter berms and along some channel edges (H.T. Harvey & Associates 2015a). Marsh gumplant grows in small patches along some of the tidal channels in Outer Faber Marsh. Overall, the marsh lacks sufficient high-tide refuge cover for the California clapper rail (H.T. Harvey & Associates 2015a). Additionally, the majority of the marsh also lacks high quality refuge cover for the salt marsh harvest mouse due to the relatively low elevations of the marsh plain (H.T. Harvey & Associates 2015a).

The levees and berms around Outer Faber Marsh are dominated by invasive plant species (about 58 percent cover) comprised mostly of invasive mustard and ice plant; however, the southern levee (Bay levee) contains more suitable native transition zone habitat (*e.g.*, marsh gumplant) than the western levee. The marsh is surrounded by PG&E towers and boardwalks and levees that increase predation risk on salt marsh harvest mice and California clapper rails in Outer Faber Marsh; the boardwalks and levees provide access for mammal predators while the PG&E towers provide perch and nest sites for raptors they may prey upon salt marsh harvest mice and California clapper rails in Outer Faber Marsh and the adjacent Main Faber Marsh. Due to the marsh's exposed location along San Francisco Bay and its lower elevation, Outer Faber Marsh is subject to more frequent tidal flooding and wave fetch than the more protected tidal marsh of Main Faber Marsh to the west. A north-south levee separates Outer Faber Marsh from Main Faber Marsh, while an east-west levee (the Bay levee) separates Outer Faber Marsh from the lower reach of San Francisquito Creek. Outer Faber Marsh provides lower quality breeding, foraging and dispersal habitat for salt marsh harvest mice and California clapper rails due to its exposure to more frequent tidal flooding and wave fetch from the Bay. Vegetation along the Bay levee and the berm separating Outer Faber Marsh from Main Faber Marsh provide transition zone habitat for salt marsh harvest mice and California clapper rails which shelter the mice and the rails from predation during extreme high tide and flooding events when the marsh plain is flooded; however, the quality of the transition zone habitat is low due to the dominance of invasive plant species which are leafless in the winter when the salt marsh harvest mouse and California clapper rail are in most need of suitable cover during the more frequent extreme high tide and winter storm events.

Laumeister Marsh

The Refuge-managed Laumeister Marsh is an approximately 91-acre high quality native tidal marsh located immediately north of Main Faber Marsh. Laumeister Marsh is bounded by the San Francisco Bay Trail levee and a residential neighborhood of the City of East Palo Alto to the west and the Cooley Landing public park to the north. The City of East Palo Alto is currently making improvements to Cooley Landing Park to increase public access and recreational opportunities (Cooley Landing Project). The Service issued a biological opinion for the indirect effects of increased public access at Cooley Landing Park on salt marsh harvest mice and California clapper rails in Laumeister Marsh (Service file number 81420-2011-F-0552-1; Service 2011). The City of East Palo Alto will minimize the indirect effects of increased public access at Cooley Landing Park by implementing a five-year adaptive mammal predator management plan beginning in October 2014 (Huffman-Broadway Group, Inc. 2011).

Diked Marsh Habitat at Palo Alto Municipal Golf Course

There about 2.7 acres of diked marsh habitat within the action area at the Palo Alto Municipal Golf Course adjacent to San Francisquito Creek. The diked marsh habitat within the action area is dominated by pickleweed and Mediterranean barley. The diked marsh habitat and adjacent ruderal grasslands at the Palo Alto Municipal Golf Course provide lower quality breeding, dispersal, and foraging habitat for salt marsh harvest mice. The managed turf of the golf course is not suitable habitat for the salt marsh harvest mouse because the turf grass is actively managed and maintained at a low height unsuitable for providing cover for the salt marsh harvest mouse. The diked marsh habitat within the action area is not suitable habitat for the California clapper rail because it is not tidally influenced.

Ruderal Annual Grassland

There are about 17.5 acres of ruderal annual grassland habitat within the action area along the middle reach of the San Francisquito Creek corridor. The ruderal annual grassland within the action area is dominated by wild oat and ripgut brome. The ruderal annual grassland habitat within the action area that is contiguous with and within 328 feet of suitable tidal salt or brackish marsh habitat along San Francisquito Creek provides suitable foraging and dispersal habitat for the salt marsh harvest mouse (Service 2010). The quality of the ruderal grassland within the action area is degraded by the presence of heavily used trails, abundance of predators in a highly urbanized environment, and frequent mowing.

Salt Marsh Harvest Mouse

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the salt marsh harvest mouse (Service 2013a). The Central/South San Francisco Bay Recovery Unit is within the range of the southern subspecies of the salt marsh harvest mouse (*R. r. raviventris*) (Service 2013a). The population status of the southern subspecies is more precarious than that of the northern subspecies (*R. r. halicoetes*). Few major, resilient, or secure populations of the southern subspecies of the salt marsh harvest mouse persist within the Central/ South San Francisco Bay Recovery Unit. The current populations within this recovery unit are very small and isolated compared with the historical pattern of distribution and abundance of the subspecies. All major population centers of the southern subspecies are remote from one another based on dispersal distances known for the species. Predation by mammalian and avian predators and spread of invasive plant species (*e.g.*, perennial pepperweed) are major threats to salt marsh harvest mice in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2010, Service 2013a).

Levees adjacent to tidal marsh habitat and PG&E's numerous boardwalks provide access for mammalian predators that may prey on salt marsh harvest mice and California clapper rails in the adjacent marsh. PG&E's numerous transmission towers and transmission lines within tidal marsh habitat in the South Bay provide artificial perches and nesting platforms for raptors (*e.g.*, red-tailed hawks, crows, ravens, northern harriers, peregrine falcons, kestrels, white-tailed kites, gulls, great blue herons, barn owls, short-eared owls, great horned owls) that may prey on salt marsh harvest mice and California clapper rails in the adjacent marshes (Albertson 1995; Olofson Environmental,

Inc. 2011a; J. Albertson, Refuge, pers. comm. 2014). Raptors that nest and perch on PG&E's transmission towers and transmission lines in tidal marsh in the South Bay have been observed hunting in tidal marsh habitat known to be occupied by breeding salt marsh harvest mice and California clapper rails (Albertson 1995; Olofson Environmental, Inc. 2011a; J. Albertson, Refuge, pers. comm. 2014). Predation rates increase during extreme high tide events when cover is limited.

The Refuge annually funds the U.S. Department of Agriculture Wildlife Services to control mammalian predators that threaten the salt marsh harvest mouse and California clapper rail on Refuge lands in the South Bay. The priority areas for predator management at the Refuge are Ideal Marsh, Dumbarton Marsh, Mowry Marsh, Main Faber Marsh, and Laumeister Marsh (Refuge 2013). The Refuge, however, lacks the funding to adequately control all mammalian predators that threaten the salt marsh harvest mouse and California clapper rail on Refuge lands in the South Bay (J. Albertson, Refuge, pers. comm. 2014). In 2012, Cargill, Inc. (Cargill) restarted the annual funding of the U.S. Department of Agriculture Wildlife Services for mammalian predator management for the benefit of the salt marsh harvest mouse and California clapper rail for a 10-year period along Cargill's 44 miles of salt pond levees that are adjacent to tidal marsh habitat in the Newark, Mowry, and Redwood City salt pond complexes in the South Bay at the Refuge in Alameda and San Mateo counties. The annual funding of mammalian predator management by Cargill is a condition of the Service's biological opinion on the issuance of a 10-year Corps regional general permit for Cargill's salt pond levee operation and maintenance work in the South Bay (Service file number 81420-2010-F-0519; Service 2012a). The areas where Cargill will be funding mammalian predator management are outside of the action area for the proposed project. The City of East Palo Alto is contributing funding for a five-year mammalian predator management program at Cooley Landing beginning in 2015 adjacent to Laumeister Marsh about 0.5 mile north of Main Faber Marsh (Huffman-Broadway Group, Inc. 2011). The annual funding of mammalian predator management by the City of East Palo Alto is a condition of the Service's biological opinion on the Cooley Landing Project to minimize the effects of increased public use at Cooley Landing (81420-2011-F-0552-1; Service 2011).

The Refuge finalized an avian predator management plan in 2012 for the benefit of the salt marsh harvest mouse, California clapper rail, western snowy plover, and other listed species on its Refuge lands in the South Bay (Refuge 2012). PG&E is currently working with the Refuge to assist in the implementation of the avian predator management plan by responding to the Refuge's requests to remove raptor nests from PG&E transmission towers within habitat for the salt marsh harvest mouse, California clapper rail, western snowy plover, and California least tern. PG&E's assistance with the avian predator management program is a requirement of the Refuge's Special Use Permit, which was renewed in 2013 (E. Mruz, Refuge, pers. comm. 2012; Service file number 81420-2011-F-0592-2; Service 2012b). At the request of the Refuge, PG&E removed 8-10 raptor nests (mostly raven nests and two red-tailed hawk nests) from listed species habitat in 2013 (C. Strong, Refuge, pers. comm. 2014; K. Sawyer, Refuge, *in litt.* 2013). However, the majority of the raptor nest removal conducted by PG&E in 2013 was for the benefit of the western snowy plover rather than the salt marsh harvest mouse and California clapper rail. PG&E removed a red-tailed hawk nest from a PG&E tower near the San Mateo Bridge toll plaza in Alameda County within salt marsh harvest mouse habitat west of Eden Landing Pond 10 in April 2013 (K. Sawyer, Refuge, *in litt.* 2013). No raptor nests were removed from California clapper rail habitat in 2013 (K. Sawyer, Refuge, *in litt.* 2013). Raptor nests (primarily ravens and red-tailed hawks) were removed from PG&E towers at 14 locations within or near tidal marsh habitat for the salt marsh harvest mouse and California clapper rail in the South Bay in 2014 outside of the action area (C. Strong, Refuge,

pers. comm.). PG&E removed several ravens' nests at the request of the Refuge from transmission towers near the action area near Faber Marsh in 2015 (R. Tertes, Refuge, 2015). However, the Refuge lacks the resources to adequately monitor all of PG&E's transmission towers for raptor nests (J. Albertson, Refuge, pers. comm. 2014). Therefore, raptor predation facilitated by PG&E transmission towers within tidal marsh habitat continues to be a major threat to salt marsh harvest mice and California clapper rails in the South Bay.

The Refuge finalized a weed management plan in 2013 to control invasive plant species (*e.g.*, perennial pepperweed) that threaten the tidal marsh and upland refugia habitat for the salt marsh harvest mouse and California clapper rail on Refuge lands in the South Bay (Marriott *et al.* 2013). The Refuge, however, lacks the resources to adequately implement its weed management plan (R. Tertes, Refuge, pers. comm. 2013). Cargill will implement the Refuge's weed management plan on the 12,100 acres of Cargill's property within the Newark, Mowry, and Redwood City salt pond complexes as a condition of the Service's biological opinion on the issuance of a 10-year Corps regional general permit for Cargill's salt pond levee operation and maintenance work in the South Bay (Service file number 81420-2010-F-0519; Service 2012a); the weed management that will be conducted by Cargill is outside of the action area for SFCJPA's proposed project.

Habitats within the Action Area

The expansive tidal marshes within the action area within Main Faber Marsh and the adjacent Laumeister Marsh provide high quality breeding, foraging, and dispersal habitat for salt marsh harvest mice. Outer Faber Marsh provides lower quality breeding habitat for the salt marsh harvest mouse since the tidal marsh is at a lower elevation and more exposed to tidal flooding and wave fetch due to its exposed location along San Francisco Bay. Potential breeding habitat for the salt marsh harvest mouse in Outer Faber Marsh is limited to the mid-elevation pickleweed marsh near the southern and western berms. Salt marsh harvest mice may also breed, forage, and disperse through the diked marsh habitat at the Palo Alto Municipal Golf Course near San Francisquito Creek. Salt marsh harvest mice are unlikely to utilize the managed turf of the adjacent golf course because it is actively managed, and the vegetation is maintained at a low height and thus does not provide suitable cover for the mouse.

The fringe of tidal marsh along the lower reach of San Francisquito Creek (downstream of Friendship Bridge) (Figure 1) provides moderate quality breeding, foraging, and dispersal habitat for salt marsh harvest mice; the suitability of this marsh for the salt marsh harvest mouse is reduced by frequent inundation of the marsh during winter storms. The fringe of tidal and brackish marsh along the middle reach of San Francisquito Creek (between Friendship Bridge and Daphne Way/Geng Road) (Figure 1) provides low quality breeding, foraging, and dispersal habitat for the salt marsh harvest mouse due to the marsh's sparse vegetative cover, frequent inundation during winter storms, the fragmented nature of the habitat, the presence of invasive plant species (*e.g.*, perennial pepperweed) and avian and mammal predators and frequent disturbance by trail users. The ruderal annual grassland habitat that is contiguous with and within 328 feet of the tidal and brackish marsh of the middle reach of San Francisquito Creek provides low quality foraging and dispersal habitat for the salt marsh harvest mouse. The marsh along the upper reach of San Francisquito Creek (Daphne Way/Geng Road to Highway 101) (Figure 1) is unsuitable for the salt marsh harvest mouse because it is less tidally influenced, has sparse vegetative cover, is frequently inundated during winter storms, highly fragmented, and located within a highly urbanized environment degraded by the presence of invasive plant species and avian and mammal predators.

Transition zone habitat along the levees and berms of Main Faber Marsh, Laumeister Marsh, San Francisquito Creek, and Outer Faber Marsh provide upland refugia cover for the salt marsh harvest mouse during extreme high tide and flooding events when the marsh plain is inundated. However, the quality of the transition zone habitat within the action area is low due to a lack of suitable canopy structure because the existing vegetation is dominated by invasive plant species, low-growing perennials, frequent bare patches, and monotypic patches of annual plants (*e.g.*, black mustard) (H.T. Harvey & Associates 2015a). Without suitable upland refugia cover, the salt marsh harvest mouse is more vulnerable to predation during extreme high tide and flooding events. Recent studies of the movement of the northern subspecies of salt marsh harvest mouse during extreme high tide events in tidal marsh in Suisun Bay found that the majority of the salt marsh harvest mice stayed in the marsh and climbed tall emergent vegetation to escape flood waters instead of moving horizontally into upland habitats along levees (Smith *et al.* 2014). Thus Smith *et al.* (2014) stressed the importance of tall emergent vegetation within the marsh to provide high tide refugia cover. However, the authors added that upland habitats along levees may be more important as high tide refugia cover to the southern subspecies of salt marsh harvest mouse in the South Bay due to the shorter heights of the marsh vegetation and the narrower widths of the marshes.

Occurrences near the Action Area

There are no known recent surveys of salt marsh harvest mouse that have been conducted within the action area. However, there are several reports of salt marsh harvest mice occurring near the action area. The San Francisco Estuary Institute (http://www.sfei.org/content/salt-marsh-harvest-mouse-database-and-maps) and California Natural Diversity Database (CNDDB; CDFW 2015) report the following salt marsh harvest mouse survey data within 0.5 mile of the action area for the proposed project:

1. Two hundred forty salt marsh harvest mice captured in tidal marsh habitat of the Palo Alto Baylands about 0.25 mile southeast of the action area during 2,050 trapping nights in 1972 (capture efficiency (CE) = 9.56) (site number 240; Wondolleck, unpubl. data, 1972);

2. Five salt marsh harvest mice captured in tidal marsh habitat of the Palo Alto Baylands about 0.25 mile southeast of the action area during 480 trapping nights in 1993 (CE = 1.04) (site number 502; Steinberg, unpubl. data, 1993);

3. One salt marsh harvest mouse captured in tidal marsh habitat of the Palo Alto Baylands about 0.25 mile southeast of the action area during 200 trapping nights in 1980 (CE = 0.5) (site number 91; Service, unpubl. data, 1980);

4. One salt marsh harvest mouse captured in tidal marsh habitat at the northern edge of the Laumeister Tract of the Refuge about 0.5 mile north of the action area during 800 trapping nights in 1990 (CE = 0.13) (site number 232; H.T. Harvey and Associates, unpubl. data, 1990); and

5. Twelve adult salt marsh harvest mice found in the Laumeister Tract of the Refuge south of Bay Road about 0.5 mile north of the action area in January 1991 (CNDDB occurrence number 131, CDFW 2015).

There is no recent survey data available for salt marsh harvest mice near the action area since 1993. However, a biological monitor for the City of East Palo Alto's Cooley Landing Project (Service file number 81420-2011-F-0552-1; Service 2011) reported the observation of a potential salt marsh harvest mouse nest during vegetation removal activities at Cooley Landing along the northern edge of Laumeister Marsh in November 2011. The biological monitor, however, could not find the nest during surveys of the area weeks later likely due to the nest being flooded during an extreme high tide event that month (R. Perrera, Huffman-Broadway Group, Inc., pers. comm. 2012). Mice were also observed recently during vegetation removal within diked brackish marsh habitat immediately west of Main Faber Marsh in October 2014 for the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project (Service file number 81420-2011-F-0103-2); however, the biological monitor was not able to determine whether the mice were salt marsh harvest mice (K. Allan, WRA Environmental Consulting, pers. comm. 2014).

Based on the known occurrence of the salt marsh harvest mouse near the action area and the availability of suitable habitat, the Service believes the salt marsh harvest mouse is likely to be present within all suitable tidal marsh, brackish marsh, diked marsh, and adjacent upland habitats (within 328 feet of suitable marsh habitat) throughout the action area within Main Faber Marsh, Outer Faber Marsh, Laumeister Marsh, along the lower and middle reaches of San Francisquito Creek, and the diked marsh habitat at the Palo Alto Municipal Golf Course near San Francisquito Creek.

California Clapper Rail

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the California clapper rail (Service 2013a). The Central/South San Francisco Bay Recovery Unit supports the majority of California clapper rail populations. Populations in this unit are widely separated from northern ones, but there may be occasional dispersal between these areas. Predation by mammalian and avian predators is one of the primary threats to California clapper rails in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2013a, Overton *et al.* 2014).

Levees adjacent to tidal marsh habitat and PG&E's numerous boardwalks provide access for mammalian predators that may prey on California clapper rails in the adjacent marsh. PG&E's numerous transmission towers and transmission lines within tidal marsh habitat in the South Bay provide artificial perches and nesting platforms for raptors (*e.g.*, red-tailed hawks, crows, ravens, northern harriers, peregrine falcons, kestrels, white-tailed kites, gulls, great blue herons, barn owls, short-eared owls, great horned owls) that may prey on California clapper rails in the adjacent marshes (Albertson 1995; Olofson Environmental, Inc. 2011; Overton *et al.* 2014; J. Albertson, Refuge, pers. comm. 2012). Raptors that nest and perch on PG&E's transmission towers and transmission lines in tidal marsh in the South Bay have been observed hunting in tidal marsh habitat known to be occupied by breeding California clapper rails (Albertson 1995; Olofson Environmental, Inc. 2011; J. Albertson, Refuge, pers. comm. 2012). Predation rates increase during extreme high tide events when cover is limited.

Overton *et al.* (2014) tracked 108 radio-marked California clapper rails at four marshes within the Central/South San Francisco Bay Recovery Unit (*i.e.*, Colma Marsh, Arrowhead Marsh, Laumeister

Marsh, and Cogswell Marsh) and estimated survival rates over 166 weeks between 2007 and 2009. Overton *et al.* (2014) found that most of the California clapper rails (53 percent) died due to predation with raptors depredating 30 individual California clapper rails (28 percent) and mammals depredating 27 individual California clapper rails (25 percent). Seasonal risk of mortality was more than twice as great in the winter than in other seasons (Overton *et al.* 2014). The mortality rate of California clapper rails increased during periods of greater tidal inundation in all four marshes studied, but the impact of tide level was greatest in the winter when senesced vegetation reduced available refuge cover (Overton *et al.* 2014). The annual survival rate for California clapper rails at Laumeister Marsh was 0.227 (Overton *et al.* 2014). Preliminary data from the U.S. Geological Survey shows that predation by avian predators followed by feral cats are the primary causes of mortality of the California clapper rail within Main Faber Marsh (C. Overton, U.S. Geological Survey, pers. comm. 2015).

The Refuge's goal for predator management at the Refuge is to increase California clapper rail population densities to 2.96 rails per acre (Refuge 2013). However, the Refuge lacks the resources to adequately control all mammalian and avian predators that threaten the California clapper rail (J. Albertson, Refuge, pers. comm. 2014). See the discussion above for the salt marsh harvest mouse regarding the implementation of mammalian and avian predator control and a weed management plan at the Refuge and within the Central/South San Francisco Bay Recovery Unit. No raptor nests were removed from PG&E towers within California clapper rail habitat in 2013 (K. Sawyer, Refuge, *in litt.* 2013). Raptor nests (primarily ravens and red-tailed hawks) were removed from PG&E towers at 14 locations in the South Bay within or near tidal marsh habitat for the California clapper rail in 2014 (C. Strong, Refuge, pers. comm.); however, no raptor nest removal occurred within the action area in 2014. PG&E removed several ravens' nests at the request of the Refuge from transmission towers near the action area near Faber Marsh in 2015 (R. Tertes, Refuge, 2015). The Refuge lacks the resources to adequately monitor all of PG&E's transmission towers for raptor nests (J. Albertson, Refuge, pers. comm. 2014). Therefore, raptor predation facilitated by PG&E transmission towers within tidal marsh habitat continues to be a major threat to California clapper rails in the South Bay.

Occurrences within the Action Area

The Refuge-managed 81.5-acre Main Faber Marsh and adjacent Laumeister Marsh contain very high quality expansive tidal marsh habitat for the California clapper rail and support one of the largest populations of the California clapper rail range-wide. Main Faber Marsh and the adjacent Laumeister Marsh accounted for about 3.8 percent of the estimated total range-wide population of the California clapper rail in 2009-2011 (Liu *et al.* 2012; L. Liu, Point Blue Conservation Science, pers. comm. 2014). Main Faber Marsh also has one of the highest population densities of the California clapper rail range-wide (Liu *et al.* 2012; L. Liu, Point Blue Conservation Science, pers. comm. 2014). There were a total of about 91 California clapper rails detected in Main Faber Marsh and Laumeister Marsh in 2012 and 94 in 2011 during the highest minimum count (Point Blue Conservation Science 2014). However, the total number of California clapper rail detections within Main Faber Marsh and Laumeister Marsh significantly declined in 2013 with only 50 California clapper rails detected during the highest minimum count (Point Blue Conservation Science 2014). Main Faber Marsh had the most significant decline in California clapper rail detections with between 57 and 62 California clapper rails detected in 2010, between 64 and 85 California clapper rails detected in 2011, and only 25 California clapper rails detected in 2013 (PRBO Conservation Science 2012, Point Blue Conservation Science 2014). The number of California clapper rail detections

within the adjacent Laumeister Marsh was 30 in 2011, 22 in 2012, and 25 in 2013 (PRBO Conservation Science 2012, Point Blue Conservation Science 2014).

Two California clapper rails were detected during protocol-level surveys in Outer Faber Marsh in 2011, two in 2013, and three in 2013 (Point Blue Conservation Science, *in litt.* 2014). Outer Faber Marsh provides lower quality habitat for the California clapper rail than Main Faber Marsh because the marsh is more sparsely vegetated, at a lower and more exposed location along San Francisco Bay, and subject to more frequent inundation from daily tides and wave fetch from the Bay. Although a few California clapper rails have been observed during protocol-level surveys within Outer Faber Marsh, it is not known if the rails successfully breed within Outer Faber Marsh.

Protocol-level surveys conducted along San Francisquito Creek detected two California clapper rails along the lower reach of the creek in 2011 and one in 2013 (PRBO Conservation Science 2012; Point Blue Conservation Science, *in litt.* 2014). California clapper rails likely forage and disperse along lower San Francisquito Creek, but it is not known if they successfully breed in the fringe of tidal marsh along lower San Francisquito Creek.

It is not known with certainty why the number of California clapper rails in Main Faber Marsh declined in 2013, but the Service believes it may be due to high levels of predation (Overton *et al.* 2014; J. McBroom, Olofson Environmental, pers. comm. 2014; J. Albertson, Refuge, pers. comm. 2014; E. Mruz, Refuge, pers. comm. 2014). The Refuge through the U.S. Department of Agriculture Wildlife Services has implemented minimal amounts of mammalian predator management within Main Faber Marsh and Laumeister Marsh in recent years due to limited funding (E. Mruz, Refuge, pers. comm. 2014; J. Albertson, Refuge, pers. comm. 2014). Studies in 2007 through 2009 showed high rates of predation in the adjacent Laumeister Marsh by both avian and mammal predators with 53 percent of California clapper rails depredated during the 166-week study period (Overton *et al.* 2014). Studies of predation in Laumeister Marsh in the 1990s showed that Norway rats depredated about half of the California clapper rail nests (Albertson 1995). The Refuge believes that Norway rats are likely still a significant source of predation within Main Faber Marsh and Laumeister Marsh because the U.S. Department of Agriculture Wildlife Services is unable to control the rat populations coming from the nearby residential communities in the City of East Palo Alto (J. Albertson, Refuge, pers. comm. 2014). The City of East Palo Alto is required under the biological opinion for the Cooley Landing Project to fund five years of mammalian predator management within Laumeister Marsh (Service file number 81420-2011-F-0552-1, Service 2011); the five-year predator management program at Laumeister Marsh was initiated in October 2014 (B. Popper, U.S. Department of Agriculture Wildlife Services, pers. comm. 2015).

Raptor predation is also likely a significant source of mortality of California clapper rails within the Main Faber Marsh, Laumeister Marsh, and Outer Faber Marsh (C. Overton, U.S. Geological Survey, pers. comm. 2015). Northern harriers and red-tailed hawks have been observed nesting in Main Faber Marsh and Laumeister Marsh and are likely to prey on California clapper rails within the action area (J. Albertson, Refuge, pers. comm. 2014). Raptor predation within Main Faber Marsh, Laumeister Marsh, and Outer Faber Marsh is facilitated by PG&E transmission towers and transmission lines within the marshes that provide artificial perch and nest sites for raptors. Avian predator management had not been implemented within the action area until 2015 when several ravens' nests were removed from transmissions towers by PG&E at the request of the Refuge (R. Tertes, Refuge, pers. comm. 2015). As stated previously, recent studies of the sources of mortality of California clapper rails within Laumeister Marsh and other marshes of the Central/South San

Francisco Bay Recovery Unit found that 53 percent of California clapper rails died due to predation with raptors depredating 28 percent and mammals depredating 25 percent of California clapper rails (Overton *et al.* 2014). Thus predation by mammal and avian predators are likely significant contributors to the recent decline in the number of California clapper rails within Main Faber Marsh.

Based on the known occurrence of the California clapper rail within the action area in Main Faber Marsh, Laumeister Marsh, Outer Faber Marsh, and lower San Francisquito Creek and the availability of suitable habitat, the Service considers the California clapper rail to have a high potential to occur within all suitable tidal marsh habitat and adjacent transition zone habitat within the action area in Main Faber Marsh, Laumeister Marsh, Outer Faber Marsh, and the lower reach San Francisquito Creek (downstream of Friendship Bridge). Individual California clapper rails may infrequently forage and disperse within the middle reach of San Francisquito Creek immediately upstream of Friendship Bridge; however, no California clapper rails have been observed upstream of Friendship Bridge during protocol-level surveys. California clapper rails are unlikely to occur within the upper reach of San Francisquito Creek (upstream of Dahpne Way/Geng Road) because this portion of the creek is less tidally influenced, sparsely vegetated, the marsh is highly fragmented, and located within a highly urbanized environment with an abundance of mammal and avian predators. California clapper rails are unlikely to occur within the diked marsh habitat at the Palo Alto Golf Course because this marsh is not tidally influenced.

Effects of the Proposed Project

Salt Marsh Harvest Mouse and California Clapper Rail

Habitat Disturbance

Table 3 below summarizes for each habitat type the acres and linear extent of suitable habitat for the salt marsh harvest mouse and California clapper rail that will be temporarily disturbed or permanently lost due to construction of the proposed project. Table 4 below summarizes the changes in the areal extent of each habitat type for the salt marsh harvest mouse and California clapper rail within the action area post-construction of the proposed project. Table 5 below summarizes the amount of tidal marsh habitat that will be temporarily disturbed during the installation of the five high-tide refuge islands in Outer Faber Marsh.

Salt Marsh Harvest Mouse

The proposed project will result in the temporary disturbance of a total of about 3.83 acres of tidal marsh habitat, 1.89 acres of diked marsh habitat, 13.05 acres of ruderal grassland habitat, and 8.12 acres of upland refugia/transition zone habitat for the salt marsh harvest mouse (Table 3). The proposed project will result in the permanent loss of a total of about 0.82 acre of tidal marsh habitat, 0.79 acre of diked marsh habitat, 7.77 acres of ruderal grassland habitat, and 0.27 acre of upland refugia/transition zone habitat for the salt marsh harvest mouse (Table 3). The proposed project will result in a net gain of about 6.90 acres of suitable tidal marsh habitat for the salt marsh harvest mouse within the widened San Francisquito Creek floodplain channel (Table 3). The proposed project will result in a net loss of about 1.61 acres of lower quality diked marsh habitat adjacent to the golf course (Table 3). The proposed project will result in a net loss of about 6.12 acres of upland foraging/dispersal habitat for the salt marsh harvest mouse primarily due to ongoing mowing

Table 3. Habitat loss and disturbance.

Habitat Type	Temporary Disturbance		Permanent Loss	
	Acres	Linear Feet[1]	Acres	Linear Feet[1]
Salt Marsh Harvest Mouse Only				
Tidal Marsh	2.07	n/a	0.46	n/a
Diked Marsh	1.89	n/a	0.79	n/a
Ruderal Grassland				
Construction	13.05	n/a	1.28	n/a
Ongoing O&M (levee mowing)[2]	0.00	n/a	6.49	n/a
Salt Marsh Harvest Mouse Only Subtotal	**17.01**	n/a	**9.02**	n/a
Salt Marsh Harvest Mouse and California Clapper Rail				
Tidal Salt Marsh				
Main Faber Marsh Southern Levee	0.32	475	0.30	598
Bay Levee	0.40	636	0.00	0
Bay Levee access	0.00	0	0.00	0
Outer Faber High-Tide Refugia Islands[3]	0.19	n/a	0.00	n/a
All other construction (creek channel)	0.85	n/a	0.06	n/a
Tidal Salt Marsh Subtotal	1.76	n/a	0.36	n/a
Upland Refugia/Transition Zone				
Main Faber Marsh Southern Levee[4]	1.03	1,018	0.27	488
Transition Zone Habitat Enhancement[4]	5.66	5,120	0.00	n/a
Bay Levee	0.93	651	0.00	0
Bay Levee access[4]	0.44	1,150	0.00	0
All other construction (creek channel)	0.06	n/a	0.00	n/a
Upland Refugia/Transition Zone Subtotal	8.12	n/a	0.27	n/a
Salt Marsh Harvest Mouse and California Clapper Rail Subtotal	**9.88**	n/a	**0.63**	n/a
GRAND TOTAL	**26.89**	n/a	**9.65**	n/a

[1] Linear footage of disturbance is only reported for effects incurred from construction of the Main Faber Marsh levee, Bay levee lowering, access, and levee habitat enhancement along the Main Faber Marsh and Outer Faber Marsh levees (n/a = not applicable).

[2] Ongoing O&M effects from annual mowing of grassland habitat along the levees is counted as a permanent effect. However, salt marsh harvest mouse forage and dispersal habitat will be present, especially seasonally between mowing events, when vegetation is taller.

[3] High-tide refuge islands will likely establish as jurisdictional wetlands (*i.e.*, tidal marsh) with wetland plant palette and saturated subsoils. The 0.19 acre of marsh disturbance will be temporary.

[4] A total of about 5,120 linear feet of habitat will be disturbed during transition zone enhancement along the northern, eastern, and southern Main Faber Marsh levees including 1,540 linear feet of the southern levee which partially overlaps with the 1,018 linear feet of disturbance from construction along the southern levee. However, the 5.66-acre estimate for transition zone enhancement does not include the impacts from construction activities along the southern levee.

Table 4. Post-construction changes in the areal extent of suitable habitat within the action area.

Habitat Type	Post-Construction Surface Area (acres)	Net Gain or Loss (acres)	Habitat Enhanced[2] (acres)
California Clapper Rail and Salt Marsh Harvest Mouse			
Tidal Marsh[1]	3.07	+1.09	n/a
Upland Refugia/Transition Zone[2]	7.83	+1.64	5.66[2]
Salt Marsh Harvest Mouse Only			
Tidal Marsh[1]	8.34	+5.81	n/a
Diked Marsh	1.06	-1.61	n/a
Upland Foraging/Dispersal[3] (Ruderal Grassland)	14.70	-6.12[3]	n/a

[1] Tidal marsh along the lower reach of San Francisquito Creek downstream of Friendship Bridge is counted as suitable habitat for both California clapper rail and salt marsh harvest mouse. Tidal marsh along the middle reach of San Francisquito Creek between Friendship Bridge and the ends of Geng Road and Daphne Way is counted as suitable habitat only for salt marsh harvest mouse (although there is the potential for California clapper rails to infrequently forage and disperse upstream of Friendship Bridge). Tidal marsh along the upper reach of San Francisquito Creek upstream of the ends of Geng Road and Daphne Way are not counted as suitable habitat for the California clapper rail or salt marsh harvest mouse.

[2] The enhancement of 5.66 acres of upland refugia/transition zone habitat along the southern, northern, and eastern levees of Main Faber Marsh and the western levee of Outer Faber Marsh through invasive plant control and planting suitable native transition zone plant species (n/a = not applicable).

[3] The ongoing disturbance of 6.49 acres of grassland habitat from annual levee mowing is counted as a net loss of habitat; however, the grassland will be available as salt marsh harvest mouse foraging and dispersal habitat in between mowing events, especially during the wet season. Some potential upland foraging/dispersal habitat would be created on the new levee on the Palo Alto side due to the increase in surface area of the levee on the Palo Alto side post-construction.

Table 5. Total maximum amount of tidal marsh habitat temporarily disturbed during installation of five high tide refuge islands in Outer Faber Marsh (copied from Table 5 in H.T. Harvey & Associates (2015a)).

Cause of Disturbance	**Total Maximum Disturbance for Five Refuge Islands (square feet (acres))**	**Expected Duration of Recovery**
Place plywood pathway and transport crew and materials through marsh habitat to access refuge islands construction locations	5,000 square feet (0.11 acre)	Marsh vegetation will fully recover within a few days-weeks after plywood is removed
Place plywood in approximately a 10-foot radius surrounding refuge islands to protect the construction area	2,000 square feet (0.05 acre)	Marsh vegetation will fully recover within a few weeks after plywood is removed
Refuge island construction (sod removed and then placed on island)	1,250 square feet (0.03 acre)	Marsh vegetation will fully recover 6 months - 1 year after refuge island construction
TOTAL	**8,250 square feet (0.19 acre)**	

of 6.49 acres of grassland on the levee side slopes along the San Francisquito Creek channel for O&M; the Service considers the annual mowing (up to three times per year during the summer and fall) of the grassland habitat to 3 or 4 inches high along the levee side slopes for O&M a net loss of habitat although the grassland would provide foraging and dispersal cover for the salt marsh harvest mouse in between mowing events particularly during the wet season (Table 3). The proposed project will result in a net gain of about 1.64 acres of upland refugia/transition zone habitat primarily along the widened San Francisquito Creek channel. An additional 5.66 acres of low quality upland refugia/transition zone habitat for the salt marsh harvest mouse will be enhanced along a total of about 5,120 linear feet of the southern, northern, and eastern Main Faber Marsh perimeter levees and Outer Faber Marsh western perimeter levee through control of invasive plant species (*e.g.*, mustard, ice plant, and perennial pepperweed) and planting suitable native transition zone plant species (*e.g.*, marsh gumplant) (Figure 4 and Table 4). The proposed project will also create upland refugia/transition zone habitat for the salt marsh harvest mouse within Outer Faber Marsh through the installation of five 10-foot-wide by 30-foot-long high-tide refuge islands at the elevation of MHHW (Figures 3, 4, and 5).

Tidal salt marsh habitat will be disturbed during stabilizing and filling in low spots in the Main Faber Marsh levee, degrading the Bay levee, excavating and widening the lower and middle reaches of the San Francisquito Creek channel, constructing the floodwalls along the middle reach of San Francisquito Creek, and creation of the five high-tide refuge islands in Outer Faber Marsh (Tables 3 and 5). The stabilizing and filling in low spots in the Main Faber Marsh levee will temporarily disturb about 0.32 acre and permanently remove about 0.30 acre of high quality tidal marsh habitat the salt marsh harvest mouse utilizes for breeding, foraging, sheltering, and dispersal (Table 5).

However, the quality of the tidal marsh habitat that will be temporarily disturbed (2.92 acres) or permanently removed (0.52 acre) along the lower and middle reaches of San Francisquito Creek is low due to frequent inundation during high tides and winter storms, presence of invasive plant species and predators, and habitat fragmentation. The quality of the tidal marsh habitat that will be temporarily disturbed (0.59 acre) within Outer Faber Marsh during degrading the Bay levee and installation of the high tide refuge islands is low due to the marsh's lower elevation and exposure to frequent flooding and wave fetch from the adjacent San Francisco Bay.

The stabilizing and filling in low spots in the Main Faber Marsh levee and accessing and degrading the Bay levee will also temporarily disturb about 2.40 acres and permanently remove about 0.27 acre of low quality upland refugia/transition zone habitat the salt marsh harvest mouse primarily utilizes for sheltering during extreme high tide and flooding events when the adjacent marsh plain is flooded. The quality of the upland refugia/ transition zone habitat along the Main Faber Marsh levee and Bay levee that will be disturbed is low due to the dominance of invasive plant species like mustard and perennial pepperweed which provide poor quality high tide refugia cover because these invasive plants are leafless in the winter.

The widening of the San Francisquito Creek channel and construction of the floodwalls will temporarily disturb about 1.89 acres and permanently remove about 0.79 acre of low quality diked marsh habitat adjacent to the golf course the salt marsh harvest mouse utilizes primarily for foraging and dispersal. The annual mowing (up to three times per year) of 6.49 acres of grassland along the San Francisquito Creek levee side slopes to 3 or 4 inches high during the summer and fall will continue to remove low quality upland habitat the salt marsh harvest mouse utilizes for foraging and dispersal; however, the grassland would provide suitable foraging and dispersal habitat in between mowing events particularly during the wet season.

SFCJPA and SCVWD will minimize the potential for the contamination of suitable tidal marsh habitat during construction of the proposed project by implementing a SWPPP, water quality protection BMPs, and a hazardous spill prevention plan.

The proposed project will compensate for the disturbance of salt marsh harvest mouse habitat by creating an additional approximately 6.90 acres of suitable tidal marsh habitat and 1.64 acres of suitable upland refugia/transition zone habitat for the salt marsh harvest mouse within the widened San Francisquito Creek channel resulting in a total of about 11.41 acres of suitable restored tidal marsh habitat and 7.83 acres of suitable upland refugia/transition zone habitat within the widened creek channel (Table 4). The created and restored tidal marsh and transition zone habitat will be restored under a Service-approved revegetation and monitoring plan with success criteria and invasive plant species control to ensure the tidal marsh and transition zone habitat revegetate with suitable native tidal marsh and transition zone plant species. The created and restored tidal marsh habitat within the widened San Francisquito Creek channel will provide higher quality breeding, foraging, and dispersal habitat for the salt marsh harvest mouse than the narrow and fragmented tidal marsh habitat that currently occurs along the creek channel; however, salt marsh harvest mouse within the tidal marsh along the creek channel would continue to be subject to frequent inundation during high tide and winter storm events. The proposed project will minimize the effects of the net loss of 6.12 acres of upland foraging/dispersal habitat and 1.61 acres of diked marsh habitat for the salt marsh harvest mouse by enhancing a total of approximately 5.66 acres (5,120 linear feet) of upland refugia/transition zone habitat for the salt marsh harvest mouse along the southern, northern, and eastern perimeter levees of Main Faber Marsh and the western levee of Outer Faber

Marsh (Figure 6) under a Service-approved restoration plan. Salt marsh harvest mice within the adjacent Laumeister Marsh will also benefit from the upland refugia/transition zone habitat along the levee that divides northern Main Faber Marsh and southern Laumeister Marsh. All temporarily disturbed habitats within the action area will be restored under a five-year Service-approved revegetation and monitoring plan with invasive plant species control and success criteria.

California Clapper Rail

The proposed project will result in the temporary disturbance of a total of about 1.76 acres of tidal marsh habitat and 8.12 acres of upland refugia/transition zone habitat for the California clapper rail (Table 3). The proposed project will result in the permanent loss of a total of about 0.36 acre of tidal marsh habitat and 0.27 acre of upland refugia/transition zone habitat for the California clapper rail (Table 3). The proposed project will result in a net gain of about 1.09 acres of suitable tidal marsh habitat for the California clapper rail within the widened San Francisquito Creek floodplain channel immediately downstream of Friendship Bridge (Table 4). The proposed project will also result in a net gain of about 1.64 acres of upland refugia/transition zone habitat for the California clapper rail primarily along the widened San Francisquito Creek channel downstream of Friendship Bridge (Table 4). Although upland refugia cover will be removed from Outer Faber Marsh during the Bay levee degrade, the creation of five high-tide refuge islands within Outer Faber Marsh will minimize the effects of the loss of upland refugia in Outer Faber Marsh (Figures 3, 4, and 5).

Tidal salt marsh habitat will be disturbed during stabilizing and filling in low spots in the Main Faber Marsh levee, accessing and degrading the Bay levee, excavating and widening the lower reach of the San Francisquito Creek channel, and installation of the five high-tide refuge islands in Outer Faber Marsh. The stabilizing and filling in low spots in the Main Faber Marsh levee will temporarily disturb about 0.32 acre and permanently remove about 0.30 acre of high quality tidal marsh habitat the California clapper rail utilizes for breeding, foraging, sheltering, and dispersal. However, the quality of the tidal marsh habitat that will be temporarily disturbed (0.85 acres) or permanently removed (0.06 acre) along the lower reach of San Francisquito Creek and the Bay levee (0.40 acre temporarily disturbed) is low due to frequent inundation during high tides and winter storms, presence of invasive plant species and predators, and habitat fragmentation. The excavation of sediment from the lower and middle reaches of the San Francisquito Creek channel will temporarily remove benthic invertebrate prey species for the California clapper rail. However, the benthic invertebrate prey community is likely to recover within a few months to a few years of excavation. Additionally, the widening of the San Francisquito Creek channel will result in an increase in the availability of foraging habitat for the California clapper rail.

The stabilizing and filling in low spots in the Main Faber Marsh levee will also temporarily disturb about 1.03 acres (1,018 linear feet) and permanently remove about 0.27 acre (488 linear feet) of low quality upland refugia/transition zone habitat the California clapper rail primarily utilizes for sheltering during extreme high tide and flooding events when the adjacent marsh plain is flooded. The quality of the upland refugia/ transition zone habitat along the Main Faber Marsh levee that will be disturbed is low due to the dominance of invasive plant species like mustard and perennial pepperweed which provide poor quality high tide refugia cover because these invasive plants are leafless in the winter.

SFCJPA and SCVWD will minimize the potential for the contamination of suitable tidal marsh habitat during construction of the proposed project by implementing a SWPPP, water quality protection BMPs, and a hazardous spill prevention plan.

The proposed project will compensate for the disturbance of California clapper rail habitat by creating an additional approximately 1.09 acres of suitable tidal marsh habitat and 1.64 acres of suitable upland refugia/transition zone habitat for the California clapper rail within the widened San Francisquito Creek channel resulting in a total of about 3.07 acres of suitable restored tidal marsh habitat and 7.83 acres of suitable upland refugia/transition zone habitat within the widened creek channel downstream of Friendship Bridge (Table 4). The created and restored tidal marsh and upland refugia/transition zone habitat will be restored under a Service-approved revegetation and monitoring plan with success criteria and invasive plant species control to ensure the tidal marsh and transition zone habitat revegetate with suitable native tidal marsh and transition zone plant species. The created tidal marsh and upland refugia/transition zone habitat within the widened San Francisquito Creek channel will provide higher quality breeding, foraging, sheltering, and dispersal habitat for the California clapper rail than the fragmented tidal marsh and transition zone habitat that currently occurs along the creek channel; however, California clapper rails within the tidal marsh along the creek channel would continue to be subject to frequent inundation during high tide and winter storm events. The proposed project will minimize the effects of the temporary disturbance of 2.40 acres and permanent loss of 0.27 acre of upland refugia/transition zone habitat for the California clapper rail in Main Faber Marsh and Outer Faber Marsh by enhancing a total of approximately 5.66 acres (5,120 linear feet) of upland refugia/transition zone habitat for the California clapper rail along the southern, northern, and eastern levees of Main Faber Marsh and the western levee of Outer Faber Marsh (Figure 6) under a Service-approved restoration plan. California clapper rails within the adjacent Laumeister Marsh will also benefit from the upland refugia/transition zone habitat along the levee that divides northern Main Faber Marsh and southern Laumeister Marsh. All temporarily disturbed habitats within the action area will be restored under a five-year Service-approved revegetation and monitoring plan with invasive plant species control and success criteria.

Direct Effects to Individuals

Any salt marsh harvest mice occurring within the proposed project area during excavation and levee construction activities could be injured or killed by being crushed by the use heavy equipment within suitable wetland and grassland habitat. Any salt marsh harvest mice occurring within the grassland habitat on the levee side slopes during annual levee mowing (up to three times per year) along the San Francisquito Creek channel could be injured or killed by the mower. Individual salt marsh harvest mice and California clapper rails may be displaced by noise and vibrations associated with construction activities and the operation of heavy equipment within and adjacent to suitable marsh habitat. Displaced salt marsh harvest mice and California clapper rails may have to compete for resources in occupied habitat, and may be more vulnerable to predators. Disturbance to female salt marsh harvest mice may cause abandonment or failure of the current litter. Thus, displaced salt marsh harvest mice may suffer from increased predation, competition, mortality, and reduced reproductive success. SFCJPA and SCVWD will avoid construction activities within 700 feet of California clapper rails during the rail's breeding season; therefore, no breeding California clapper rails will be disturbed during the construction of the proposed project. All work will stop if a salt marsh harvest mouse or its nest is observed within the work area.

The level of disturbance of individual salt marsh harvest mice and California clapper rails may vary depending on the type of equipment being used; different pieces of equipment have different noise levels and, thus, cause more or less disturbance. Noise and vibrations may result in displacement of salt marsh harvest mice and California clapper rails from protective cover and their territories. These disturbances are likely to disrupt normal behavior patterns of breeding, foraging, sheltering, and dispersal. The level of disturbance of salt marsh harvest mice and California clapper rails would be exacerbated if construction activities near tidal areas occurred during an extreme high tide event when the mice and rails escape the flooded marsh to seek high tide refugia cover that is not submerged; this is when the salt marsh harvest mouse and California clapper rail are most vulnerable to predation.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and reduce the level of harassment by removing vegetation within a 4-foot buffer around work areas using only non-mechanized hand tools and installing salt marsh harvest mouse-proof exclusion fencing around work areas prior to the initiation of work within suitable habitat. The hand removal of vegetation and installation of salt marsh harvest mouse-proof exclusion fencing will be supervised by a Service-approved biological monitor. A Service-approved biological monitor will be onsite during all construction activities within or adjacent to potential habitat for the salt marsh harvest mouse and California clapper rail. Prior to construction activities, environmentally sensitive areas will be flagged or fenced in order to clearly delineate the extent of the construction. A worker awareness program will be presented to all construction personnel before they start work on the proposed project; the program will summarize relevant laws and regulations that protect biological resources, discuss sensitive habitats and listed species with the potential to occur in the work zone, explain the role and authority of the biological monitors, and review applicable avoidance measures to protect listed species and habitats.

SFCJPA and SCVWD will minimize the level of harassment of salt marsh harvest mice and California clapper rails during extreme high tide events by avoiding work within 50 feet of suitable tidal marsh habitat within two hours before and after an extreme high tide event (6.5 feet or higher measured at the Golden Gate Bridge and adjusted to the timing of local high tides). All work will occur during the daylight hours to avoid disturbance of salt marsh harvest mice and California clapper rails at night. All foods and food-related trash items will be enclosed in sealed trash containers and removed from the site at the end of each workday to prevent attracting predators to the work site.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and harassment of California clapper rails during annual mowing of the levee slopes by: having a qualified biologist survey the area to be mowed; avoiding mowing suitable wetland, marsh, and transition zone habitat; avoiding mowing during extreme high tide events when salt marsh harvest mice and California clapper rails are most likely to approach the upland areas along the levee slopes; avoiding mowing at night; and stopping mowing if any salt marsh harvest mice or California clapper rails are observed within 50 feet.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and California clapper rails during rodent control within the action area by prohibiting the use of rodenticides and fumigants within suitable habitat for the salt marsh harvest mouse and California clapper rail. In areas where rodenticides are used, carcass retrieval surveys will be conducted daily for acute toxins and weekly for anticoagulants to minimize secondary poisoning impacts during the

use period. Methods of rodent control within salt marsh harvest mouse or California clapper rail habitat will be limited to live trapping. All live traps will have openings measuring no smaller than 2 inches by 1 inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and California clapper rails and reduce the level of harassment during installation of the high tide refuge islands in Outer Faber Marsh by avoiding work during the California clapper rail's breeding season; accessing the refuge island sites on foot or boat; a biological monitor will work with the contractor(s) to reduce and minimize the impacts on wetlands from construction access; protective materials such as plywood sheets over geotextile fabric (or equivalent) will be temporarily installed (for a maximum of 2-3 days) to cover all vegetated marsh areas that will be regularly accessed during island construction; using wheelbarrows to transport necessary materials over protective sheets; using skilled personnel and qualified biologists trained in working in sensitive wetland habitats; and utilizing hand tools and manual labor to construct the islands.

Invasive Plant Species

The proposed project has the potential to degrade salt marsh harvest mouse and California clapper rail habitat through the introduction of invasive weeds during proposed project construction. Invasive weeds, such as perennial pepperweed, could spread into marsh habitats when seeds are attached to vehicles, equipment, and clothing. The spread of perennial pepperweed and other invasive plants can displace native marsh vegetation and lower habitat quality for salt marsh harvest mice and California clapper rails by reducing the amount of plants they use for refugia, foraging, and nesting, such as marsh gumplant and pickleweed. Perennial pepperweed provides poor upland refugia cover because the plant is leafless in the winter when the salt marsh harvest mouse and California clapper rail are in most need of suitable upland refugia cover during the more frequent winter extreme high tides and storm events. Without suitable upland refugia cover, the salt marsh harvest mouse and California clapper rail are more vulnerable to predation during extreme high tide events. To minimize the potential for the spread of invasive plants during proposed project implementation, SFCJPA will clean all construction equipment of soil, seed, and plant parts prior to arriving onsite; utilize fill material that is free of vegetation and plant material; utilize certified weed-free erosion control materials; implement a Service-approved revegetation and monitoring plan to ensure all temporarily disturbed areas revegetate with suitable native plant species; and control invasive plant species.

Installation of Rock-Slope Protection

The installation of 3.71 acres of rock-slope protection within the San Francisquito Creek channel could provide denning areas for predators of the salt marsh harvest mouse and the California clapper rail (*e.g.*, foxes, rats, raccoons) if installed in a manner that left voids in between the rocks. This would increase the risk of predation by mammal predators on the salt marsh harvest mouse and the California clapper rail within the action area. SFCJPA will fund the implementation of a five-year mammal predator control program within the action area which will reduce the potential for predation on salt marsh harvest mice and the California clapper rails during the five-year predator control period; however, predation by mammal predators is likely to increase within the action area once the five-year predator management program is terminated.

Altered Hydrology

Main Faber Marsh

Fluvial flood flows above the five-year event (20 percent chance of happening once in any given year) currently spill over from San Francisquito Creek into Main Faber Marsh under average tidal conditions due to an approximately 400-foot-long low spot in the Main Faber Marsh levee downstream of the Friendship Bridge. Once construction of the proposed project is completed, this frequency will decrease to roughly the 25-year event (4 percent chance of happening once in any given year) due to the SFCJPA filling in the low spot in the Main Faber Marsh levee. Hydraulic modeling for the proposed project indicates that there would not be discharge to the Main Faber Marsh from San Francisquito Creek post-project during a two-year, three-year, five-year or 10-year fluvial flood flow event occurring during MHHW. If occurring during a king tide of 10.5 feet, a 10-year flow event would result in a discharge of approximately 100 cfs into Main Faber Marsh, which is a reduction from the volume that would be discharged if these two conditions happened at the same time with the current channel and levee dimensions.

Since salt marsh harvest mice and California clapper rails are most vulnerable to predation during flooding events when cover is limited (Albertson 1995, Service 2013a, Overton *et al.* 2014), any reductions in the frequency of flooding of Main Faber Marsh would likely benefit the mouse and rail by reducing the risk of predation. SFCJPA will further reduce the risk of predation on salt marsh harvest mice and California clapper rails within Main Faber Marsh by contributing funding to a Service- and Refuge-approved five-year predator management program; enhancing transition zone habitat for salt marsh harvest mice and California clapper rails along the southern, eastern, and northern levees of Main Faber Marsh under a Service-approved plan; and installing fencing at the entrance to the southern levee of Main Faber Marsh to deter people and mammal predators from accessing the southern levee. The salt marsh harvest mouse would also benefit from reductions in the frequency of flooding of salt marsh harvest mouse nests within Main Faber Marsh. Salt marsh harvest mice and California clapper rails within the adjacent Laumeister Marsh would also benefit from transition zone habitat enhancement along the northern Main Faber Marsh/southern Laumeister Marsh berm and the implementation of the five-year predator management program.

However, it is not known to what extent reductions in fluvial flooding may alter habitat quality within Main Faber Marsh. Fluvial floods may contribute sediment to Main Faber Marsh which is important for tidal marsh accretion and the ability of the marsh plain to keep up with sea level rise. Thus any decrease in the input of sediment from fluvial flood flows into Main Faber Marsh could decrease the rates of tidal marsh accretion and the ability of the tidal marsh to keep up with sea level rise.

High velocity fluvial flood flows may also scour marsh vegetation and thus reduce the availability of cover for the salt marsh harvest mouse and California clapper rail. Under existing conditions, fluvial flood flows spilling over a low spot in the Main Faber Marsh levee where San Francisquito Creek makes a sharp right turn creates a "fire hose" effect with a zone of concentrated high velocity flows spilling into the tidal marsh of the Main Faber Marsh (A. Riley, SFRWQCB, pers. comm. 2014). The proposed increase in channel capacity within the San Francisquito Creek channel could exacerbate the "fire hose" effect into Main Faber Marsh during flood events (A. Riley, SFRWQCB, pers. comm. 2014). SFCJPA will minimize the "fire hose" effect by filling in the low spot in the Main Faber Marsh levee downstream of the Friendship Bridge.

Fluvial flood flows may also alter vegetation communities within the tidal marsh of the Main Faber Marsh through the introduction of freshwater flows. For example, freshwater discharges from the San Jose/Santa Clara Water Pollution Control Plant since 1970 are thought to have contributed to a net conversion from tidal to brackish marsh and a reduction in habitat quality and population densities of the California clapper rail at the southern end of San Francisco Bay around Coyote Creek (H.T. Harvey and Associates 1989, Service 2013a). However, between 2006 and 2008, a decrease in freshwater outflow from the San Jose/Santa Clara Water Pollution Control Plant has resulted in a shift from brackish marsh to tidal marsh, in turn resulting in a net formation of 77 acres of tidal marsh at the southern end of San Francisco Bay since 1989 (H.T. Harvey Associates 2008, Service 2013a). Thus it is possible that decreases in freshwater flows into Main Faber Marsh could improve habitat quality for the California clapper rail. However, the tidal marsh of the Main Faber Marsh already supports one of the highest densities of California clapper rails range-wide; therefore, it is unlikely that further decreases in freshwater flows would significantly improve habitat quality for California clapper rails except for decreasing the risk of predation as described above.

Freshwater flows increase the biodiversity of the plant community within brackish marsh habitat around San Francisco, San Pablo, and Suisun bays. Thus it is possible that any reductions in freshwater flows may also decrease the biodiversity of plant species within Main Faber Marsh which could alter habitat quality for the salt marsh harvest mouse and California clapper rail. However, since the California clapper rail prefers more saline tidal marshes and the salt marsh harvest mouse occurs in both brackish and saline marsh habitats, it is unlikely that any decreases in freshwater flows into Main Faber Marsh would decrease habitat quality for the salt marsh harvest mouse and California clapper rail.

Outer Faber Marsh

The degrading of the Bay levee will result in an increase in the frequency of fluvial flooding of Outer Faber Marsh thus having the opposite effect described above for Main Faber Marsh. Increases in the frequency of flooding of Outer Faber Marsh may make the marsh less suitable for salt marsh harvest mice and California clapper rails. SFCJPA estimates that degrading the Bay levee will result in three to four additional flood events entering Outer Faber Marsh during large storm events over the 50-year life span of the proposed project.

Additionally, the removal of upland refugia/transition zone habitat along the Bay levee will make salt marsh harvest mice and California clapper rails within Outer Faber Marsh more vulnerable to predation during the more frequent flood events. Recent surveys of Outer Faber Marsh show only two or three California clapper rails occur within Outer Faber Marsh; therefore, the Service anticipates that no more than two or three California clapper rails will be harassed during each of the three to four additional flooding events in Outer Faber Marsh during the 50-year life span of the proposed project. Altered hydrology within Outer Faber Marsh may adversely affect breeding, foraging, and dispersing salt marsh harvest mice or result in the flooding of salt marsh harvest mouse nests; however, the number of breeding salt marsh harvest mice and their nests occurring within Outer Faber Marsh is likely to be low due to the marginal quality of the marsh for breeding salt marsh harvest mice. Degrading the Bay levee could result in an increase in the rate of sedimentation and tidal marsh accretion within Outer Faber Marsh which in the long-term could increase elevations within the marsh making the marsh more suitable for salt marsh harvest mice and California clapper rails.

SFCJPA will minimize the effects of increased flooding and loss of upland refugia/transition zone habitat on salt marsh harvest mice and California clapper rails within Outer Faber Marsh by creating five high-tide refuge islands in Outer Faber Marsh. The high-tide refuge islands will be planted with marsh gumplant and be constructed at high enough elevation to provide cover for salt marsh harvest mice and California clapper rails during most flooding events. The high-tide refuge islands are expected to provide suitable high-tide refuge habitat for the salt marsh harvest mouse and California clapper rail in Outer Faber Marsh within 3-5 years after installation (H.T. Harvey & Associates 2015a). SFCJPA will also minimize the effects of increased flooding and loss of upland refugia/transition zone habitat on salt marsh harvest mice and California clapper rails by enhancing transition zone habitat along the western Outer Faber Marsh levee. SFCJPA will also minimize the risk of predation on salt marsh harvest mice and California clapper rails within Outer Faber Marsh during flooding events by contributing to the Refuge's predator management program within the action area for five years.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

City of Palo Alto Levee O&M Mowing

The City of Palo Alto conducts frequent mowing of the San Francisco Bay Trail levees within the action area along the lower reach of San Francisquito Creek adjacent to the Palo Alto Municipal Golf Course and Palo Alto Airport and along the western side of Main Faber Marsh (K. Murray, SFCJPA, *in litt.* 2015c, 2015d). Levee mowing may result in the harassment of salt marsh harvest mice and California clapper rails and the potential for injury and mortality of salt marsh harvest mice. The level of harassment of salt marsh harvest mice and California clapper rails and potential for injury and mortality of salt marsh harvest mice increases if the mowing is conducted during an extreme high tide or flooding event when the adjacent marsh plain is inundated because this is when the mouse and the rail are most likely to approach the levee to seek cover along the levee that is not submerged. The frequent mowing of the levees also increases the risk of predation on salt marsh harvest mice and California clapper rails within the action area by removing high tide refugia cover the mice and the rails utilize as shelter from predators when the adjacent marsh plain is flooded. Levee mowing during extreme high tide and flooding events may also increase the risk of predation on salt marsh harvest mice and California clapper rails within the action area by flushing the mice and rails from suitable cover or preventing the mice and rails from seeking available unsubmerged cover along the levees. Levee mowing may also introduce and spread invasive plant species which displace higher quality transition zone habitat plant species like marsh gumplant that provide suitable year-round cover for salt marsh harvest mice and California clapper rails during extreme high tide events. The displacement of suitable higher quality transition zone habitat plant species like marsh gumplant that provide year-round suitable cover increases the risk of predation on salt marsh harvest mice and California clapper rails especially during winter extreme high-tide and flooding events when suitable cover is limited.

California clapper rails are sensitive to noise disturbance during the breeding season. For example, Albertson (1995) documented a California clapper rail abandoning its territory in Laumeister Marsh

shortly after a repair crew worked on a nearby transmission tower. The California clapper rail did not establish a stable territory within the duration of the breeding season. As a result of this territorial abandonment, the opportunity for successful reproduction during the breeding season was eliminated. Thus noise from levee mowing adjacent to California clapper rail breeding habitat in Main Faber Marsh and along lower San Francisquito Creek during the rail's breeding season may result in the flushing of California clapper rails from their nests and the loss of breeding activity. The flushing of California clapper rails from their nests increases the risk of predation on the adult California clapper rail and its nest. However, it is possible that some California clapper rails may acclimate to noise from frequent levee mowing.

The City of Palo Alto mows about 0.32 acre of salt marsh harvest mouse grassland foraging/ dispersal habitat to control ruderal grasses in an approximately 3-foot wide strip along the top of the levee along the left bank of the lower reach of San Francisquito Creek downstream of Friendship Bridge adjacent to the Palo Alto Municipal Golf Course and the Palo Alto Airport two or three times per year. The City of Palo Alto also mows annually about 0.29 acre of transition zone habitat for the salt marsh harvest mouse and California clapper rail and about 0.32 acre of grassland foraging/dispersal habitat for the salt marsh harvest mouse within an approximately 9-foot-wide by 2,830-foot-long strip along the western Main Faber Marsh levee. The strip of transition zone habitat mowed by the City of Palo Alto along the western Main Faber Marsh levee includes about 50 percent of the City of East Palo Alto's 0.58-acre transition zone habitat enhancement area which is required habitat compensation for the effects of the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project on the salt marsh harvest mouse and California clapper rail (Service file number 81420-2011-F-0103-2, Service 2013b). The City of Palo Alto avoids the mowing of the City of East Palo Alto's transition zone shrub mitigation plantings (*e.g.*, marsh gumplant and salt marsh baccharis) during levee mowing within the 0.58-acre habitat compensation area along the western Main Faber Marsh levee; however, the mowing of the grassland vegetation in between the shrubs within the habitat compensation area reduces the ability of the habitat compensation area to provide suitable cover for salt marsh harvest mice during extreme high tide and flooding events and during seasonal foraging and dispersal.

Conclusion

After reviewing the current status of the salt marsh harvest mouse and California clapper rail, the environmental baseline for the action area, the effects of the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, and the cumulative effects, it is the Service's biological opinion that the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, as proposed, is not likely to jeopardize the continued existence of the salt marsh harvest mouse and California clapper rail. The Service reached this conclusion because the project-related effects to these species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of these species based on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual salt marsh harvest mice and California clapper rails; (2) the avoidance of construction activities within 700 feet of California clapper rail activity centers during the rail's breeding season; (3) the small amount of habitat within Main Faber Marsh that will be directly disturbed; (4) the reduction in the frequency of flood flows entering Main Faber Marsh due to filling in low spots in the levee along San Francisquito Creek will reduce the risk of predation on salt marsh harvest mice and California clapper rails and the potential for flooding of salt marsh harvest mouse

nests in Main Faber Marsh; (5) the creation of an additional approximately 6.90 acres of suitable tidal marsh habitat for the salt marsh harvest mouse and an additional approximately 1.09 acres of suitable tidal marsh habitat for the California clapper rail within the widened San Francisquito Creek channel; (6) the creation of an additional approximately 1.64 acres of suitable upland refugia/ transition zone habitat for the salt marsh harvest mouse and California clapper rail along the widened San Francisquito Creek channel; and (7) the reduction in predation levels on the salt marsh harvest mouse and California clapper rail within Main Faber Marsh and Outer Faber Marsh due to SFCJPA's contribution to the Refuge's predator management program for at least five years, the enhancement of 5.66 acres of transition zone habitat along the Main Faber Marsh and Outer Faber Marsh perimeter levees, and the installation of fencing to deter people and mammal predators from accessing the southern Main Faber Marsh levee.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or SFCJPA must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

Salt Marsh Harvest Mouse

The Service anticipates incidental take of individual salt marsh harvest mice will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of salt marsh harvest mice that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

1. The harassment and non-lethal harm of all salt marsh harvest mice within the 3.64 acres of suitable tidal marsh habitat, 1.89 acres of suitable diked marsh habitat, 13.05 acres of suitable ruderal grassland foraging/dispersal habitat, and 2.46 acres of suitable upland refugia/ transition zone habitat temporarily disturbed during construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

2. The harassment and harm of all salt marsh harvest mice within the 0.82 acre of suitable tidal marsh habitat, 0.79 acre of suitable diked marsh habitat, 1.28 acres of suitable ruderal grassland habitat, and 0.27 acre of suitable upland refugia/transition zone habitat permanently lost during construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

3. The harassment of all salt marsh harvest mice within the 5.66 acres of low quality transition zone habitat temporarily disturbed along a total of 5,120 linear feet of the southern, eastern, and northern Main Faber Marsh perimeter levees and the western Outer Faber Marsh perimeter levee during transition zone habitat enhancement.

4. The harassment of all salt marsh harvest mice within the 0.19 acre of suitable tidal marsh habitat temporarily disturbed during installation of five high tide refuge islands in Outer Faber Marsh.

5. The ongoing harassment and non-lethal harm of all salt marsh harvest mice within 6.49 acres of ruderal grassland foraging/dispersal habitat disturbed up to three times per year during annual levee mowing along the San Francisquito Creek levee slopes.

6. The harassment of all salt marsh harvest mice within the 13.8 acres of suitable tidal marsh and transition zone habitat in Outer Faber Marsh during four additional flooding events during the 50-year life span of the proposed project.

7. The injury or mortality of two adult salt marsh harvest mice and four juvenile salt marsh harvest mice.

<u>California Clapper Rail</u>

The Service anticipates incidental take of individual California clapper rails will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of California clapper rails that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

1. The harassment and non-lethal harm of all California clapper rails within the 1.57 acres of suitable tidal marsh habitat and 2.46 acres of suitable upland refugia/transition zone habitat temporarily disturbed during the construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

2. The harassment and non-lethal harm of all California clapper rails within the 0.36 acre of suitable tidal marsh habitat and 0.27 acre of suitable upland refugia/transition zone habitat permanently lost during the construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

3. The harassment of all California clapper rails within the 0.19 acre of tidal marsh disturbed during installation of up to five high-tide refuge islands within Outer Faber Marsh.

4. The harassment of all California clapper rails within the 5.66 acres of low quality transition zone habitat temporarily disturbed along 5,120 linear feet of the southern, eastern, and northern Main Faber Marsh levees and western Outer Faber Marsh levee during transition zone habitat enhancement.

5. The harassment of all California clapper rails within the 13.8 acres of suitable tidal marsh and transition zone habitat in Outer Faber Marsh during four additional flooding events during the 50-year life span of the proposed project.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the salt marsh harvest mouse and California clapper rail.

Reasonable and Prudent Measures

All necessary and appropriate measures to avoid or minimize effects on the salt marsh harvest mouse and California clapper rail resulting from implementation of the proposed project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the salt marsh harvest mouse and California clapper rail:

1. All conservation measures, as described in the biological assessment and restated here in the Description of the Proposed Project section of this biological opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The Corps shall include full implementation and adherence to the conservation measures as a condition of any permit or contract issued for the proposed project.

2. The Corps shall ensure that no rodenticides are used within 328 feet of suitable habitat for the salt marsh harvest mouse and California clapper rail.

3. The Corps shall ensure that any mammals trapped during rodent control that are potential predators of the California clapper rail or salt marsh harvest mouse (*e.g.*, Norway rats, feral cats, skunks, red foxes, raccoons, opossums) are dispatched and removed from the site.

4. The Corps shall ensure that SFCJPA has a plan for marsh ecotone/transition zone habitat enhancement along the Main Faber Marsh and Outer Faber Marsh levees and avian and mammal predator monitoring and management within the action area reviewed and approved by the Service prior to the initiation of construction of the proposed project. The marsh ecotone/transition zone habitat enhancement and the funding for predator management shall be initiated within one year of the initiation of construction of the proposed project.

5. The Corps shall ensure that SFCJPA has a plan for the installation of the permanent high-tide refuge islands in Outer Faber Marsh reviewed and approved by the Service within six months of the initiation of construction of the proposed project. The permanent high-tide refuge islands shall be installed within two years of the initiation of construction of the proposed project.

6. The Corps shall ensure that SFCJPA installs the rock-slope protection in a manner that minimizes voids in between the rocks that could provide denning areas for predators of the salt marsh harvest mouse and California clapper rail.

Monitoring

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

a. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Corps shall provide bimonthly updates to the Service with a precise accounting of the total acreage of habitat impacted. Updates shall also include any information about changes in project implementation that result in habitat disturbance not described in the Description of the Proposed Project and not analyzed in this Biological Opinion.

b. For those components of the action that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death is anticipated, the Corps shall immediately contact the Service's Sacramento Fish and Wildlife Office (SFWO) at (916) 414-6623 to report the encounter. If encounter occurs after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the Corps shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

c. The Corps shall ensure that SFCJPA or SCVWD provide annual reports to the Service during the five-year post-construction monitoring period on the status of revegetation and invasive plant species control of the temporarily disturbed areas, tidal marsh creation/

restoration within the widened San Francisquito Creek floodplain, transition zone habitat enhancement along the Main Faber Marsh and Outer Faber Marsh perimeter levees, and revegetation of the permanent high-tide refuge islands in Outer Faber Marsh.

d. The Corps shall ensure that SFCJPA or the U.S. Department of Agriculture Wildlife Services provides annual reports to the Service on the implementation of the avian and mammalian predator monitoring and management program within the action area. The annual reports should include the number of each species of avian and mammal predator observed, the number of each species of predator removed, and the frequency of monitoring for predators.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Coast/Bay Division Chief of the Endangered Species Program at the SFWO at (916) 414-6623.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Develop, fund, and annually implement a predator management program for controlling avian and mammal predators that threaten the salt marsh harvest mouse and California clapper rail, western snowy plover, and California least tern. Fund the monitoring of PG&E transmission towers for avian predators within suitable habitat for the salt marsh harvest mouse and California clapper rail and report any raptor nests to PG&E and the Refuge for removal. Work with PG&E to install raptor perch deterrents on their transmission towers within suitable habitat for the salt marsh harvest mouse and California clapper rail.

2. Control rat populations within the City of East Palo Alto near the Faber and Laumeister marshes.

3. Decommission trails or require that dogs be kept on a leash near breeding habitat for the California clapper rail. Avoid constructing trails near suitable habitat for the California clapper rail and salt marsh harvest mouse. Enforce dog leash laws along the San Francisco Bay Trail.

4. Remove raptor perches near suitable habitat for the salt marsh harvest mouse and California clapper rail.

5. Prohibit the feeding of wildlife near suitable habitat for the salt marsh harvest mouse and California clapper rail.

6. Control invasive perennial pepperweed within suitable upland transition zone and tidal marsh habitat for the salt marsh harvest mouse and California clapper rail and implement measures to minimize the introduction and spread of perennial pepperweed and other invasive plant species.

7. Restore tidal marsh habitat and marsh ecotone/transition zone habitat for the California clapper rail and salt marsh harvest mouse in priority areas identified in the Recovery Plan.

8. Report sightings of any listed or sensitive animal species to the CNDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, from San Francisco Bay to Highway 101, in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have any questions regarding this biological opinion on the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project please contact Joseph Terry, Senior Biologist, or Ryan Olah, Coast/Bay Division Chief, at the letterhead address, electronic mail (Joseph_Terry@fws.gov; Ryan_Olah@fws.gov), or at telephone (916) 943-6721.

Sincerely,

Jennifer M. Norris (FOR)
Field Supervisor

cc:
Anne Morkill, San Francisco Bay National Wildlife Refuge Complex, Fremont, California
Kim Squires, Bay/Delta Fish and Wildlife Office, Sacramento, California
Tami Schane, California Department of Fish and Wildlife, Napa, California
Susan Glendening, San Francisco Bay Regional Water Quality Control Board, Oakland, California
Len Materman, San Francisquito Creek Joint Powers Authority, Menlo Park, California
Amanda Morrison, National Oceanic and Atmospheric Administration/National Marine Fisheries Service, Santa Rosa, California
Brenda Goeden, San Francisco Bay Conservation and Development Commission, San Francisco, California

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Personal Communications

Albertson, Joy. Supervisory Wildlife Biologist, San Francisco Bay National Wildlife Refuge Complex, Fremont, California.

Allan, Kate. Wildlife Biologist, WRA Environmental Consulting, San Rafael, California.

McBroom, Jen. Clapper Rail Monitoring Manager, Olofson Environmental, Inc., Oakland, California.

Mruz, Eric. Refuge Manager, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California.

Overton, Cory. Wildlife Biologist, U.S. Geological Survey, Dixon, California.

Perrera, Robert. Biological Monitor, Huffman-Broadway Group, Inc., San Rafael, California.

Popper, Brian J. Wildlife Biologist, U.S. Department of Agriculture Wildlife Services, San Luis District, Fremont, California.

Riley, Ann L. Watershed and Stream Protection Advisor, San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Strong, Cheryl. Wildlife Biologist, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California.

Tertes, Rachel. Wildlife Biologist, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California.

Don Edwards San Francisco Bay National Wildlife Refuge
General Activities
Special Use Permit

(For Official Use Only)

Permit #: 2016-07

Permit Term: From: 9/1/2016 To: 1/31/2017

1) Permittee Name/Business: Kevin Murray, San Francisquito Creek Joint Powers Authority

2) Permit Activity Type: restoration in Faber Tract marsh as part of the San Francisquito Creek project

2) Permit Status:

- [x] Approved — If approved, provide special conditions (if any) in the text box below.
- [ ] Denied — If denied, provide justification in the text box below.

Restoration activities within and around Faber Tract marsh related to the San Francisquito Creek project and agreed to by the USFWS, COE and the JPA including: degrading of a portion of the levee between the Creek and Outer Faber Tract, and the raising and grading of a portion of the levee between the Creek and Faber Tract adjacent to the mosquito ponds (see design sheets, on file). Project subject to conditions in the Biological Opinion (on file) and attached to this SUP. Permittee is responsible for all conditions and enforcement of conditions with contractors.

3) Are there additional special conditions attached to the permit? (●) Yes ( ) No ( ) N/A

4) Are other licenses/permits required, and have they been verified? (●) Yes ( ) No ( ) N/A

5) Are Insurance and/or Certification(s) required, and have they been verified? ( ) Yes ( ) No (●) N/A

6) Record of Payments: ( ) Full ( ) Partial (●) Exempt

7) Is a surety bond or security deposit required? ( ) Yes ( ) No (●) N/A

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the applicant signed below, subject to the terms, covenants, obligations, and reservations, expressed or implied therein, and to the notice, conditions, and requirements included or attached. A copy of this permit should be kept on-hand so that it may be shown at any time to any refuge staff

8) Permit approved/issued by: (Signature and title)

Cheryl Strong

Date: 18 February 2016

9) Permit accepted by: (Signature of permittee)

Kevin Murray

Date: February 19, 2016

General Conditions and Requirements

1) Responsibility of Permittee: The permittee, by operating on the premises, shall be considered to have accepted these premises with all facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, and/or the part of anyone of his/her associates, to use reasonable care.

2) Operating Rules and Laws: The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal county, and State laws applicable to the operations under the permit as well as all Federal laws, rules, and regulations governing national wildlife refuges and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the refuge official in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of refuge fires.

3) Use Limitations: The permittee's use of the described premises is limited to the purposes herein specified and does not, unless provided for in this permit, allow him/her to restrict other authorized entry onto his/her area; and allows the U.S. Fish and Wildlife Service to carry on whatever activities are necessary for: (1) protection and maintenance of the premises and adjacent lands administered by the U.S. Fish and Wildlife Service; and (2) the management of wildlife and fish using the premises and other U.S. Fish and Wildlife Service lands.

4) Transfer of Privileges: This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of the Regional Director of the U.S. Fish and Wildlife Service and the permit shall not be used for speculative purposes.

5) Compliance: The U.S. Fish and Wildlife Service's failure to require strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the U.S. Fish and Wildlife Service's right to thereafter enforce any of the permit's terms or conditions.

6) Conditions of Permit not Fulfilled: If the permittee fails to fulfill any of the conditions and requirements set forth herein, the U.S. Fish and Wildlife Service shall retain all money paid under this permit to be used to satisfy as much of the permittee's obligation as possible.

7) Payments: All payment shall be made on or before the due date to the local representative of the U.S. Fish and Wildlife Service by a postal money order or check made payable to the U.S. Fish and Wildlife Service.

8) Termination Policy: At the termination of this permit the permittee shall immediately give up possession to the U.S. Fish and Wildlife Service representative, reserving, however, the rights specified in paragraph 11 below. If he/she fails to do so, he/she will pay the U.S. Fish and Wildlife Service, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed to reenter as needed to remove his/her property as stated in paragraph 11 below. The acceptance of any fee for the liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmation of the permittee's action nor shall it operate as a waiver of the U.S. Fish and Wildlife Service's right to terminate or cancel the permit for the breach of any specified condition or requirement.

9) Revocation Policy: The Regional Director of the U.S. Fish and Wildlife Service may revoke this permit without notice for noncompliance with the terms hereof, or for violation of general and/or specific laws or regulations governing national wildlife refuges, or for nonuse. It is at all times subject to discretionary revocation by the Director of the Service. Upon such revocation the U.S. Fish and Wildlife Service, by and through any authorized representative, may take possession of said premises for its own and sole use, and/or may enter and possess the premises as the agent of the permittee and for his/her account.

10) Damages: The U.S. Fish and Wildlife Service shall not be responsible for: any loss or damage to property including but not limited to crops, animals, and machinery; injury to the permittee or his/her relatives or to the officers, agents, employees, or any other(s) who are on the premises from instructions; the sufferance from wildlife or employees or representatives of the U.S. Fish and Wildlife Service carrying out their official responsibilities. The permittee agrees to hold the U.S. Fish and Wildlife Service harmless from any and all claims for damages or losses that may arise to be incident to the flooding of the premises resulting from any associated government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.

11) Removal of Permittee's Property: Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the U.S. Fish and Wildlife Service have been paid, the permittee may, within a reasonable period as stated in the permit or as determined by the U.S. Fish and Wildlife Service official in charge, but not to exceed 60 days, remove all structures, machinery, and/or equipment, etc., from the premises for which he/she is responsible. Within this period the permittee also must remove any other of his/her property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the U.S. Fish and Wildlife Service.

FOR ANY LAW ENFORCEMENT ISSUES PLEASE CALL DISPATCH AT 415-561-5510. BE PREPARED TO EXPLAIN WHO AND WHERE YOU ARE.

1. Permittee or designee must carry a copy of permit and the research / study proposal when on Refuge lands. Permittees and designees will place the appropriate placard on the dashboard of all vehicles while on the Refuge and behind locked gates.

2. Permittee is responsible for meeting all conservation measures (pages 15-27) of the biological opinion, dated 15 January 2015, and for enforcing said conditions with any contractor(s). A biological monitor will be on site during all activiites.

3. Work includes the degrading of a portion of the levee between the Creek and Outer Faber Tract, and the raising and grading of a portion of the levee between the Creek and Faber Tract adjacent to the mosquito ponds as specified in the design plans dated Feb 2016.

4. Permittee will not interfere with ongoing Dept. of Agriculture-Wildlife Service's predator management activities. Permittee will not interfere with work by Cargill Salt Division or Refuge visitors using public trails.

5. All work will be conducted in a manner which minimizes disturbance to wildlife and damage to wetland habitat. Noise must be minimized to prevent wildlife disturbance.

6. **Permittee may not drive on levees for 3-5 days after a moderate rain or under conditions that may damage the levee. Any damage caused by construction and access will be repaired by pemirttee.** When permittee encounters visitors on Refuge trails, speed will be reduced to prevent dust and unnecessary disturbance of visitors.

7. Permittee will immediately report any active burrowing owl burrows to Refuge Biologists.

8. Permittee will immediately report all sightings or feral cats, dogs, red fox, or active raven and hawk nests (on PG&E towers) observed on the Refuge. Fox dens will not be approached or searched.

9. **Access into salt marsh habitat is prohibited** except on boardwalks, railroad grades, and similar structures. No access to the marsh will be allowed during the California clapper rail breeding season, 1 February to August 31. Marsh access is not permitted during extreme high tide events (>6.5 at GG) to reduce impacts to tidal marsh species looking for refugia. Exceptions to this must be cleared by Refuge biologists prior to access.

10. All locked gates opened must immediately be shut and locked behind you. TAKE CARE NOT TO LOOK OUT ANY OTHER LOCKS IN THE CHAIN LOOP.

11. Refuge contacts: Cheryl Strong, biologist, 510-557-1271, Cheryl_strong@fws.gov; and Chris Barr, acting Refuge manager, 510-792-0222 ext. 127.

San Francisco Bay Conservation and Development Commission
455 Golden Gate Avenue, Suite 10600, San Francisco, California 94102 tel 415 352 3600 fax 415 352 3606

Permittee's Copy

PERMIT NO. 2013.007.00

February 22, 2016

San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

ATTENTION: Mr. Len Materman

Ladies and Gentlemen:

On February 18, 2016 the San Francisco Bay Conservation and Development Commission, by a vote of 17 affirmative, 0 negative, and 0 abstentions, approved the resolution pursuant to which this permit is hereby issued:

I. Authorization

A. Subject to the conditions stated below, the permittee, the San Francisquito Creek Joint Powers Authority, is granted permission to do the following:

Location: In the Bay and within the 100-foot shoreline band, within the lower reach of the San Francisquito Creek (SFC) and adjacent Faber Tract Marsh, between the Counties of San Mateo and Santa Clara.

In the Bay:

1. Construct up to five, high tide refugia islands in Outer Faber Marsh by placing approximately 1,250 square feet (250 square feet per island; 0.006 acres) of imported solid fill in the Marsh. Each island would be approximately 10 feet by 30 feet in size and constructed to an initial elevation of approximately 8.8 feet (NAVD88), planted with native marsh gumplant and other tall stature wetland vegetation (Exhibit F);
2. Excavate approximately 1,470 cubic yards (cy) of sediment from an approximately 23,600-square-foot area of the creek channel and dispose of the material at an upland disposal location;
3. Remove 390 feet of abandoned sanitary sewer line within BCDC's Bay jurisdiction located near Friendship Bridge and install 810 feet of new sewer line embedded at least 6.0 feet or deeper below the channel mudline;
4. Construct an approximately 2,062-square-foot, wooden, pile-supported boardwalk (approximately 202 feet long and 10 feet wide) over the newly created marsh plain terrace to connect the abutment of the left side of Friendship Island to the newly realigned SFC south levee (L-line levee in the *San*

Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project Draft Plans dated July 2015) within the Commission's future Bay jurisdiction;

5. Construct one "steelhead passage feature" in the creek, including a permanent rock spur (partial weir), consisting of approximately 1,710 square feet of large rock and other solid fill in the channel; and
6. Place approximately 12,810 square feet of temporary solid fill during in-channel construction occurring over a two-year period, which includes:
   a. Installing an approximately 1,850-foot-long, 36-inch diameter HDPE diversion pipe along the outboard side of the SFC north levee (R-line levee in the *San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project* Draft Plans dated July 2015);
   b. Constructing a temporary, steel sheet pile cofferdam, approximately 12 feet tall and 160 feet long, spanning the width of the channel;
   c. Placing gravel-filled bags around the connection between the pipe and the cofferdam walls;
   d. Placing approximately 7,256 square feet of rock within the channel as an energy dissipater for the diversion pipe water outflow;
   e. Dewatering the channel and creek for in-channel construction activities from June through October during each year of the two-year construction (2016-2018); and
   f. Removing all temporary fill (water diversion pipes, rock and cofferdam, etc.) following the closure of the in-channel work window.

Partially Within the Bay and 100-foot Shoreline Band:

1. Place approximately 26,340 square feet of riprap around the eastern footings of Friendship Bridge (future Friendship Island);
2. Place approximately 28,480 square feet of riprap along the inboard side of the SFC north levee, along Faber Tract Marsh near Friendship Bridge, and along the inboard side of the SFC southern levee to stabilize shoreline features during increased flood flows within the creek;
3. Place approximately 11,140 square feet of clean fill along the outboard side of the SFC north levee, in the Faber Tract Marsh to stabilize and restore low portions of the levee from 11 feet (NAVD88) to approximately 13 feet (NAVD88). Extend the outboard side of a portion of the SFC north levee at a 6:1 slope into Faber Tract Marsh to protect the toe of the existing levee from failure during high flow events;

4. Restore 1.74 acres of high marsh and transitional habitat along and within San Francisquito Creek, and the north and south levees as part of the total 15.14-acre high marsh/transition zone restoration effort. This would include 0.88 acres of newly created high marsh plain terrace in the Commission's future Bay and shoreline band jurisdictions and restoration of 0.86 acres of high marsh/transition zone along the edges of the creek; and
5. Restore 1.7 acres of high marsh and transition zone habitats in the Faber Tract Marsh within the Commission's Bay and shoreline band jurisdictions.

Within the 100-foot Shoreline Band:

1. Degrade approximately 600 linear feet (37,680 square feet) of an unmaintained section of the existing SFC north levee that runs between the Outer Faber Marsh and the terminus of San Francisquito Creek from 10-12 foot elevation (NAVD88) to approximately 8 feet (NAVD 88) to create a connection between the creek and the Outer Faber Marsh during high flow periods. Use approximately 4,000 cy of excavated soils for levee fill if it is suitable for this use;
2. Degrade portions of the existing paved SFC south levee (approximately 700 linear feet; 60,380 square feet) to an elevation of 7 feet (NAVD 88) and widen the existing channel, and setback portions of the existing SFC south levee into the golf course, outside the Commission's current jurisdiction. Setting the levee back would expand the Commission's Bay and shoreline band jurisdictions beyond their current boundary (Exhibit C);
3. Place approximately 56,480 square feet of new fill for a portion of the newly aligned SFC south levee, within the Commission's existing and future shoreline band jurisdiction and realign 600 linear feet of the public access along the new SFC south levee top. The new SFC south levee along the golf course would be approximately 80 feet wide at the base and 14 feet tall;
4. Pave and maintain 600 linear feet of the newly realigned public access trail running along the crown of the realigned SFC south levee and therefore restoring the Bay Trail;
5. Temporarily close existing public access trails on the south side of the San Francisquito Creek near Friendship Bridge during construction operations;
6. Leave portions of the existing SFC south levee connection with Friendship Bridge to create an island (Friendship Island) in the center of the newly widened channel;
7. Stockpile topsoil removed during excavation and reuse stockpiled soil to repair areas disturbed during construction;

8. Install and maintain at least one interpretive sign related to Faber Tract Marsh at an approved location near Friendship Bridge or the newly constructed boardwalk;
9. Install and maintain at least seven BCDC public shoreline signs at approved locations to notify the public of where to access the shoreline;
10. Remove old PG&E gas utility lines and install a new 24-inch gas line upstream of Friendship Bridge via micro-tunneling;
11. Construct a steel sheet pile floodwall up to four feet above (18.40 NAVD 88) the existing SFC north levee top of bank and along approximately 500 feet of shoreline near the O'Connor Way Pump Station and Friendship Bridge (between about STA 28+00 to STA 33+00) to connect the outfall structure to the adjacent levees, a portion of which is within the Commission's jurisdiction;
12. Plant native high marsh vegetation on approximately 5,120 feet (approximately 6 acres) along the levees on the north, east, and south sides of Faber Tract Marsh to improve high tide refuge areas;
13. Utilize certain areas for the staging of construction equipment or materials (Exhibit D); and
14. Install, use and maintain a fence to exclude predators from entering the Faber Tract Marsh on the northern side of the San Francisquito Creek via the SFC north levee. The length, height and materials of the fence shall be reviewed and approved pursuant to Special Condition II-G-3, herein.

B. This authority is generally pursuant to and limited by your application dated August 26, 2013, including all accompanying and subsequently submitted correspondence and exhibits, subject to the modifications required by conditions herein.

C. Work authorized herein must commence prior to September 1, 2016, or this permit will lapse and become null and void. All work authorized herein must be diligently pursued to completion and must be completed within two years of commencement or by October 15, 2018 whichever is earlier, unless an extension of time is granted by amendment of the permit. Changes in the work authorized will likely require amendments to the authorization.

D. After completion of construction, the project will result in the placement of approximately 2,060 square feet (0.05 acres) of pile-supported fill for new public access over the Bay and approximately 22,000 square feet (9,990 cy) of solid fill. The project will open up a constriction point near the mouth of San Francisquito Creek, by removing approximately 37,680 square feet (3,380 cy) of existing fill. In the Commission's Bay and shoreline band jurisdictions, the project will place approximately 54,820 square feet (10,150 cubic yards) of solid fill (rock riprap) to

reinforce parts of the inboard sides of SFC north and SFC south levees and protect footings on Friendship Bridge, and will place approximately 11,140 square feet (12,000 cy) of solid fill (soil) to reinforce a portion of the SFC north levee. The project will place small amounts of fill for habitat improvements, including 1,250 square feet for high tide refugia islands and approximately 1,710 square feet of rock for steelhead habitat features. In total, the project will result in a net increase of Bay fill of approximately 24,000 square feet (0.55 acres).

Table 1. Fill Areas for the project (in square feet)

		Bay Jurisdiction (sf)		Shoreline Band Jurisdiction (sf)		
Description	**Type of Fill**	**To Be Removed**	**To Be Placed**	**To Be Removed**	**To Be Placed**	**Total Net Fill Area (sf)**
SFC north and south levee riprap	Solid	0	7,130	0	21,350	28,480
Friendship Island Riprap	Solid	0	2,650	0	23,690	26,340
SFC north levee outboard side	Solid	0	8,460	0	2,680	11,140
Fish passage structures (rock)	Solid	0	1,710	0	0	1,710
SFC south levee fill	Solid	0	3,530	-60,380	52,950	-3,900
Outer Faber Marsh levee degrade	Solid	-2,810	0	-34,870	0	-37,680
Earth fill for Faber Marsh levees and high tide refugia	Solid	0	1,250	0	540	1,790
Temporary Cofferdam and other construction structures	Temporary	-12,810	12,810	0	0	0
Total Solid Fill		**21,920 (9,990 cy)**		**5,960**		**27,880**
Boardwalk	Pile-Supported	0	2,060	0	0	2,060
Total Pile-Supported Fill		**2,060**				2,060
TOTAL BAY FILL (sf)		**23,980**				**29,940**

Table 2. Habitat Restoration in BCDC's jurisdiction (in acres)

Restoration Technique	Habitat Restoration Surface Area (acres)		
	Bay Jurisdiction	Shoreline Band Jurisdiction	Total
Faber Marsh			
Active Revegetation Creation			
High Marsh Habitat	0.00	0.00	
High Marsh Transition Habitat	0.00	0.80	
Active Revegetation Enhancement			
High Marsh Habitat	0.00	0.00	
*High Marsh Transition Habitat**	0.09	0.00	
Passive Re-establishment**	0.81	0.00	
Faber Marsh Tidal Habitat	0.90	0.80	1.7
Active Revegetation Enhancement			
Upland Berm Refugia Habitat	0.00	6.00	
Faber Marsh Total * **	**0.90**	**6.80**	**7.7**
San Francisquito Creek			
Active Revegetation Creation			
High Marsh Habitat	0.31	0.03	
High Marsh Transition Habitat	0.36	0.18	
Active Revegetation Enhancement			
High Marsh Habitat	0.54	0.00	
High Marsh Transition Habitat	0.00	0.00	
Passive Re-establishment	0.29	0.03	
San Francisquito Creek Subtotal	**1.50**	**0.24**	**1.74**
Total	**2.40**	**7.04**	**9.44**

* Includes 0.03 ac of tidal marsh within Bay Jurisdiction that will be temporarily impacted by refuge island construction and actively revegetated with native marsh vegetation.
** Includes 0.16 ac of tidal marsh within Bay Jurisdiction that will be temporarily impacted by refuge island construction access and will re-establish naturally post-construction.
*** Tidal marsh habitat and berm refugia habitat combined

II. Special Conditions

The authorization made herein shall be subject to the following special conditions, in addition to the standard conditions in Part IV:

A. **Specific Plans and Plan Review.**

1. **Construction.** The final construction plans submitted pursuant to this condition shall generally conform to HDR's *San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project* (Draft 100% Design dated July 2015). Additionally, the permittee shall submit construction plans for the pile-supported boardwalk, bollards, public access signs, steelhead passage features or any other project elements not included in the *San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project* (Draft 100% Design dated July 2015) construction plans prior to conducting any work on these project elements. Final plans for the construction of the structures authorized herein shall be prepared and submitted for Commission review as described below. No significant changes to the design of the project shall be made without review and written approval by the staff on behalf of the Commission.

2. **Plan Review**. No work whatsoever shall be commenced pursuant to this authorization until final precise site, demolition, construction staging, engineering, architectural, grading, landscaping, and best management practices plans and any other relevant criteria, specifications, and plan information for that portion of the work have been submitted to, reviewed, and approved in writing by or on behalf of the Commission. Construction staging plans shall ensure that there is minimal impact to tidal marsh areas and public access areas, subject to Special Condition II-C below. The specific drawings and information required for approval will be determined by the Commission staff. Preliminary drawings should be submitted and approved prior to submission of final drawings.

   a. **Site, Architectural, and Public Access Plans**. All plans shall include and clearly label: the shoreline (Mean High Water Line or the inland edge of marsh vegetation up to 5 feet above Mean Sea Level where tidal marsh is present); the line 100 feet inland of the shoreline; property lines; Highway 101; East Bayshore Road; the boundaries of all areas to be reserved for public access purpose; and details showing the location, types, dimensions, and materials to be used for all structures, irrigation, landscaping, drainage, bollards, signs, lighting, fences, paths, trash containers, utilities and any other improvements.

b. **Engineering Plans.** Engineering plans shall include a complete set of construction drawings, specifications and design criteria. The design criteria shall be appropriate to the nature of the project and include the use of any structures, and soil and foundation conditions at the site. Final plans shall be signed by the professionals of record and be accompanied by:

(1) Evidence that the design complies with all applicable codes; and

(2) Evidence that a thorough and independent review of the design details, calculations, and construction drawings has been made.

c. **Preliminary and Final Plan Submital.** Not later than 60 days prior to planned commencement, plans shall be accompanied by a letter requesting plan approval and including: identifying the type of plans submitted; the portion of the project involved; and indicating whether the plans are final or preliminary. Approval or disapproval shall be based upon:

(1) Completeness and accuracy of the plans in showing the features required above, particularly the shoreline, property lines, and the line 100-feet inland of the shoreline, and any other criteria required by this authorization;

(2) Consistency of the plans with the terms and conditions of this authorization;

(3) The provision of the amount and quality of public access to and along the shoreline and through the project to the shoreline required by this authorization, but limited to ensuring: (a) the public's use and enjoyment of the access area; (b) public safety; (c) accessiblity for persons with disabilities; (d) sufficient durability and maintenance of materials and structures; and (e) that the access is clear and continuous and encourages public use;

(4) Whether the fill in the Bay does not exceed this authorization and will consist of approprate shoreline protection materials as determined by or on behalf of the Commission;

(5) Whether the appropriate provisions have been incorporated for safety in case of seismic event;

(6) Whether the placement of fill in the Bay will avoid or minimize impacts to the Bay and adjacent tidal marsh habitats;

(7) Whether the appropriate elevations will be achieved to minimize overtopping, flooding, and 100-year storm events in all public access areas; and

(8) Assuring that existing public access will not be impeded during construction to the maximum extent feasible and if temporaray closure is necessary, the permittee shall provide information, for staff review and approval, on the period of time for the temporary closure and a timeline for reopening the public access.

Plan review shall be completed by or on behalf of the Commission within 45 days after receipt of the plans to be reviewed.

3. **Conformity with Final Approved Plans**. All work, improvements, and uses shall conform to the final approved plans. Prior to any use of the facilities authorized herein, the appropriate design professional(s) of record shall certify in writing to the Commission that, through personal review, the work covered by the authorization has been performed in accordance with the approved design criteria and in substantial conformance with the approved plans. No noticeable changes shall be made thereafter to any final plans or to the exterior of any constructed structure, plantings, trails, signage, or shoreline protection work without first obtaining written approval of the change(s) by or on behalf of the Commission.

4. **Discrepancies between Approved Plans and Special Conditions**. In case of any discrepancy between final approved plans and Special Conditions of this authorization or legal instruments approved pursuant to this authorization, the Special Condition or the legal instrument shall prevail. The permittee is responsible for assuring that all plans accurately and fully reflect the Special Conditions herein and any legal instruments submitted pursuant to this authorization.

5. **Appeals of Plan Review Decisions**. Any plan approval, conditional plan approval or plan denial may be appealed by the permittee or any other interested party to the Design Review Board, the Engineering Review Board, or if necessary, subsequently to the Commission. Such appeals must be submitted to the Executive Director within 30 days of the plan review action and must include the specific reasons for appeal. The Design Review Board shall hold a public hearing and act on the appeal within 60 days of the receipt of the appeal. If subsequently appealed to the Commission, the Commission shall hold a public hearing and act on the appeal within 90 days of the receipt of the subsequent appeal.

B. **Construction Operations.**

1. **Testing Imported Soils.** Prior to importing soils for fill that would come into contact with waters of the Bay, all soils shall be tested for elevated levels of contaminants in accordance with the provisions of the Regional Water Quality Control Board's (Water Board) Conditional Water Quality Certification (WQC) issued on April 7, 2015. No soils found to have levels of contaminants above levels approved by the Water Board shall be imported to or utilized at the site.

2. **Best Management Practices**. The permittee shall also employ best management practices, such as use of: soil compaction; silt fences; dust control; cofferdams; water diversion pipes; minimizing impacts from human and vehicle traffic; revegetation and planting native species in impacted areas; and other practices to assure that material placed to enhance existing shoreline protection features and to create a new levee alignment will minimize impacts to the creek and tidal marsh habitat and inhabiting species. Special care should be given to ensure newly placed soils do not erode into the Bay.

3. **Marsh and Upland Plant Protection During Construction.** The work authorized by this permit shall be performed in a manner that will prevent, avoid, or minimize to the extent feasible, any significant adverse impact on any tidal marsh, other sensitive wetland resources, and existing native upland vegetation. If any unforeseen adverse impacts occur to any such areas as a result of the activities authorized herein, the permittee shall restore the area to its previous condition, including returning the disturbed area to its original elevation and soil composition and, if the area does not revegetate to its former condition within one year, the permittee shall seed all disturbed areas with appropriate vegetation consistent with plans approved by or on behalf of the Commission. The permittee shall employ measures to minimize impacts to wetland areas, such as: (a) minimizing all traffic in marsh/mudflat areas; (b) ensure that any imported fill material, soil amendments, gravel, etc. placed within 12 inches of the ground surface shall be free of vegetation and plant material; (c) carefully remove, store, and replace wetland vegetation that has been removed or "peeled back" from construction areas as soon as possible following construction; and (d) reuse stockpiled soil, where appropriate, for re-establishment of disturbed project areas following construction.

4. **Worker Education Program.** All proposed project construction staff shall be trained by a qualified biologist in identifying special status species within the project area, their habitats, and avoidance and minimization measures prior to any work being performed. The training shall include information on the salt

marsh harvest mouse, California Ridgway's rail, other sensitive species in the area and sensitive habitats in accordance with the United States Fish and Wildlife Service's (USFWS) Biological Opinion (BO) dated January 15, 2016.

5. **Construction Staging**. Staging areas for construction shall be generally located within the designated areas shown on the plan titled, "Staging Area Map," prepared by the San Francisquito Creek Joint Powers Authority in the "*Draft Biological and Essential Fish Habitat Assessment for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project San Francisco Bay to Highway 101*" (November 2012; ICF International) and be in accordance with methods specified in the National Marine Fisheries Service (NMFS) Biological Opinion (BO) dated December 30, 2015, USFWS BO dated January 15, 2016, and the California Department of Fish and Wildlife (CDFW) Streambed Alteration Agreement (SAA) dated February 9, 2016. All work areas shall be appropriately screened and fenced and any on-land construction equipment shall be operated in a manner to ensure that impacts to public access areas and adjacent baylands are minimized.

6. **Removal of Temporary Fill.** All temporary fill (including cofferdams, construction equipment, diversion pipes, rock placed as energy dissipaters, and other necessary construction materials) placed within the Commission's jurisdiction during construction shall be removed no more than 30 days following the end of construction activities during each year of construction or if more time is needed, the permittee shall notify Commission staff in writing and substantiate the time period required and shall obtain staff approval.

7. **Debris Removal**. All construction operations shall be performed to prevent construction materials from falling into the Bay. In the event that such material escapes or is placed in an area subject to tidal action of the Bay, the permittee shall immediately retrieve and remove such material at their expense.

8. **Certification of Contractor Review.** Prior to commencing any grading, demolition, or construction, the general contractor or contractors in charge of that portion of the work shall submit written certification that s/he has reviewed and understands the requirements of the permit and the final BCDC-approved plans, particularly as they pertain to any public access or open space required herein, or environmentally sensitive areas.

C. **San Francisquito Creek Widening.** The permittee shall remove a maximum of a 3-feet thick layer of sediment along the creek edges and shall utilize equipment that minimizes impacts to the surrounding creek and marsh habitats. All material shall be disposed or placed at an appropriate location outside the Commission's jurisdiction.

1. **Dewatering Plan.** Prior to in-stream construction, the permittee shall submit for Commission review a Dewatering Plan that includes a Surface Water Diversion Plan and Groundwater Management Plan, best management practices to ensure that groundwater flows are appropriately pumped, contained, and meet applicable water quality objectives before discharging the flow back into the creek downstream of the cofferdam.

2. **In-Stream Construction.** The permittee shall install cofferdams during all work in tidal areas the creek. Discharge waters coming from the cofferdam bypass pipes shall not exceed particulate limits defined in the USFWS BO dated January 15, 2016 and the Water Board's WQC dated April 7, 2015.

3. **Water Quality Best Management Practices.** In order to minimize impacts to natural resources, the permittee shall implement the mitigation measures, best management practices and other conditions required in its approved WQC dated April 7, 2015 and shall be in compliance with the Statewide National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges of Stormwater Associated with Construction Activities, and an approved Storm Water Pollution Prevention Plan. Prior to beginning construction, the permittee shall obtain final written approval for the project construction from the Executive Officer of the Water Board and submit a copy of this approval to the Commission staff.

4. **Hazardous Material/Spill Prevention.** The permittee shall implement measures contained in an approved hazardous material/spill prevention plan. If hazardous materials are released into waters of the State during construction activities, the permittee shall implement clean up procedures identified in the approved plan and notify Commission staff within 48 hours.

D. **Marsh Restoration Work and Plans**

1. **Marsh Restoration Plan**. Within 90 days of issuance of this permit, the permittee shall work with the Commission staff and the Resource Agencies to finalize and submit the *Mitigation and Monitoring Plan* (MMP), including the marsh restoration and enhancement plan and program for review and approval by Commission staff. The MMP shall include, at a minimum, the following information:

a. **Site Conditions and Modifications.** A topographic map of the site in one-foot contours and a topographic map showing the proposed modifications. All elevations shall be relative to National Geodetic Vertical Datum (NGVD88).

   (1) Within San Francisquito Creek, the plan shall include typical cross-sections showing proposed final elevation of marsh plain and creek channel, and any high spots. The plans shall show: (a) figures for the ratios of typical horizontal to vertical slopes for existing and proposed marsh surface, channels, and sloughs; (b) proposed plant species along the cross-sections according to their expected zone of growth; (c) the elevation of adjacent surrounding levees; and (d) the estimated tidal range related to Mean Higher High Water, Mean High Water, Mean Lower Low Water, Mean Sea Level, the maximum predicted tide, and the 100-year tide.

   (2) Within and adjacent to Faber Tract Marsh, the plan shall include typical cross-sections showing proposed final elevation of marsh plain, transitional habitat along the levee toe, degraded levee (outer Faber Tract) and marsh mounds. The plans shall show: (a) figures for the ratios of typical horizontal to vertical slopes for existing and proposed transitional habitat adjacent to the levees, the degraded levee; (b) location of the marsh mounds; proposed plant species along the cross-sections according to their expected zone of growth; (c) the elevation of adjacent surrounding levees; and (d) the estimated tidal range related to Mean Higher High Water, Mean High Water, Mean Lower Low Water, Mean Sea Level, the maximum predicted tide, and the 100-year tide.

b. **Plantings and Revegetation Plan.** The plan shall maximize the use of native plants consistent with the adjacent baylands and high profile marsh vegetation; and shall utilize appropriate native mix erosion-control seed mixes where appropriate, such as levee slopes.

c. **Identification of a Suitable Reference Site.** The plan shall include appropriate, nearby reference sites for evaluating the progress of the restoration and enhancement site that shall be used as a comparison site in the monitoring program.

d. **Soil and Water Information.** The restoration program shall include a report identifying the type of soils found at the site and the soil type of any fill to be imported to the site, including all necessary sediment testing required under the Water Board's WQC. Information shall be provided on the quantitative soil measurements of salinity, pH, organic content, and bulk density. All imported soils must be within 10% of the range of values found at the

"reference marsh" for soil qualities such as grain size, organic content, salinity, and pH. Information shall also be provided on the water, including water analysis of salinity, pH, biochemical oxygen demand (BOD), dissolved oxygen (DO), and, if appropriate, heavy metals.

e. **Schedule.** The plan shall include a construction, planting and temporary fill removal schedule consistent with water quality and wildlife protections described herein.

f. **Invasive Species Control**. The plan shall include appropriate measures to prevent the spread of invasive plants. Undesirable exotic plant species such as pepperweed (*Lepidium latifolium*), *Spartina alterniflora*, broom, or star thistle shall be reasonably controlled (coverage of less than 5 percent of the expected zone of growth) during the first five years or until invasive plants are eliminated in 90% of the site.

2. **Monitoring**. Beginning February 1, 2018, and each February in years following, the permittee shall report to the Commission on the success of the project in restoring tidal marsh and transition zone habitats at the locations identified in the approved MMP. The monitoring period shall last for a minimum of five years, and continuing until those portions of the restoration site subject to tidal action meet the designated success criteria as specified in the MMP as compared with nearby reference marshes, or for up to ten years, whichever occurs first. Monitoring shall generally occur between September 1st and December 1st as specificied in the USFWS BO.

   The permittee shall submit annual reports and a final comprehensive report that includes the percentage of the site revegetated, plant survival rates, invasive species coverage, approximate percentage representation of different plant species, and a qualitative assessment of plant growth rates for the all tidal and creek restoration areas, including adjacent transition zone habitats.

   The permittee shall monitor the success of high tide refuge islands for a minimum of five years and generally in accordance with an MMP approved by or on behalf of the Commission.

   Should adverse conditions be identified during the five years of monitoring following construction, the permittee shall take corrective action, in a reasonable period of time, as specified by or on behalf of the Commission. Once corrective actions have occurred, the permittee shall commence additional monitoring as specified by the Commission to identify additional issues or find the project has met its success criteria.

3. **Restoration Plan Submittal and Review.** At least 60 days prior to the commencement of any work at any location pursuant to this authorization, the permittee shall submit the *Mitigation and Monitoring Plan* (MMP), which includes the marsh restoration and enhancement plan and program, to be approved by or on behalf of the Commission for the restoration and enhancement of areas within and along the San Francisquito Creek and adjacent to Faber Tract Marsh. The tidal marsh restoration and berm enhancement program shall consist of not less than 9.44 acres of restored habitat areas.
4. **Marsh Restoration Work.** Prior to the completion of all construction activities authorized herein, the permittee shall undertake all necessary grading, installation of temporary irrigation, planting of marsh plants and monitoring, generally in accordance with the final approved *Mitigation and Monitoring Plan* as approved by or on behalf of the Commission as described above.

E. **Minimize Impacts to Wildlife.** In order to minimize impacts to listed and special status species, the permittee shall, to the maximum extent feasible, take all precautions to avoid adverse impacts to the California Ridgeway's rail, California black rail, salt marsh harvest mouse, green sturgeon, longfin smelt, steelhead, and California red-legged frog and other species of concern that may occur in the project area. The permittee shall employ the conservation measures outlined in its permit application and subsequent submittals, and adhere to the avoidance and minimization measures identified in the CDFW SAA dated February 9, 2016, the conservation measures in the USFWS BO dated January 15, 2016, and the reasonable and prudent measures identified in the NMFS BO and Incidental Take Statement. All construction activities within San Francisquito Creek shall occur between June 15th through October 15th of any year and work outside the creek shall occur between May 1st and October 15th of any year, unless an extension of time is requested by the permittee in writing and is approved on behalf of the Commission.

1. **Biological Monitors.** The permittee shall employ a qualified biologist(s) to conduct onsite monitoring during construction activities for potential impacts to California red-legged frog, San Francisco garter snake, California Ridgway's rail, California black rail and salt marsh harvest mouse, special status plant species and their habitat.

2. The permittee shall be responsible for implementing the following minimization measures specific to species protection for work in and adjacent to Faber Tract Marsh:

   a. **California Ridgway's Rail:**

      (1) For any work performed during the Ridgway's rail breeding season (February 1st through August 31st), weekly call counts shall be conducted each year during the rail courting period;

      (2) Surveys shall be coordinated with the USFWS, but will generally follow the protocols outlined in the USFWS BO, dated January 15, 2016;

      (3) A 700-foot-wide buffer shall be maintained at active Ridgway's rail nest sites and be monitored by a qualified biologist; and

      (4) All activity near the buffer area shall be evaluated by the field biologist in an effort to eliminate any possible disturbance of adult or juvenile birds.

   b. **Salt Marsh Harvest Mouse:**

      (1) Installation of mouse exclusion fencing around the defined work area following any vegetation removal; and

      (2) Any work within 300 feet of tidal or pickleweed habitats shall have a biologist inspect the work area and adjacent habitats to determine if salt marsh harvest mice are present and the biologist shall remain on site to monitor during operations.

3. **Endangered Species Siting.** No work shall be performed if the qualified biologist determines that any California Ridgway's rail, California black rail, or salt marsh harvest mouse is within the work area. Any individual of these listed species that is found within the work area shall be allowed to leave the work area of its own volition.

4. **Work Limitation**. No work shall occur within 2 hours of extreme high tides (6.5 feet NAVD88 or above) within the habitats of the California Ridgway's rail, California black rail, and salt marsh harvest mouse habitat.

5. **Limits for Pesticide and Herbicide Use.** The permittee shall not utilize rodenticides or fumigants within 328 feet of suitable habitat for the salt marsh harvest mouse or California Ridgway's rail. All herbicides shall be in compliance with the State-certified applicators and under the direction of a licensed Pest Control Advisor. Only herbicides and surfactants approved for aquatic use shall be applied to the channel/creek banks and within 20 feet of any water present

on site. Aquatic herbicide use shall be limited to use from between **July 1st through October 15th** in accordance with the USFWS BO dated January 15, 2016 and the CDFW SAA dated February 9, 2016.

6. **Protection of Nesting Shorebirds.** Migratory bird nesting surveys shall be performed prior to any proposed project-related activities that may impact nesting migratory species (nesting season between January 15th and September 1st) in accordance with the USFWS BO and the CDFW SAA.

7. **Predator Control.** The permittee shall develop and implement a predator control program for controlling predators around and within the marsh and shall submit a copy of the plan to Commission staff for approval.

F. **Mitigation**. To mitigate for impacts to species and habitat, the permittee shall construct the following habitat features. These features shall be constructed as authorized in Section I-A herein and as depicted on final plans and specifications approved pursuant to Special Condition II-A, herein.

1. **High Tide Refuge Islands.** Within two years of project commencement, the permittee shall construct at least five high tide refuge islands.

2. **Steelhead Passage Features.** As part of the widening and restoration of San Francisquito Creek, the permittee shall construct steelhead high flow refugia features. These features shall be constructed concurrently with the creek restoration and not later than October 15, 2017. The steelhead high flow refugia shall be constructed with either quarry rock, tree rootwads or other inert material approved by or on behalf of the Commission.

3. **Tidal Marsh Restoration.** To mitigate for both the temporary impacts and permanent loss of marsh, the permittee shall restore a minimum of 3.44 acres of high marsh and high marsh transition habitats within the Commission's jurisdiction. The restoration work shall occur concurrently with the project to the maximum extent feasible and must be commenced by August 1, 2017 or a later date approved by Commission staff. By, August 31, 2016, the permittee shall submit plans for the preparation, planting, establishment care, and monitoring of these of tidal marsh restoration areas for review and approval by Commission staff.

4. **Faber Marsh Berm Enhancements**. By December 30, 2018, the permittee shall construct all berm enhancements in and around Faber Marsh, unless a later completion date is approved by Commission staff. By August 31, 2016, the permittee shall submit plans for the preparation, planting, establishment, care, and monitoring of Faber Marsh Berm Enhancements as described in the USFWS BO dated January 15, 2016.

G. **Public Access**

1. **Total Area.** The public access provided by this project shall total approximately 209,120 square feet (4.8 acres), of which approximately 47,500 square feet will be new public access added as part of this project to the currently existing public access, both inside and outside the Commission's jurisdiction, and shall be made available exclusively to the public for unrestricted public access for walking, bicycling, viewing, and related purposes. All public access improvements including, but not limited to, trail alignments (including configuration and dimensions), benches, overlook improvements, signage, railings, trash containers, fencing and interpretive exhibits shall be subject to final plan review approval pursuant to Special Condition II-A of this permit. On limited and rare occasions, if the permittee wishes to use the required public access areas for uses other than the uses described above, such as extended closures for levee maintenance or repair, the permittee must obtain written approval by or on behalf of the Commission at least 30 days prior to such use of the public access area.

2. **Public Access Improvements.** No later than six months after substantially completing levee realignments and improvements authorized herein, or by October 15, 2018, whichever is sooner, the permittee shall install the following public access improvements, as generally shown on Exhibit D, and make the improvements available exclusively to the public for unrestricted public access:

   a. **Improvements within the Commission's jurisdiction shall include:**

      (1) Remove approximately 700 linear feet of existing paved Bay Trail running along the existing SFC south levee and realign approximately 600 linear feet of the paved public access trail along the new realigned SFC south levee. The new trail shall be a minimum of 10 feet wide and may be up to 16 feet wide;

      (2) Construct an approximately 202-linear-foot, 10-foot-wide, wooden, pile-supported boardwalk across the newly widened San Francisquito Creek (from the realigned SFC south levee to Friendship Island), connecting sections of the Bay Trail on the north and south sides of the project area;

      (3) Install and maintain two approximately, 250-square-foot overlook areas (one on each end of the boardwalk connecting Friendship Island and the SFC south levee) with overlook improvements such as, bicycle pull-out spaces and benches, and install and maintain interpretive signage related to Faber Tract Marsh near the overlook areas;

(4) Place compacted aggregate (4-inch minimum depth), such as decomposed granite, on portions of the trail north of Friendship Bridge and near the O'Connor Pump Station.

b. **Improvements Within the Total Public Access Area**. Prior to the completion of the project authorized herein, the permittee shall install the following improvements, as generally shown on the attached Exhibit D:

(1) Approximately 2,500 linear feet of asphalt paved trail running from the new boardwalk connection on the SFC south levee top to the Geng Road access point. The trail shall be a minimum of 10 feet wide and may be up to 16 feet wide in some locations;

(2) Approximately 1,590 linear feet of compacted aggregate (4-inch minimum depth) trail running along the SFC south levee from about the Geng Road access point to the end of the project constructed trail, which connects to an existing 220-foot section of pavement near East Bayshore Road (on the SFC south levee near the East Bayshore Road access point). The trail shall be a minimum of 12 feet wide and may be up to 16 feet wide in some locations;

(3) Approximately 3,070 linear feet of compacted aggregate (4-inch minimum depth) trail, such as decomposed granite, along the top of the SFC north levee extending from the O'Connor Pump Station to East Bayshore Road. A small portion (1,450 linear feet) of the SFC north levee trail near Daphne Way will remain as the existing earthen trail. The trails must be a minimum of 12 feet wide and may be up to 16 feet wide in some locations;

(4) Install and maintain no fewer than seven BCDC public shoreline signs placed at approved locations. There shall be one sign located near each of the trail access points generally shown on Exhibit D, and one sign placed near the intersection of Geng Road and Embarcadero Road in the City of Palo Alto to direct public access users to the trail;

(5) Establish new formal access points for the trail by providing public access improvements at Verbena Drive, Daphne Way, and East Bayshore Road (on both the SFC north and SFC south levees) that shall include signage, and any other public access improvements needed to clearly identify the access points for the public and to prevent unauthorized use of the trail; and

(6) Install bollards and other public access improvement near the O'Connor Pump Station and Geng Road access points to prevent unauthorized vehicles from entering the public access area.

Such improvements shall be consistent with the plans approved pursuant to Condition II - A of this authorization and generally conform to the areas shown on Exhibit D of this authorization.

3. **Fencing Impacts on Public Access.** The permittee shall submit plans for all fencing proposed, including predator exclusion fencing, as part of the project, which shall undergo plan review per Special Condition II – A above. The permittee shall discuss design considerations (dimensions, height, fencing type, etc.) with staff during planning and gain staff approval through plan review prior to constructing any permanent fencing on the project site. The permittee shall utilize fencing materials that maximize views to the Bay and surroundings from the public access corridors to the maximum extent feasible.

4. **Temporary Closure of Public Access**. The permittee shall place appropriate signage on either side of construction areas, as needed, to alert the public of the work, advising caution and potential delays, indicating when public access areas may be closed, cleared, and re-opened, and indicating the location of alternative routes around the construction project to access the Bay Trail. The permittee shall provide alternative routes around construction zones when possible and ensure that appropriate signage and personnel are on-site to re-route the public around any portion of the public access areas that may be closed during construction activities.

5. **Reasonable Rules and Restrictions.** The permittee may impose reasonable rules and restrictions for the use of the public access areas to correct particular problems that may arise. Such limitations, rules, and restrictions shall have first been approved by or on behalf of the Commission upon a finding that the proposed rules will not significantly affect the public nature of the area, will not unduly interfere with reasonable public use of the public access areas, and will tend to correct a specific problem that the permittee have both identified and substantiated. Rules may include restricting hours of use and delineating appropriate behavior.

6. **Maintenance of Public Access Improvements**. The areas and improvements within the 209,120 square feet (4.8 acres) public access area described above shall be permanently maintained by and at the expense of the permittee or their assignees. Such maintenance shall include, but is not limited to: repairs to all path surfaces; replacement of any plant materials that die or become unkempt; repairs or replacement as needed of any public access amenities such as signs, benches, bollards, etc.; periodic cleanup of litter and other materials deposited within the access areas; removal of any encroachments into the public access areas; assurance that the public access signs remain in place and visible; and repairs to any public access areas or improvements that are damaged by future

subsidence or uneven settlement, or flooding, or inundation caused by sea level rise, including raising land elevations or redesigning public access features to protect and ensure the usability of the public access areas and improvements at all times. Within 30 days after notification by staff, or a longer period of time requested by the permittee and approved by Commission staff, the permittee shall correct any maintenance deficiency noted in a staff inspection of the site. The permittee shall obtain approval by or on behalf of the Commission of any maintenance that involves more than in-kind repair and replacement.

7. **Assignment.** The permittee shall transfer maintenance responsibility to a public agency or another party acceptable to the Commission at such time as the property transfers to a new party in interest but only provided that the transferee agrees in writing, acceptable to counsel for the Commission, to be bound by all terms and conditions of this permit.

H. **Riprap and Shoreline Protection**. Riprap placed within the project site shall be either quarry rock or specially cast or carefully selected concrete pieces free of reinforcing steel and other extraneous material and conforming to quality requirements for specific gravity, absorption, and durability specified by the California Department of Transportation or the U. S. Army Corps of Engineers. The material shall be generally spheroid-shaped. Use of dirt, small concrete rubble, concrete pieces with exposed rebar, large and odd shaped pieces of concrete, and asphalt concrete as riprap is prohibited.

1. **Placement.** Riprap material shall be placed so that a permanent shoreline with a minimum amount of fill is established by means of an engineered slope not steeper than two (horizontal) to one (vertical) unless slope is keyed at the toe. The slope shall be created by the placement of a filter layer protected by riprap material of sufficient size to withstand wind and wave generated forces at the site. Further, all rock-slope projections shall be in a manner that minimizes spaces between the rocks that may provide predator denning areas in accordance with the USFWS BO dated January 15, 2016.

2. **Design.** Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design of the shoreline protection improvement authorized herein.

3. **Maintenance.** The shoreline protection improvements authorized herein shall be regularly maintained by, and at the expense of the permittee(s), any assignee, or other successor in interest to the project. Maintenance shall include, but not be limited to, collecting any riprap materials that become dislodged and repositioning them in appropriate locations within the riprap covered areas, replacing in-kind riprap material that is lost, repairing the required filter fabric as

needed, and removing debris that collects on top of the riprap. Within 30 days after notification by the staff of the Commission, the permittee(s) or any successor or assignee shall correct any maintenance deficiency noted by the staff.

I. **Levee and Floodwall Maintenance Restrictions.** The levees and floodwall improvements authorized herein shall be regularly maintained by, and at the expense of the permittee(s), any assignee, or other successor in interest to the project. Maintenance shall include, but not be limited to, replacing in-kind material that is lost, repairing degraded portions of the levees and/or floodwalls as needed, and removing debris that collects on the levees and near floodwalls. Within 30 days after notification Commission staff, the permittee(s) or any successor or assignee shall correct any maintenance deficiency noted by the staff. Further maintenance limitations for all levees authorized herein include:

1. **Rodent control.** No rodenticides shall be used in areas within or adjacent to known and potential habitat for salt marsh harvest mouse and Ridgway's rail. In areas near suitable habitats for the salt marsh harvest mouse and Ridgway's rail, the permittee shall use only live traps to control rodents in compliance with the USFWS BO and CDFW SAA. In the event that a listed species becomes trapped, the appropriate Resource Agencies should be contacted for instructions regarding release or care for the animal.

2. **Levee mowing for Operations and Maintenance.** The grassland habitat along the San Francisquito Creek levee slopes up shall be mowed not more than three times per year to maintain acceptable roughness and prevent fire hazards. However, prior to mowing, the permittee shall conduct cutting of vegetation in accordance with USFWS BO dated January 15, 2016 and the CDFW SAA dated February 9, 2016.

3. **Transfer of Maintenance Responsibility**. Operation and maintenance, of the levees only, may be transferred to the Santa Clara Valley Water District Stream Maintenance Program (SMP) upon approval of the SMP by or on behalf of the Commission.

J. **Creosote Treated Wood**. No pilings or other wood structures that have been pressure treated with creosote shall be used in any area subject to tidal action in the Bay or any certain waterway, in any salt pond, or in any managed wetland within the Commission's jurisdiction as part of the project authorized herein.

III. Findings and Declarations

This authorization is given on the basis of the Commission's findings and declarations that the work authorized herein is consistent with the McAteer-Petris Act, the *San Francisco Bay Plan* (Bay Plan), the California Environmental Quality Act (CEQA), and the Commission's amended coastal zone management program for San Francisco Bay for the following reasons:

A. **Bay Fill.** The Commission may allow fill only when it meets the requirements identified in the McAteer-Petris Act Section 66605, which states, in part, that: "[(a)] the public benefits from fill in the Bay should be authorized when public benefits from fill clearly exceed public detriment from the loss of water areas, fill should be limited to water-oriented uses or minor fill for improving shoreline appearance and public access; (b) there is no alternative upland location; (c) the fill is the minimum amount necessary; (d) the fill is designed to minimize harmful effects to the Bay Area, including reducing impacts to water circulation, water quality, marshes and wildlife, and other conditions of the environment; (e) that the fill should be constructed in accordance with sound safety standards, which offer protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters; (f) authorized fill should establish a permanent shoreline; and (g) the fill should be authorized only when the applicant has valid title."

   The project would result in the net placement of approximately 24,000 square feet of new permanent fill in the Bay for a variety of uses, including those related to stabilization and protection of existing levees along the creek, construction of a floodwall (part of which is in the Commission's jurisdiction), construction of a new pile-supported boardwalk, replacement of utility lines, creation of high tide refugia islands in the Outer Faber Marsh, placement of in-stream fish high flow refugia structures (steelhead passage features), and protection of bridge footings/abutments located within the streambed. Solid fill placed on the outboard side of the SFC north levee in Outer Faber Tract would be primarily for the creation of high tide refugia (Exhibit D). Fill for public access within the Bay would include approximately 2,062 square feet of the fill for the new wooden, pile-supported boardwalk over newly created open-water area and tidal marsh terrace within the Commission's future Bay jurisdiction. The Commission's Bay and shoreline band jurisdictions will be expanded as a result of the project.

   Placement of temporary fill includes cofferdams, water diversion pipes, and energy dissipaters to dewater and divert stream flows from upstream during the in-channel construction period. Approximately 12,810 square feet of temporary fill, necessary for the construction of a temporary cofferdam and water diversion structure, would be placed within the creek. The cofferdam would consist of sheet piles driven approximately 20 feet deep into the channel. A 36-inch HDPE diversion pipe would

run along the surface of the Faber Tract Marsh (1,850 feet long, 1,940 cy of fill) temporarily covering about 5,550 square feet of the marsh. At the end of the diversion pipe, a rock energy dissipater would be constructed within the channel, resulting in approximately 540 cy of temporary solid fill (7,260 square feet). The pipes and the rock energy dissipater would be removed at the end of each construction, June through October, and stored outside BCDC's jurisdiction.

1. **Public Benefit**. The existing shoreline and creek consists of an undersized flood protection channel; flood protection levees in need of repair; and an existing marsh that lacks connection to the creek and has limited existing high tide refugia for certain species. In addition, levees on the north side of the creek are lower than the other side creating a greater flood risk for East Palo Alto, and an inadequate level of flood protection exists for the current and future conditions as evidenced by recent flood events. Currently, the lower portion of the creek is constrained, and partially filled with sediment, reducing flood capacity. Degrading the levee along the Outer Faber Marsh will reduce the constriction point near the Bay and reduce flood elevations further upstream during high flows.

   The Faber Tract Marsh is bordered on four sides by levees or earthen berms that restrict fluvial and tidal exchange of sediment into the marsh. The marsh has limited existing transition zones and high tide refugia, so the highest tides fully inundate the marsh. During high tides, wildlife, including two federally- and state-listed species, must move to the edges of the marsh where predation rates can be high. The fill placed within the marsh to create high tide refugia islands and along the edges to provide additional transitional space at the toe of the levee will provide much needed opportunities for species to reach higher elevations during high tides.

   The Commission finds that the public benefits associated with the fill placed within the Commission's jurisdiction to enhance existing levees and widen the creek to protect inland areas from flooding exceeds the public detriment from its placement. Additionally, the Commission finds that fill placed for high tide and transition zone habitats will provide a significant public benefit by supporting native Bay species, especially those with critical population issues associated with habitat loss.

2. **Water Oriented Use.** Within the Commission's jurisdiction, approximately 30,000 square feet of fill is proposed within the Commission's Bay and 100-foot shoreline band jurisdictions for the purpose of flood protection. While not explicitly described as a "water oriented use" by the McAteer-Petris Act, shoreline protection systems, have been authorized in numerous locations around the Bay by the Commission, and have been found to be a water-oriented

use. The Bay Plan has an entire section with findings and policies on Shoreline Projection in the Bay. Finding (b) of the Commission's Shoreline Protection policies recognizes that, "[m]ost structural shoreline protection projects involve some fill...." The primary purpose of much of the proposed project elements that include fill, is to provide upstream flood protection for residents within the City of East Palo Alto and to provide protection to property owners in the City of Palo Alto by reinforcing, realigning or enhancing existing levees.

The Commission finds that the fill associated with the project (riprap and earthen fill) protects residents against flooding and serves a water-oriented use similar to other shoreline protection systems approved by the Commission.

3. **Alternative Upland Location.** The flood control project is designed to protect residents in the floodplain from flooding. There is no alternative upland location for the fill proposed in the channel because shoreline protection features are necessary for the basic project purpose and need. In addition to flood protection, the project has other goals, including habitat enhancement, restoration, and creating upland refugia. Faber Tract Marsh would be subject to more frequent flooding events after the lowering of the levee between the San Francisquito Creek and the Outer Faber Marsh, and therefore, the proposed fill is necessary to provide higher elevation refugia for Ridgway's Rail and salt marsh harvest mice that live there.

   The Commission finds that there is no alternative upland location for the riprap and earthen fill needed to protect levees from erosion and protect residents from flooding. Additionally, the Commission finds that there is no alternative upland location for the earthen fill needed to provide high tide refugia, a necessary habitat feature for marsh dependent, special status species and to adapt to sea level rise.

4. **Minimum Amount Necessary**. The project will involve a net placement of approximately 24,000 square feet of new fill in the Commission's current and future Bay jurisdiction (Table 1). The permittee stated that this is the minimum amount of fill necessary to construct project elements and achieve the flood protection and habitat restoration goals of the project.

   Of the new Bay fill, approximately 18,240 square feet of solid fill, consisting of riprap and earthen fill, is necessary for protecting existing levees and reinforcing low sections of the outboard side of the SFC north levee; and protecting areas of Friendship Island from erosion. Due to the velocity of the water flowing through the channel during high flows, rock riprap is needed to maintain the levees in the channel as softer sediments would likely be washed out or eroded.

To connect the newly widened creek and the public access trails, approximately 2,060 square feet of the new pile-supported fill is needed to provide continuity along the trail. If this boardwalk is not provided, a gap would exist between the trail on the north and south sides of the creek.

As required by NMFS and CDFW, the project will also involve minor amounts of solid fill consisting of mainly rock (approximately 1,710 square feet) within the creek to create one of six high velocity refuge areas for migrating steelhead (five features are outside the Commission's jurisdiction). This refuge area would allow for individual steelhead and other fish species living within and traveling through the channel to have an area of respite. If the fish passage features were not created, steelhead migrating in the channel would not have the necessary quiet waters to rest and feed during migration, which could lead to the species abandoning this creek over time. Because these features are specifically designed for this purpose, the permittee has stated it is the minimum amount of fill necessary.

Additionally, approximately 1,250 square feet (110 cy) of the new fill will be for the creation of five high tide refugia islands in the Outer Faber Marsh. The permittee has stated that the fill is the minimum amount necessary to achieve the desired habitat features with minimal reduction in existing marsh habitat and to mitigate for temporary or permanent loss of high tide refuge areas resulting from the project. These features have been incorporated into the project as mitigation for habitat loss and species impacts and are required by the Resource Agencies.

The permittee will also be remove a minor amount of existing Bay fill (approximately 2,810 square feet) along the Outer Faber Marsh levee (Exhibit D) to restore the area to marsh plain elevation.

Because most of the fill placed as part of this project will be for shoreline protection, and minor amounts of fill is for public access along the shoreline and the creation of important habitat features for special status species, the Commission finds that this is the minimum amount of fill necessary to construct the project.

5. **Permanent Shoreline.** The fill placed along the levees as part of this project and within the Commission's Bay and shoreline band jurisdiction would bolster existing levees, increase channel flood capacity and protect the adjacent communities along the San Francisquito Creek from flood damage by protecting residents and the surrounding land from flooding that would occur during a 100-year storm event occurring at a time when the Bay experiences 26 inches of sea level rise in the future. In addition, the project would result in a net increase in

the Commission's Bay jurisdiction after the widening of the San Francisquito Creek is completed. The proposed design is anticipated to be a long-term solution that would establish a permanent shoreline until at least 2067. Beyond that date, project modifications and adaptations may be needed to further protect residents and adjacent properties from future conditions.

6. **Valid Title.** All work for the project, within BCDC's jurisdiction, would be conducted on property owned by the City of Palo Alto. The City of Palo Alto granted an easement for work on the proposed project to the Santa Clara Valley Water District, which is a member of the JPA.

For these reasons, the Commission finds that the fill placed during this project is the minimum amount necessary, has been designed and will be constructed to sounds safety standards, will establish a permanent shoreline and will minimize harmful impacts to the Bay Area.

B. **Natural Resources.** Within the Commission's jurisdiction, the project would impact approximately 2.19 acres of tidal marsh habitat and proposes to restore and enhance a total of 9.44 acres of tidal marsh, transition zone, and high tide refuge habitats. The project would: (1) widen the tidal creek by realigning an adjacent levee; (2) excavate upland habitat that has developed within the creek channel and restore tidal marsh along the edges of the channel; (3) fill small amounts of tidal marsh in the Faber Tract Marsh to create high tide refugia islands and enhance adjacent transitional areas to improve refuge habitat for the salt marsh harvest mouse and the Ridgway's Rail; (4) install fish velocity refuge features within creek using solid fill, such as large rock; and (5) place fill on the outboard side of the SFC north levee to reduce erosion of the levee toe during overtopping.

1. **Fish, Wildlife and Tidal Marsh Habitat.** The Bay Plan policies on Fish, Other Aquatic Organisms, and Wildlife state, in part, that "[t]o assure the benefits to fish, other aquatic organisms and wildlife for future generations... the Bay's tidal marshes, tidal flats, and subtidal habitat should be conserved, restored, and increased." Similarly, the Bay Plan policies on Tidal Marshes and Tidal flats state, in part, "[t]idal marshes and tidal flats should be conserved to the fullest possible extent. Filling, diking, and dredging projects that would substantially harm tidal marshes or tidal flats should be allowed only for purposes that provide substantial public benefits and only if there is no feasible alternative." These policies further state that any proposed projects in these areas, "[s]hould be thoroughly evaluated to determine the effect of the project on tidal marshes and tidal flats, and designed to minimize, and if feasible, avoid any harmful effects," and that "[p]rojects should be sited and designed to avoid, or if avoidance is

infeasible, minimize adverse impacts on any transition zone present...." The policies encourage that "shoreline projects should be designed to provide a transition zone between tidal and upland habitats."

Fish, Other Aquatic Organisms and Wildlife Policy 4 states that "[t]he Commission should consult with the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service whenever a proposed project may adversely affect an endangered or threatened plant, fish, other aquatic organisms or wildlife species...and give appropriate consideration of (their) recommendations in order to avoid possible adverse impacts of a proposed project on fish, other aquatic organisms and wildlife habitat."

Tidal Marsh Policy 6 states, in part, that, "[a]ny ecosystem restoration project should include clear and specific long-term and short-term biological and physical goals, and success criteria, and a monitoring program to assess the sustainability of the project. Design and evaluation of the project should include analysis of: (a) how the system's adaptive capacity can be enhanced so that it is resilient to sea level rise and climate change; (b) the impact of the project on the Bay's sediment budget; ...(e) potential invasive species introduction, spread, and their control; (f) rates of colonization by vegetation; (g) the expected use of the site by fish, wildlife and other aquatic organisms and wildlife; ... and (i) site characterization. If success criteria are not met, appropriate adaptive measures should be taken."

Finally, Fish, Other Aquatic Organisms and Wildlife Policy 5 states that "[t]he Commission may permit a minor amount of fill or dredging in wildlife refuges, shown on the Plan Maps, necessary to enhance fish, other aquatic organisms and wildlife habitat or to provide public facilities for wildlife observation, interpretation and education." Tidal Marsh Policy 8 further states that "[b]ased upon scientific ecological analysis and consultation with the relevant federal and state resource agencies, a minor amount of fill may be authorized to enhance or restore fish, other aquatic organisms or wildlife habitat if the Commission finds that no other method of enhancement or restoration except filling is feasible...."

To assess the impacts to habitats and species, the project underwent a California Environmental Quality Act (CEQA) review, as well as review by the State and Federal Resource Agencies, resulting in the issuance of two Biological Opinions and a Streambed Alteration Agreement from CDFW.

a. **Creek Alteration**. As proposed, the project would alter the existing tidal creek habitat within the Commission's Bay and shoreline band jurisdictions by widening areas to increase flood flows. In the process, both tidal and

riparian habitats would be affected through excavation of upland areas within the lower reach of the creek. The realignment of the channel would impact approximately 1.15 acres of tidal marsh habitat within BCDC's jurisdiction. The proposed excavation activities would remove approximately 1,470 cy of sediment within the channel and would temporarily impact 16,120 square feet of ruderal and high marsh habitat within the channel, but would restore elevations in the creek to approximately Mean Higher High Water (6.0-8.0 ft NAVD88, graded at approximately 30:1) and allow for passive revegetation of high marsh habitat along the channel edges. Additionally, transitional habitat would be constructed along the levee slopes within the Commission's jurisdiction. Post construction, the project would provide a total of 15.14 acres of tidal marsh and transition zone habitats over the full length of the lower reach of the creek, 1.74 acres of which are within the Commission's existing and future jurisdiction.

Once the creek is widened, it will include a low flow channel and a wider high flow channel, at appropriate elevations for normal and flood flows. The project will also create a new high tide marsh terrace area, between Friendship Island and the SFC south levee, within the widened creek, which would be planted with high marsh plants including alkali weed, saltgrass, alkali heath, marsh jaumea, and perennial pickleweed. The in-channel tidal marsh and transition zone habitats will improve habitat connectivity between the creek and surrounding baylands, enhancing ecosystem functionality.

Caltrans work upstream of the project site will widen the bridge over San Francisquito Creek, allowing additional flows into the project reach. This work could increase velocities within the channel and have the potential to impact steelhead. As discussed in more detail below, six "steelhead passage features" would be installed along the lower reach of San Francisquito Creek and consist mainly of rock and root wad materials. Of the six steelhead passage features, one high velocity refuge area would be located within the Commission's jurisdiction. This would provide desirable habitat features within the channel, which is expected to have long-term benefits for fish and wildlife species within the project area.

While the San Francisquito Creek could accommodate greater flood flows, the widened portion of the creek would not be expected to significantly impact the tidal hydrology and sediment movement within the Bay and would reduce upstream flood elevations.

Between June 15th through October 15th, in 2016 and 2017, the project would have temporary impacts to the channel and tidal hydrology during the in-stream construction window. During this period, temporary fill for construction, including placement of two cofferdams, one at the Bayward end of the channel and one upstream of the Commission's jurisdiction, would be necessary to dewater the creek and perform work. The construction would also require temporary use of a 36-inch HDPE water diversion pipe that would be routed along the outboard bank of the Faber Tract marsh levee to an energy dissipater (consisting mostly of rock) just downstream from the cofferdam. The energy dissipater would help prevent the erosion of channel banks due to outflow from the diversion pipe.

The project will have both temporary and permanent impacts on in-stream tidal marsh and transition zone habitats. Special Conditions II-B-1 through II-B-8 and Special Condition II-E have been included herein to ensure that the project utilizes best management practices during construction to minimize impacts to these habitat areas. Some minor amounts of temporary fill are required during construction, but Special Condition II-B-6 ensures that the permittee will remove all temporary fill and Special Condition II-B-3 ensures these impacted areas will be restored through either passive or active revegetation. Minor amounts of permanent fill are necessary to create habitat features for steelhead. The project will also create new tidal marsh within the creek, restore tidal marsh along the edges of the creek, and restore areas temporarily impacted by the project that are within the Commission's current and future jurisdictions. Special Condition II-F has been included herein to ensure that these habitat features are built in a reasonable amount of time after the in-stream construction on the project is complete. The project will result in the restoration of more tidal marsh and transition zone habitats within the creek than the amount of habitat impacted by the project.

The Commission finds that the project, in implementing best management practices and restoring affected habitat within the creek, has been designed and conditioned herein to minimize harmful impacts resulting from fill placement.

b. **Faber Tract Marsh.** The Faber Tract Marsh is a 95-acre tidal salt marsh situated along the north side of San Francisquito Creek, and supports one of the largest populations of California Ridgway's rail in the region. It is also part of the USFWS' designated Central/South San Francisco Bay Recovery Unit for the California Ridgway's rail, and therefore is considered an important and sensitive area. It also supports a significant population of salt marsh harvest

mouse, black rails and other marsh dependent species. Currently, Faber Tract Marsh contains little elevation diversity and is primarily tidal salt marsh with a few salt pannes.

To restore flood protection along the creek and protect species living in Faber Tract Marsh, low spots on the SFC north levee adjacent to the marsh would be repaired. In reinforcing the SFC north levee, the toe of the levee would be widened into the marsh to create a new gentler slope at a 6H:1V ratio to reduce erosion of the levee and adjacent marsh during levee overtopping. The widening of the toe of the levee would provide transitional habitat between the marsh and levee, thereby providing an ecosystem enhancement that will support mid and high marsh habitats. The project would also degrade an unmaintained levee between San Francisquito Creek and Outer Faber Marsh (final elevation would be 8 feet NAVD88) to allow floodwater to flow into the marsh, near the mouth of the creek, to further reduce upstream flood elevations and provide greater habitat connectivity. The proposed project would impact approximately 1.04 acres of tidal marsh habitats within Faber Tract Marsh.

As part of the mitigation package proposed by the permittee, and agreed to by the Resource Agencies, the project would restore and create approximately 1.7 acres of tidal marsh and high marsh transition habitats within and around Faber Tract Marsh. The project would include the creation of up to five marsh mounds in the Outer Faber Tract to provide high tide refugia for special status species. These mounds would provide relief from high tides and increased inundation due to flooding and sea level rise over time. The marsh mounds would require approximately 1,250 square feet of total fill (0.006 acres footprint for each of the five islands) and be constructed using imported fill material free from vegetation or plant material. The constructed elevation of the refugia islands would be approximately 8.8 feet (NAVD88) and would be planted with high profile marsh vegetation that would allow California Ridgway's rails and salt marsh harvest mice to escape current king tides. The islands are anticipated to settle to a final elevation of about 8.4 feet (NAVD88) at five years post construction. The proposed fill volume for each island is similar to volumes that the Commission approved for the California State Coastal Conservancy to build high tide refugia habitat in other marsh locations around San Francisco Bay (BCDC Permit No. M2014.025.00) and was considered a minor amount of fill for habitat purposes.

Additionally, the permittee would provide approximately 6.0 acres of berm enhancements and revegetation of the levees surrounding Faber Tract Marsh (levees to the north, south and east of the marsh) to further provide high tide refuge areas for California Ridgway's rail and salt marsh harvest mouse. Berm enhancements would include removal of invasive species, planting of high marsh and transitional upland habitat necessary for these species, and monitoring of the revegetation efforts along these levees, as discussed below.

The levees surrounding Faber Tract Marsh and the high tide refugia islands would be planted with high marsh and transitional vegetation consistent with the levee locations and adjacent baylands. Planting vegetation is an important aspect of the project because the levees and boardwalks around the project site provide potential access for mammalian predators of the California Ridgway's rail and the salt marsh harvest mouse. Additionally, utility transmission towers and lines located within and adjacent to the marsh provide artificial perches and nesting platforms for raptors and other avian predators that may prey upon the Ridgway's rail and salt marsh harvest mouse. Predation rates are known to increase during extreme high tide events when appropriate cover is not available. The vegetation will provide an additional protective measure for these species during high tide. Together, this portion of the project would enhance approximately 7.7 acres of high marsh, transitional and high tide refugia habitats in and around Faber Tract Marsh.

Special Conditions II-B and II-C have been added herein to minimize the impacts of the project on tidal marsh habitats within and around Faber Tract Marsh. Additionally, Special Condition II-F has been added herein to ensure that habitat restoration/enhancements occur in a reasonable amount of time and within the construction period of the project. Special Condition II-D ensures that the permittee will monitor the success of the restoration efforts within the marsh. Special Conditions II-E-4 and II-E-7 have been added herein to further require protection of special status species from predation that may occur during high tides while the restoration of the high tide refuge habitat areas is underway.

Therefore, the Commission finds that the project as designed and conditioned herein will minimize impacts to Faber Tract Marsh and where impacts are unavoidable, the permittee will mitigate for the impacts through habitat restoration and will be responsible for monitoring the success of the restoration efforts.

c. **Wildlife.** Within the full project area, there are several state- and federally-listed species, or species of special concern that could be affected by the project, including Central California Coast steelhead, longfin smelt, California red-legged frog, green sturgeon, western snowy plover, black rail, salt marsh harvest mouse, California Ridgway's rail, San Francisco garter snake, California least tern, white-tailed kite, western pond turtle, western burrowing owl, northern harrier, San Francisco common yellowthroat, and Alameda song sparrow; other native and non-native fish species, and nesting birds. Within the Commission's jurisdiction, the species of concern excludes the fresh water species, such as the pond turtle and red-legged frog.

On December 30, 2015, NMFS issued a BO that determined that the proposed project is "not likely to jeopardize the continued existence of the threatened [Central California Coast] CCC steelhead (*Oncorhynchus mykiss*) or southern distinct population of green sturgeon, nor is it likely to adversely modify their critical habitat." However, NMFS determined that incidental take of CCC steelhead would occur during project construction, as juvenile steelhead are likely to be present during the dewatering of the site for construction. NMFS provided reasonable and prudent measures and conditions to minimize impacts to steelhead in the channel, which included measures to reduce harm during dewatering of the channel; monitoring and reporting of steelhead "take" during construction activities; building steelhead habitat complexity features (steelhead passage features) such as rock weirs or debris jams that offer refuge during future flood flows; and performing annual inspections of fish habitat features. Additionally, NMFS concluded that the proposed project "would adversely affect EFH [Essential Fish Habitat] for species managed within the Pacific Coast Groundfish and Coastal Pelagic Species Fishery Management Plans," specifically impacting Pacific Groundfish and Coastal Pelagic species that use the creek and adjacent subtidal areas. NMFS found that prey items within the project area for these coastal pelagic and groundfish species would likely take at least one year to re-establish in the area after construction activities have finished. NMFS provided conservation recommendations in the BO, which would avoid, minimize, or otherwise offset potential adverse effects on EFH. NMFS recommend in-kind compensatory mitigation at a ratio of 1:1 on-site or at a ratio of 3:1 if off-site to compensate for temporal impacts to EFH over an estimated 6.9 acres of channel habitat resulting from all construction activities during the proposed project. However, the permittee provided NMFS with further information describing how the project as designed will offset temporary impacts to EFH, and on February 4, 2016 NMFS agreed with the permittee's justification.

The USFWS issued a BO on January 15, 2016 and found that, while the project will occur in an area thought to be habitat for a number of federally-listed species, the project was "not likely to adversely" affect these species because many of the species have not been found in or around the project site or will not occur in this area during construction activities. In the BO, USFWS did provide general conservation measures for protected species in the project area, including general site construction, water quality measures, use of pesticides, limits on operation and maintenance of levees, and vegetation management.

The USFWS determined the project as proposed would result in potential impacts to the Ridgway's rail and salt marsh harvest mouse in the form of increased likelihood of predation from increased habitat inundation in Outer Faber Marsh and removal of the upland refugia along the Outer Faber levee. During the consultation phase, the permittee and the USFWS entered into discussions to reduce impacts to listed species, particularly in regards to the marsh habitat in Faber Tract Marsh. In the BO, the USFWS provided conservation measures specific to Ridgway's rail and salt marsh harvest mouse, which it determined when implemented would ensure that the proposed project would not be likely to jeopardize the continued existence of these species. The project would minimize impacts to these species through implementation of the conservation measures related to predator management, vegetation removal, creation and restoration of high tide refuge, and other measures. The BO also requires conditions related to construction of specific habitat features, and monitoring of these features.

The CDFW issued a Streambed Alteration Agreement (SAA) on February 9, 2016, in which CDFW determined that the proposed project "could substantially adversely affect existing fish or wildlife resources." CDFW prepared the SAA for the project, which includes measures to protect fish and wildlife species within the project area. Without implementation of protection measures identified in the SAA, CDFW believes that the project would result in permanent loss of natural bed or bank; channel profile widening; loss of bank stability during construction; increased bank erosion; accelerated channel scour; increased turbidity; changes in pH; short-term release of contaminants; short-term changes in dissolved oxygen, water temperature, and stream flow; dryback of stream channels; permanent loss of wetland vegetation; permanent decline in vegetative diversity; colonization by exotic plant species; change in stream flow; temporary impacts to stream due to dewatering activities; direct take of aquatic species from pumps; construction of trenches that can capture terrestrial and semi-aquatic organisms; temporary loss of wildlife connectivity to water source;

temporary loss of terrestrial animal species' travel routes due to construction; disturbance or mortality of terrestrial, aquatic, and semi-aquatic fish and wildlife species; and disturbance to nesting birds. However, the SAA includes avoidance and minimization measures to reduce impacts to state-listed species by requiring a number of construction best management practices, on site monitoring by a CDFW approved biologist, and a number of other minimization measures. Additionally, the SAA also requires mitigation for both temporary and permanent impacts to habitat as a result of the project. The SAA also includes a requirement for a finalized, approved MMP for all habitat mitigation work (habitat restoration, enhancement and creation).

Special Condition II-E has been added herein to ensure that the project is in compliance with the NMFS BO, USFWS BO, and CDFW SAA regarding special status species living within tidal marsh habitats. Special Condition II-D requires the submittal of a final Mitigation and Monitoring Plan and approval by or on behalf of the Commission. It also ensures that the MMP will be consistent with monitoring required by the Resource Agencies and will provide long-term monitoring of all habitat restoration elements authorized herein and assess whether the restoration sites have met the required success criteria.

The Commission finds that the fill placed as part of this project provides substantial public benefits by protecting the surrounding areas from flooding and that the project as designed and conditioned herein will minimize impacts to Bay species and tidal marsh habitats, within San Francisquito Creek and Faber Tract Marsh.

C. **Water Quality.** The Bay Plan policies on Water Quality state, in part that "Bay water pollution should be prevented to the greatest extent feasible. The Bay's tidal marshes, tidal flats, and water surface area and volume should be conserved and, whenever possible, restored and increased to protect and improve water quality." They further state that "the Commission should consider the recommendations, decisions, and advice and authority of ...the Regional Board," and that the Board's recommendations and decisions should be the basis for carrying out the Commission's water quality responsibilities. The policies also state that "New projects should be sited, designed, constructed and maintained to prevent or, if prevention is infeasible, to minimize the discharge of pollutants into the Bay...."

The project includes grading and the excavation of upland sediments within the channel to enhance flood capacity, restore marsh elevations and habitat functionality and connectivity in and around the project site. Through restoration and expansion of the lower reach of San Francisquito Creek, the project would result in a net increase in the surface area and volume of the Commission's Bay jurisdiction

and improve the quality of tidal marsh habitat. The proposed project includes enhancement of local ecosystems, and an enlarged Bay/creek interface, which will improve the passage for steelhead migrating from the Bay into the creek and upper watershed.

As is typical of construction projects, potential sources of water pollution include the use of small amounts of hazardous materials such as fuels, oils, concrete and asphalt in the construction of the proposed project elements. The permittee has stated that they would work with the selected construction contractor to prepare a Storm Water Pollution Prevention Plan (SWPPP) and would provide it to the Commission when available. This plan would include construction best management practices to minimize construction related discharges into the creek, including construction debris, no use of chemically-treated wood in the channel, minimizing disturbance and removal of vegetation, and minimizing disturbance to the creek where possible.

Adjacent to the project site, a former landfill is located near the Palo Alto Baylands Athletic Center. In addition, a few underground storage tanks that may have contained petroleum hydrocarbons are located along the creek. Currently, an automotive repair business is located along the left bank of the creek. The Final EIR found that the project is not likely to encounter any of the above-mentioned potential sources of contamination because they are located outside of the construction footprint and therefore, the project would not result in soil and groundwater contamination.

On April 7, 2015, the Water Board issued a conditional Water Quality Certification (WQC) for the project. The WQC requires the permittee to provide a revised dewatering plan to address both surface water and groundwater management to ensure the proposed discharges would meet applicable water quality objectives and to further reduce potential for pollutants to enter the Bay. In addition, it requires the permittee to test any imported soil that would be placed below top of bank, on levees and at any other locations where it has the potential to discharge to the creek or other waters of the State to ensure it does not have elevated levels of contaminants.

Regarding the discharge of storm waters through the channel, the permittee is required to obtain coverage under the NPDES General Permit for the Discharges of Stormwater Associated with Construction Activity (Water Board Order No. DWQ-2009-0009 as amended by Orders Nos. 2010-0014-DWQ and 2012-006-DWQ).

To ensure potential water quality impacts are minimized, Special Conditions II-C-2 through II-C-4 and II-J herein require that the permittee comply with the Water Quality Certification issued by the Water Board. Additionally, Special Condition II-B-1 ensures that soils brought on site will not have elevated levels of contaminants, and

that the permittee tests the soils proposed for use on site. Special Condition II-C-1 requires the permittee to submit an updated dewatering plan to the Commission for review prior to initiating construction activities.

The project will result in the restoration of tidal marsh and transition zone habitats and will increase the Bay's water surface area as a result of widening the creek. Further, the permittee will take measures to ensure hazardous materials are properly contained, and that soils brought on site will be free from contaminants. Therefore, the Commission finds that the project as designed and conditioned herein will prevent pollution to the greatest extent feasible and that the Bay's water quality will be maintained.

D. **Mitigation**. The Bay Plan policies on mitigation state that "[p]rojects should be designed to avoid adverse environmental impacts to Bay natural resources....Whenever adverse impacts cannot be avoided, they should be minimized to the greatest extent practicable... and when unavoidable adverse impacts occur, mitigation should be required." The mitigation policies also state, in part, that "Individual compensatory mitigation projects should be sited and designed within a Bay-wide ecological context, as close to the impact site as practicable to: (1) compensate for the adverse impacts; (2) ensure a high likelihood of long-term ecological success; and (3) support the improved health of the Bay ecological system...." Additionally, these policies state, "[t]he amount and type of compensatory mitigation should be determined for each mitigation project based on a clearly identified rationale and analysis of a number of metrics. Further, the mitigation should, be provided prior to, or concurrently with the occurrence of project impacts." The Commission's policies allow for compensatory mitigation when necessary, as part of a mitigation program and further describe the components of a proposed mitigation and monitoring plan necessary to ensure success.

The permittee describes the project's impacts within the Commission's jurisdictions as occurring in tidal portions of San Francisquito Creek and Faber Tract Marsh and seeks to mitigate for these impacts through a combination of habitat enhancements and restoration. As proposed, the project would impact a total of 2.19 acres of existing habitats, including: 1.15 acres of tidal marsh habitat impacts from the excavation of sediment and vegetation within the creek, and approximately 1.04 acres of both temporary and permanent impacts to tidal marsh within Faber Tract Marsh during the creation of the wider levee toe slope on the SFC north levee and within the marsh. In impacting these habitats, wildlife species that are dependent on these habitats are also impacted as described in the fish and wildlife section above.

1. **Proposed Mitigation**. Mitigation for these impacts is both proposed by the permittee in the draft *Mitigation and Monitoring Plan* (December 2015) (MMP) and required by the Resource Agencies and the Water Board. To compensate for the impacts to the tidal creek and in Faber Tract Marsh, the permittee has proposed to create 1.68 acres of new marsh habitat within the Commission's jurisdiction and restore 1.76 acres of tidal marsh habitat: for a total of 3.44 acres of tidal marsh and transition zone habitat restoration. In widening the creek, the project will provide a low flow channel with adjacent marsh plain benches that can accommodate flood flows, much like a natural creek would. This would improve the existing habitat and increase available low, medium and high marsh within the channel. This proposal is consistent with the requirements of the Water Board, USFWS and CDFW for mitigation of impacts to this portion of the project and is also subject to final approval and agreement by BCDC and these agencies.

   NMFS, CDFW, and the Water Board identified potential impacts to native steelhead that migrate up San Francisquito Creek annually to spawning grounds higher in the watershed. These agencies found that increased water flow and reduced resting areas (high flow refugia) could impact this listed species as well as other native species that use the creek. To mitigate for this impact, the project includes the placement of high velocity refuge areas (steelhead passage features) within the creek, using large rock and root wads to create areas of calm water for resting and foraging fish. Of these, one is located within the Commission's jurisdiction. Additionally, the project would include the restoration (active and passive re-establishment) of about 1.74 acres of tidal marsh habitats within the creek, within BCDC's jurisdiction, to support fish and other wildlife utilizing the creek and adjacent habitats. The in-stream restoration work would be performed at a 1:1 ratio for temporary project impacts, and a 2:1 ratio for permanent habitat loss/impacts, as agreed upon by CDFW and the Water Board. Additionally, NMFS had originally recommended mitigation for in-stream impacts to Essential Fish Habitat, but the permittee provided NMFS with further information describing how the project as designed will offset temporary impacts to EFH, and NMFS agreed with the permittee's justification.

   To additionally compensate for the impacts of the project on Faber Tract Marsh, the permittee proposed to provide habitat enhancements within the Faber Tract Marsh, with which the USFWS, CDFW and Water Board have agreed. These enhancements include: construction of up to five high tide refugia islands; enhancing approximately 6.0 acres of transition zone and high tide refugia habitat along the levees surrounding the marsh; removal of invasive species along the levees; and planting native mid and high marsh species on the high tide refugia islands and degraded levees. Together, all habitat creation,

restoration and enhancement features provide 21.17 acres of enhanced marsh habitat, transition zone, and high tide refuge habitats, of which 9.44 acres would be within the Commission's jurisdiction. These habitat improvements would likely result in increased species survival during marsh inundation as a result of increased vegetative coverage in the refuge areas, which would reduce chances of predation.

In reviewing the Water Board's mitigation requirements, they appear to be consistent with the proposed mitigation package required by other agencies and for the project areas within the Commission's jurisdiction. However, the Water Board included a condition that increases mitigation requirements if the initially required mitigation is not completed within 12 months time of when the associated impact first occurred. If mitigation construction does not occur within a year of the impacts, then the permittee would be responsible for an additional ten percent mitigation per year, as appropriate, on or adjacent to the project site, for the portion of the mitigation not completed within 12 months of the impact occurrence. Further, if on site mitigation is not available, the Water Board has required mitigation at an alternate site at higher ratios than currently proposed.

The project will have both temporary and permanent impacts on 2.19 acres of tidal marsh and high marsh transition habitats within the Commission's jurisdiction as a result of construction activities during the project and will improve a total of 9.44 acres of habitat around the project site, of which 3.44 acres will be tidal marsh and transition habitats. The Commission finds that the project as designed and conditioned herein will minimize impacts to tidal marsh areas, and where impacts are unavoidable, the permittee has proposed habitat improvements that constitute in-kind mitigation at a greater than 1:1 ratio within the Commission's jurisdiction. Additionally, the permittee will construct steelhead passage features along the creek to mitigate for impacts to steelhead trout resulting from increased flows that may occur as a result of the project. Special Conditions II-F-1 through II-F-4 have been included herein to ensure that the habitat improvements occur in a timely manner during construction of the project. The Commission finds that the permittee has proposed sufficient amounts of in-kind and out-of-kind mitigation to mitigate for the temporary and permanent impacts of the project.

2. **Monitoring.** The permittee submitted a draft *Mitigation and Monitoring Plan* (December 2015) and a draft *High Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015), which identify several elements that will be monitored for successful habitat restoration and enhancement. The permittee is proposing annual monitoring of restoration areas over at least a five-year period,

which will be overseen and conducted by a qualified biologist. The permittee is proposing to continue monitoring until defined and agreed upon success criteria are met. The permittee is proposing that target success criteria for the channel be set at 60% restored vegetative cover, which the permittee believes is reasonable given that the project site is in a tidal channel that experiences both erosional and depositional forces.

Monitoring of the marsh berm enhancements and tidal marsh restoration efforts within Faber Tract would proceed once construction is complete and continue over five years, or until the success criteria have been met. The permittee is proposing 60% vegetative cover as target success criteria with no more than 5% invasive species. For the high tide refuge islands, the permittee is proposing success criteria of 70% vegetative cover with no more than 5% invasive species. In the past, the Commission has required 90% vegetative cover as the success criteria for similar projects. The *Monitoring and Management Plan* is currently in a draft form. The Commission staff will continue to work with the permittee to reach agreement on required elements and success criteria of the monitoring program, prior to approval of the plan.

Special Conditions II-D-1 through II-D-7 require the permittee to submit a mitigation and monitoring plan and gain final approval from Commission staff regarding the monitoring of habitat restoration efforts and improvements. This special condition also ensures that discussions between the permittee and Commission staff continue regarding the appropriate success criteria for these habitat improvements and the appropriate monitoring timeline until an agreement is reached. The Commission finds that the project as conditioned herein will provide appropriate monitoring, approved by Commission staff, for the habitat improvements authorized and required herein. The permittee is required by Special Condition II-D-2 herein to submit annual reports on the restoration progress and consult with staff in the event that restoration success criteria are not achieved after the first five years of monitoring.

The Commission finds that the Special Conditions added herein minimize impacts to natural resources within the Commission's jurisdiction, and where impacts to natural resources are unavoidable, the Commission finds that the permittee will provide appropriate mitigation for the impacts. Further, the Commission finds the program for monitoring the restoration and habitat enhancements is generally consistent with the *Bay Plan* monitoring requirements, but is subject to further refinement and approval by Commission staff in the future.

E. **Public Access and Scenic Views.** The McAteer-Petris Act and the Bay Plan policies require that projects provide the maximum feasible public access consistent with the project, that proposed public access be compatible with wildlife, that projects be designed to preserve views to the Bay, and that any public access provided as part of the project remain viable as sea level rises.

1. **Maximum Feasible Public Access.** Section 66602 of the McAteer-Petris Act states that, "...water-oriented land uses along the bay shoreline are essential to the public welfare of the bay area...that existing public access to the shoreline and waters of the San Francisco Bay is inadequate and that maximum feasible public access consistent with a proposed project, should be provided." The Bay Plan Public Access Policy 1 states, "[a] proposed fill project should increase public access to the Bay to the maximum extent feasible...."

   In the project vicinity, the Bay Trail runs along Geng Road from Embarcadero Road to San Francisquito Creek (Exhibit D), continues along the southern bank of the project site to Friendship Bridge, and then north along the levee adjacent to East Palo Alto residences and the Palo Alto Baylands Nature Preserve. There are three existing access points to the Bay Trail located at: (1) Geng Road; (2) the Lucy Evans trail east of the Palo Alto Airport in Palo Alto; and (3) the O'Connor Pump Station via Friendship Bridge in East Palo Alto. Additionally, there are three other informal access points along the levees that are currently used by the public and generally located near (1) Verbena Drive, (2) Daphne Way, and (3) East Bayshore Road on the SFC south levee.

   The permittee will construct and enhance a number of new public access features both within and outside the Commission's jurisdiction, including newly, realigned levees trails, new boardwalk spanning the widened section of the creek, interpretive signage related to Faber Tract Marsh, and two new overlook areas for the public to sit and view San Francisquito Creek and the Bay.

   Within the Commission's jurisdiction, the permittee will realign the SFC south levee and widen the creek. As a result, an approximately one-mile stretch of Bay Trail will be realigned and paved consistent with the existing trail in this area. The new boardwalk constructed in the Commission's jurisdiction would match the design of Friendship Bridge in accordance with the Bay Trail Design Guidelines. The boardwalk will include two viewing platforms, one on each end of the boardwalk, with interpretive signage and also include benches, and other public access amenities.

From May through October in 2016 and 2017, the portion of the Bay Trail portion located along the crown of levee between the golf course and San Francisquito Creek will be temporarily closed. After construction is complete, all recreational facilities will be available for full use by the public.

Because opportunities to increase public access within the project site are limited, the permittee will provide additional public access and recreational opportunities, and improvements outside of BCDC's jurisdiction (Exhibit D). These include: (a) widening sections of trail from 10 feet to 12-16 feet and placing an aggregate base along the trail to improve the trail surface along the SFC north levee, (b) providing an additional trail access point located at East Bayshore Road on the SFC north levee; (c) paving and improving sections of trail along the SFC south levee; and (d) further improving all access points by formalizing trail connections through the use of gate improvements, signage, and other public access amenities. Bollards and gates improvements at the access points would also serve to limit unauthorized recreational motor vehicle access to the trails, and protect pedestrians, bicyclists, and wildlife.

Special Conditions II-G-1 through II-G-7 have been included herein to ensure that the permittee will obtain final approval for all public access plans, construct the public access according to the submitted plans and maintain public access over time. The Commission finds that the public access improvements required herein will improve current public access trails, provide more formal access to the trails around San Francisquito Creek and will provide the maximum feasible public access consistent with the project.

2. **Minimize Impacts to Wildlife.** The Bay Plan Public Access policy 2 states, in part that "...public access to the Bay...should be provided in and through every new development in the Bay or on the shoreline...except in cases where public access would be clearly inconsistent with the project because of public safety considerations or significant use conflicts, including unavoidable, significant adverse effect on Bay natural resources. In these cases, in lieu access at another location preferably near the project should be provided." Additionally, Public Access policy 3 states in part, "...projects in [natural areas with sensitive wildlife] should be carefully evaluated in consultation with appropriate agencies to determine the appropriate location and type of access to be provided." Public Access policy 4 states, in part, that "[p]ublic access should be sited, designed and managed to prevent significant adverse effects on wildlife...."

   Through its BO, the USFWS excluded the use of the levees along the north, south and eastern side of Faber Tract Marsh for public access in order to protect listed species and their habitat. Limiting public access on top of these levees is protective of the state- and federally-listed Ridgway's rail and salt marsh harvest

mouse found in and around Faber Tract Marsh. To further protect these and other species and in response to USFWS requirements, the permittee proposes to install a predator exclusion fence along the SFC north levee near the connection point to the Bay Trail and Friendship Bridge (Exhibit B). This fencing is intended to keep out mammalian predators and prevent humans from entering the area. The design of this fence is still in review, and staff will work with the permittee to authorize a fence that both reduces predator access and does not unnecessarily block views to the Bay. Special Condition II-G-3 included herein ensures that the permittee will continue to work with Commission staff to determine appropriate heights and materials that will minimize impacts to wildlife and maximize views of the Bay and Faber Tract Marsh.

3. **Viable Public Access and Maintenance.** Bay Plan policies on public access state that "[p]ublic access should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding." The project would provide public access along the crown of the levees on either side of the San Francisquito Creek. Bay Plan Public Access policy 6 states, "[w]henever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed...any public access provided as a condition of development should either be required to remain viable in the event of future sea level rise or flooding, or equivalent access consistent with the project should be provided nearby."

   The public access proposed by the permittee is located primarily on levee tops, on and adjacent to a bridge crossing the creek, and a boardwalk over newly created marsh (Exhibit D). The flood protection levees and bridge are designed to the 100-year flood level, with a 100-year tide and sea level rise (26 inches) for the life of the project (2060). Beyond 2060, the permittee has stated that earthen levees included in the project have the potential to be raised further by adding earthen baskets or additional floodwalls of synthetic piling and that existing steel sheet pile floodwalls could be raised by welding additional steel sheets to the existing structure. The permittee used the Our Coast Our Future (OCOF) projections (Exhibit M) to illustrate that even with about five feet of sea level rise at 2100, which is the best available data at this time, flooding would likely occur within the Faber Tract Marsh and the golf course to the north and south of the creek, but that the levees are mostly not overtopped based upon the current design. Therefore, the public access would remain viable through the life of the project.

The Commission finds that the public access provided by the project as designed and conditioned herein will provide the maximum feasible public access, protect adjacent wildlife refuge areas and species within those areas, and remain viable over the life of the project.

F. **Bay Plan Priority Use Areas.** Portions of the project are located within two priority use areas designated in the Bay Plan as shown in Bay Plan Map 7: the northern levee adjacent to Faber Tract is designated as a Waterfront Park priority use area and Faber Tract is designate as a Wildlife Refuge priority use area. The Refuge has closed the public access along these levees to protect Ridgway's rail and salt marsh harvest mouse inhabiting Faber Tract Marsh, thereby limiting the use as a Waterfront Park. The project would provide interpretive signage near Friendship Bridge and the new boardwalk to provide information related to Faber Tract Marsh and the wildlife within the area, thus supporting the Waterfront Park use in the adjacent area, while protecting sensitive species and their habitat.

In addition, the Palo Alto Golf Course (golf course) is designated as a waterfront park priority use area. The project would permanently impact a small portion (8.6 acres) of this use by decreasing the size of the golf course to widen the creek, providing additional flow capacity and creating new tidal marsh. Access to the golf course would be temporarily closed during the project and while the City of Palo Alto works on a planned reconfiguration of the golf course. In approximately two years, recreational opportunities at the golf course would be fully restored.

The Wildlife Priority Use area would be impacted during the construction of the high tide refugia, transitional slopes and levee repair. While there will be some disruption to wildlife use, the construction will occur during environmental work windows from June 15th to October 15th. The work on the toe of the levees is limited to a few small areas, and care will be taken to avoid harm to listed species through best management practices. Work within the marsh is expected to be conducted mostly with hand-operated tools, and therefore will limit impacts on wildlife use of the area.

The Commission finds that the project as designed would temporarily affect the Waterfront Park and Wildlife Refuge priority use areas, but after construction is complete, the use would be restored. The exception to this is the limited use of the levee along Faber Tract, but interpretive signage supports the designated Waterfront Park use and the closure of the levee is consistent with wildlife protection. Therefore, the project as authorized and conditioned is consistent with the Waterfront Park and Wildlife Refuge priority use designations of the Bay Plan.

G. **Protection of Shoreline.** Bay Plan policies on Shoreline Protection Policy 1, states, in part, "[n]ew shoreline protection projects and maintenance or reconstruction of existing projects and uses should be authorized if: (a) the project is necessary to provide flood or erosion protection for (i) existing development, use or infrastructure, or (ii) proposed development, use or infrastructure that is consistent with other Bay Plan policies...(c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account... [and] (e) the protection is integrated with current or planned adjacent shoreline protection measures...."

Bay Plan Policy 3 requires that authorized shoreline protection projects be regularly maintained according to a long-term maintenance program and assure protection from tidal erosion and flooding and minimize impacts to natural resources during the life of the project. Shoreline Protection Policy 4 requires that whenever feasible, shoreline protection projects should include nonstructural elements that include elements for Bay ecosystem enhancement and that in shoreline areas that support marsh vegetation, the Commission should require the inclusion of project provisions for establishing marsh and transitional habitats as part of shoreline protection measures. Shoreline Protection Policy 5 requires that impacts to natural resources and public access from new shoreline protection projects be avoided, mitigated or alternative public access should be provided.

In order to improve shoreline protection, the project would construct a steel sheet pile floodwall along approximately 500 linear feet near the O'Connor Way Pump Station and Friendship Bridge to connect the outfall structure at the pump station to the adjacent upstream and downstream levees for shoreline protection. Approximately 200 linear feet of the floodwall would be within the Commission's shoreline band jurisdiction, with portions of the floodwall embedded within the levee on the southern edge of Faber Tract Marsh. The sheet pile floodwall would provide continuous shoreline protection and strengthen the levee against higher volumes and velocities of floodwater that the project would accommodate.

To restore flood protection along the creek, low spots on the unmaintained levee north of San Francisquito Creek would be repaired with engineered soils to strengthen the levee and accommodate anticipated future high flow events. The final height of the levee would be a maximum of 13 feet (NAVD88). In reinforcing the levee, the toe of the levee within Faber Tract would be widened and a new slope at six horizontal to one vertical foot would be created to protect against levee erosion due to flow overtopping, and reduce potential impacts to the adjacent marsh. The widening of the toe of the levee will stabilize it without the need for placing riprap within the marsh.

In accordance with Policy 4, the permittee anticipates that tidal marsh vegetation and transition zone habitats would migrate up the levee slopes adjusting to the changing hydrology and would remain present with two feet of predicted sea level rise. However, there is potential for substantial loss of tidal marsh habitat within the project area with predicted sea level rise of about five feet, but these impacts would be beyond the current planned life of the project. Regarding Shoreline Protection Policy 5, the project would have potential impacts to habitat and wildlife, which it is addressing through mitigation measures discussed under the mitigation section above.

The project includes the placement of minor amounts of fill for shoreline protection and the use of habitat features to support and restore marsh vegetation within the creek. Special Conditions II-H herein requires that all riprap installed during the project will be appropriately designed and maintained over the life of the project. Additionally, Special Conditions II-B and II-C require construction best management practices to minimize impacts to adjacent marsh and aquatic environments during project construction. Impacts associated with the placement of riprap, construction of floodwalls and levees will be mitigated through habitat restoration in San Francisquito Creek and Faber Marsh and as required in Special Condition II-F.

Special Conditions have been added herein to ensure that the shoreline improvements are built to appropriate engineering safety standards and undergo plan review and that the shoreline protection features (levees, floodwalls, riprap, etc.) are appropriately maintained over the life of the project. The project has also been designed to account for reasonable foreseeable flooding and stormwater hazards over the life of the project.

With the Special Conditions included above, the Commission finds that the project design will be constructed in accordance with sound safety standards, offer protection to persons and property against flooding or stormwater hazards over the life of the project, will minimize impacts to natural resources, and that the authorized fill will establish a permanent shoreline to protect residents in areas adjacent to the creek.

H. **Review Boards**

1. **Engineering Criteria Review Board.** The Engineering Criteria Review Board did not evaluate the proposed project.
2. **Design Review Board.** Given the nature of the proposed improvements, the Design Review Board did not evaluate the proposed project.

I. **Environmental Review.** In accordance with the California Environmental Quality Act (CEQA) requirements, the JPA certified the Final Environmental Impact Report (FEIR) for the project on October 25, 2012 (JPA Resolution Number 12-10-25A). The FEIR found that the project would have significant impacts to some special status species and their habitat areas, air quality, and recreation, of which most impacts could be reduced to a less-than-significant level through minimization and mitigation measures. However, the CEQA review found that the project would likely result in significant and unavoidable effects on air quality associated with construction of various project elements during all project phases. Additionally, the project would have significant and unavoidable effects on recreation due to a reduction in the size of the existing golf course (loss of 7.4 acres of golf course) as a result of the levee realignment and creek widening. The JPA has committed to all feasible mitigation to reduce impacts on air quality, but the residual effect is still likely to be significant. The proposed mitigation measure for recreation impacts is outside the JPA's jurisdiction and therefore cannot be guaranteed. No additional feasible mitigation for recreational impacts is available.

The JPA adopted a Statement of Overriding Considerations, which acknowledged the existing flood risks along San Francisquito Creek associated with lack of adequate capacity in the creek, and considered the analysis of all the project outcomes. The JPA found that the economic, social, and environmental benefits of meeting the project's flood protection goals outweigh the significant and unavoidable air quality and recreation impacts associated with the project's construction and operation. The Water Board agreed on April 7, 2015 that the FEIR appropriately addressed the foreseeable potential environmental impacts from the project.

J. **Conclusion**. For all the above reasons, the Commission finds, declares, and certifies that, subject to the Special Conditions stated herein, the project authorized herein is consistent with the McAteer-Petris Act, the *San Francisco Bay Plan,* the Commission's Regulations, the California Environmental Quality Act, and the Commission's Amended Management Program for the San Francisco Bay segment of the California coastal zone.

IV. Standard Conditions

A. **Permit Execution**. This permit shall not take effect unless the permittee(s) execute the original of this permit and return it to the Commission within ten days after the date of the issuance of the permit. No work shall be done until the acknowledgment is duly executed and returned to the Commission.

B. **Notice of Completion**. The attached Notice of Completion and Declaration of Compliance form shall be returned to the Commission within 30 days following completion of the work.

C. **Permit Assignment**. The rights, duties, and obligations contained in this permit are assignable. When the permittee(s) transfer any interest in any property either on which the activity is authorized to occur or which is necessary to achieve full compliance of one or more conditions to this permit, the permittee(s)/transferors and the transferees shall execute and submit to the Commission a permit assignment form acceptable to the Executive Director. An assignment shall not be effective until the assignees execute and the Executive Director receives an acknowledgment that the assignees have read and understand the permit and agree to be bound by the terms and conditions of the permit, and the assignees are accepted by the Executive Director as being reasonably capable of complying with the terms and conditions of the permit.

D. **Permit Runs With the Land**. Unless otherwise provided in this permit, the terms and conditions of this permit shall bind all future owners and future possessors of any legal interest in the land and shall run with the land.

E. **Other Government Approvals**. All required permissions from governmental bodies must be obtained before the commencement of work; these bodies include, but are not limited to, the U. S. Army Corps of Engineers, the State Lands Commission, the Regional Water Quality Control Board, and the city or county in which the work is to be performed, whenever any of these may be required. This permit does not relieve the permittee(s) of any obligations imposed by State or Federal law, either statutory or otherwise.

F. **Built Project must be Consistent with Application**. Work must be performed in the precise manner and at the precise locations indicated in your application, as such may have been modified by the terms of the permit and any plans approved in writing by or on behalf of the Commission.

G. **Life of Authorization**. Unless otherwise provided in this permit, all the terms and conditions of this permit shall remain effective for so long as the permit remains in effect or for so long as any use or construction authorized by this permit exists, whichever is longer.

H. **Commission Jurisdiction**. Any area subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission under either the McAteer-Petris Act or the Suisun Marsh Preservation Act at the time the permit is granted or thereafter shall remain subject to that jurisdiction notwithstanding the placement of any fill or the implementation of any substantial change in use authorized by this permit. Any area not subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission that becomes, as a result of any work or project authorized in this permit, subject to tidal action shall become subject to the Commission's "bay" jurisdiction.

I. **Changes to the Commission's Jurisdiction as a Result of Natural Processes**. This permit reflects the location of the shoreline of San Francisco Bay when the permit was issued. Over time, erosion, avulsion, accretion, subsidence, relative sea level change, and other factors may change the location of the shoreline, which may, in turn, change the extent of the Commission's regulatory jurisdiction. Therefore, the issuance of this permit does not guarantee that the Commission's jurisdiction will not change in the future.

J. **Violation of Permit May Lead to Permit Revocation**. Except as otherwise noted, violation of any of the terms of this permit shall be grounds for revocation. The Commission may revoke any permit for such violation after a public hearing held on reasonable notice to the permittee(s) or their assignees if the permit has been effectively assigned. If the permit is revoked, the Commission may determine, if it deems appropriate, that all or part of any fill or structure placed pursuant to this permit shall be removed by the permittee(s) or their assignees if the permit has been assigned.

K. **Should Permit Conditions Be Found to be Illegal or Unenforceable**. Unless the Commission directs otherwise, this permit shall become null and void if any term, standard condition, or special condition of this permit shall be found illegal or unenforceable through the application of statute, administrative ruling, or court determination. If this permit becomes null and void, any fill or structures placed in reliance on this permit shall be subject to removal by the permittee(s) or their assignees if the permit has been assigned to the extent that the Commission determines that such removal is appropriate. Any uses authorized shall be terminated to the extent that the Commission determines that such uses should be terminated.

L. **Permission to Conduct Site Visit**. The permittee(s) shall grant permission to any member of the Commission's staff to conduct a site visit at the subject property during and after construction to verify that the project is being and has been constructed in compliance with the authorization and conditions contained herein. Site visits may occur during business hours without prior notice and after business hours with 24-hour notice.

M. **Abandonment**. If, at any time, the Commission determines that the improvements in the Bay authorized herein have been abandoned for a period of two years or more, or have deteriorated to the point that public health, safety or welfare is adversely affected, the Commission may require that the improvements be removed by the permittee(s), its assignees or successors in interest, or by the owner of the improvements, within 60 days or such other reasonable time as the Commission may direct.

N. **In-Kind Repairs and Maintenance.** Any in-kind repair and maintenance work authorized herein shall not result in an enlargement of the authorized structural footprint and shall only involve construction materials approved for use in San Francisco Bay. Work shall occur during periods designated to avoid impacts to fish and wildlife. The permittee(s) shall contact Commission staff to confirm current restricted periods for construction.

Executed at San Francisco, California, on behalf of the San Francisco Bay Conservation and Development Commission on the date first above written.

LAWRENCE J. GOLDZBAND
Executive Director
San Francisco Bay Conservation and
Development Commission

By: _____
BRAD McCREA
Regulatory Program Director

* *

Receipt acknowledged, contents understood and agreed to:

Executed at 455 Golden Gate Ave San Francisquito Creek Joint
San Francisco, CA 94102 **Permittee** Powers Authority

On February 23, 2016 By: _____

Len Materman, Executive Director
Print Name and Title

cc: California Department of Fish and Wildlife, Craig Weightman
NOAA National Marine Fisheries Service, Amanda Morrison
US Fish and Wildlife Service, Joseph Terry
San Francisco Regional Water Quality Control Board, Susan Glendening
US Army Corps of Engineers, Gregory Brown
San Francisco Bay National Wildlife Refuge Complex, Anne Morkill
City of Palo Alto
City of Menlo Park
City of East Palo Alto
San Mateo County Flood Control District
Santa Clara Valley Water District

PERMIT NO. 2013.007.00

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY

CERTIFICATION OF CONTRACTOR REVIEW

San Francisco Bay Conservation
and Development Commission
455 Golden Gate Avenue, Suite 10600
San Francisco, CA 94102

Ladies and Gentlemen:

You are hereby informed that prior to commencing any grading, demolition, or construction authorized by the above referenced permit, I personally reviewed and understand the terms and conditions of the permit, the final plans approved by or on behalf of the Commission, particularly as they pertain to the public access, and environmentally sensitive areas required herein, for those portions of the work for which I am in charge.

I, _____, hereby declare under penalty of perjury that the foregoing is true and correct and that if called upon to testify to the contents of this notice, I would so testify.

Executed on this _____ day of _____,

20_____, at_____, California.

_____

Contractor Name and Company

_____

(Title)

PERMIT NO. 2013.007.00

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY

NOTICE OF COMPLETION AND DECLARATION OF COMPLIANCE

San Francisco Bay Conservation
and Development Commission
455 Golden Gate Avenue, Suite 10600
San Francisco, CA 94102

Ladies and Gentlemen:

You are hereby informed that the work authorized by the above-referenced permit was completed on _____.

I have personally reviewed the terms and conditions of the permit, the final plans approved by or on behalf of the Commission, and the completed project and hereby certify that the project is in compliance with all terms and conditions of the permit and conforms to the plans previously reviewed and approved by or on behalf of the Commission. I further certify that all conditions of the permit, particularly with regard to plan review, public access areas and improvements, and other special conditions have been met.

I, _____, hereby declare under penalty of perjury that the foregoing is true and correct and that if called upon to testify to the contents of this notice, I would so testify.

Executed on this _____ day of _____,

20_____, at _____, California.

_____
(Permittee)

_____
(Title)

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

Regulatory Division

FEB 23 2016

SUBJECT: File Number 2013-00030S

Mr. Len Materman
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

Dear Mr. Materman:

Enclosed is your signed copy of a Department of the Army permit (Enclosure 1) to construct the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, along the border between the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California.

Please complete the appropriate parts of "Project Status" form (Enclosure 2), and return it to this office as your work progresses. You are responsible for ensuring that the contractor or workers executing the activity authorized herein are knowledgeable of the terms and conditions of this authorization.

Should you have any questions regarding this matter, please call Greg Brown of our Regulatory Division at 415-503-6791. Please address all correspondence to the Regulatory Division and refer to the File Number at the head of this letter. If you would like to provide comments on our permit review process, please complete the Customer Survey Form available online at http://www.spn.usace.army.mil/Missions/Regulatory.aspx.

Sincerely,

John C. Morrow for
Lieutenant Colonel, U.S. Army
Commander and District Engineer

Enclosures

Copy Furnished (w/ encl 1 only):

US FWS, Sacramento, CA
US NMFS, Santa Rosa, CA
CA RWQCB, Oakland, CA
SF BCDC, San Francisco, CA

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

DEPARTMENT OF THE ARMY PERMIT

PERMITTEE: Len Materman, San Francisquito Creek Joint Powers Authority

PERMIT NO.: 2013-00030S

ISSUING OFFICE: San Francisco District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate District or Division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below:

PROJECT DESCRIPTION: The project involves construction of flood control improvements along 7,450 linear feet of lower San Francisquito Creek, from Highway 101 downstream to San Francisco Bay. Work will include the following major components:

- Rebuilding levees, degrading levees, and relocating a portion of the southeast levee to widen the channel for increased channel capacity and protection from extreme tides.
- Excavating sediment deposits within the channel to maximize conveyance, and regrading a stable channel profile with marsh terraces.
- Constructing floodwalls in the upper reach to increase capacity.
- Extension of Friendship Bridge via a boardwalk across new marshland within the widened channel.

Approximately 5,650 linear feet of floodwalls will be constructed on both banks from U.S. Highway 101/East Bayshore Road downstream to approximately Daphne Way on the northwest bank (East Palo Alto side) and Geng Road on the southeast bank (Palo Alto side). Downstream of the floodwalls, approximately 2250 linear feet of the existing levee on the northwest side of the channel will be raised and strengthened to the location of the O'Connor Pump Station near Friendship Bridge. On the southeast side, approximately 2727 linear feet of new levee will be constructed inland of the existing levee on land currently occupied by the Palo Alto Golf Course, and the existing levee along this reach will be removed, except for an approximately 300-foot section around the southeastern footing of Friendship Bridge. Levee construction will permanently impact 0.70 acres of wetlands on the northwest side and 0.79 acres of wetlands on the southeast side. Portions of the channel along the toe of the floodwalls and levees will be armored with approximately 22,000 cubic yards (cy) of rock slope protection (RSP) along 4,000 linear feet (3.71 acres) of stream banks. Approximately 11,000 cy of accumulated sediment will be excavated from 4800 linear feet (2.12 acres) of the existing channel, and a new stable channel bordered by floodplain terraces will be graded within the levees. The existing Friendship Bridge will be retained and extended via a boardwalk from the retained southeastern footing across the new floodplain terrace to the relocated southeast levee. A total of 15.14 acres of native high-marsh and marsh ecotone vegetation will be planted/seeded throughout the expanded floodplain terrace. Project activities will require relocation of electrical transmission towers and poles; abandonment of existing and construction of new gas transmission lines; and realignment or relocation of sewer lines and storm drains, most of which will occur within areas to be impacted by levee construction and channel grading. Utility work will include realignment of a sewer line crossing of the creek near Friendship Bridge using open trenching, installation of a new gas line crossing under the channel using micro-tunneling upstream of Friendship Bridge, and relocation of an electrical transmission line crossing over the channel from its existing location near the north end of Jasmine Way to a new crossing location approximately 250 feet upstream. Construction of project elements will likely occur over two years, and up to 4500 linear feet of the channel will be dewatered between June 15th and October 15th each year to allow in-channel construction. Dewatering each year will be done with upstream and downstream coffer dams consisting of sheetpiles spanning the channel. Downstream of the lower cofferdam a rock energy dissipator for bypass discharge will cover approximately 7250 square feet (0.17 ac) and consist of 570 cy of temporary fill. A minimum number of gravel bags will only be used in the event of seepage past the sheet piles.

All dewatering materials will be removed from the channel immediately after each construction season and properly stored where no material can enter the channel.

In response to agency feedback and requirements, the following modifications have been incorporated into the project:

1) Faber Tract levee stability improvement: To reduce concerns regarding levee erosion and the potential for mass levee failure which would impact the Faber Tract tidal marsh, approximately 12,000 cy of clean imported fill will be added to the levee separating the creek from the Faber tract marsh downstream of Friendship Bridge. Approximately 850 linear feet of the existing levee will be strengthened by raising the levee crest elevation from a minimum elevation of 11 feet to 13 feet, and incorporating a 6H:1V levee side slope into the Faber Tract marsh, resulting in permanent impacts to 0.30 acres of existing tidal marsh. This levee side slope will help protect the levee toe from erosion due to flow overtopping as it transitions to a higher elevation closer to Friendship Bridge.
2) Bay levee degrade: Removal of approximately 600 feet of the existing levee downstream of the Faber Tract, along the Outer Faber Marsh area adjacent to San Francisco Bay. Approximately 2,820 cy of sediment/soil will be removed within approximately 0.73 acres of existing levee footprint to lower the area down to marsh plain elevation.
3) RSP reduction: Proposed RSP has been reduced by approximately 2.33 acres from the original project design, resulting in a new RSP area total of 3.71 acres. The 2.33 acres will be replaced with vegetative levee protection and turf reinforcement mat that will provide soil stabilization and habitat improvements.
4) Faber Marsh enhancement to offset impacts to Ridgway's rail and salt marsh harvest mouse: Five high tide refugia islands vegetated with native high marsh vegetation will be created in the outer Faber marsh, consisting of 100 cubic yards of fill placed across 0.03 acre of existing marsh plain. An additional 0.19 cubic yards of marsh will be temporarily impacted by work activities during island construction. Vegetation enhancement will also occur along 5120 linear feet (5.66 acre) of perimeter berm around the Faber Tract marsh.
5) Instream velocity refugia for migrating steelhead: A total of approximately 840 cubic yards of rock and woody debris will be placed in the creek channel to create up to 6 instream habitat structures, totaling 0.09 acre.

All work shall be completed in accordance with the plans and drawings titled "USACE File #2013-00030S, San Francisquito Creek, July 2015, Figure 1 to 119" (enclosure 1). High tide refugia islands shall be constructed in accordance with the plans and drawings titled "USACE File #2013-00030S, High tide refuge islands, October 2015, Figure 1 to 3" (enclosure 2). Channel dewatering and coffer dam construction shall be completed in accordance with the plans and drawings titled "USACE File #2013-00030S, Temporary water diversion plan, February 2016, Figure 1 to 9" (enclosure 3).

PROJECT LOCATION: Lower San Francisquito Creek downstream of Highway 101, on the border between the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California.

PERMIT CONDITIONS:

GENERAL CONDITIONS:

1. The time limit for completing the work authorized ends on February 28, 2021. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. For your convenience, a copy of the water quality certification or waiver is attached. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

7. You understand and agree that, if future operations by the United States require the removal, relocation or other alteration of the structure or work authorized herein, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, you will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

SPECIAL CONDITIONS:

1. To remain exempt from the prohibitions of Section 9 of the Endangered Species Act, the non-discretionary Terms and Conditions for incidental take of federally-listed Species shall be fully implemented as stipulated in the enclosed Biological Opinions from NMFS dated December 30, 2015 (NMFS # SWR-2013-9572) (enclosure 4) and USFWS dated January 15, 2016 (USFWS # 08ESMF00-2013-F-0401) (enclosure 5). Project authorization under this permit is conditional upon compliance with the mandatory terms and conditions associated with incidental take. Failure to comply with the terms and conditions for incidental take, where a take of a federally-listed species occurs, would constitute an unauthorized take and non-compliance with the authorization for your project. The USFWS and NMFS are, however, the authoritative federal agencies for determining compliance with the incidental take statements and for initiating appropriate enforcement actions or penalties under the Endangered Species Act.

2. The JPA shall provide compensatory mitigation for impacts to waters of the U.S. by fully implementing the *San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project: Mitigation and Monitoring Plan*, dated December 2015. Restoration performance standards shall be adhered to, and an annual monitoring report shall be submitted to USACE by December 31 for five years following the completion of construction. This report shall include dated photographs that cover the entire project reach, including the creek and both banks. If performance standards are not being met, a brief explanation of the difficulties and potential remedial actions shall be provided.

3. Your responsibility to complete the required compensatory mitigation as set forth in Special Condition 2 will not be considered fulfilled until you have demonstrated mitigation success and have received written verification from the U.S. Army Corps of Engineers.

4. The JPA shall submit 60 percent and 90 percent design plans for steelhead habitat features (*i.e.*, debris jams and rock weir) to NMFS and USACE for review and approval at least 90 days prior to the initiation of construction activities.

5. In addition to General Condition 3, you shall comply with the following:
   a. If cultural resources are encountered during project implementation, the JPA shall immediately cease all work activities in the area (within approximately 100-feet) of the discovery. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered

stone tools, such as hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. USACE shall be notified of the discovery and a professional archaeologist shall be retained by the JPA to evaluate the find and recommend appropriate mitigation measures. Proposed mitigation measures shall be submitted for USACE approval, and project related activities shall not resume within 100 feet of the find until USACE provides written authorization.

b. If human remains are encountered unexpectedly during construction excavation and grading activities, no further disturbance shall occur within 100 feet of the find until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission (NAHC). The NAHC will then identify the person(s) thought to be the Most Likely Descendent of the deceased Native American, who may make recommendations regarding the appropriate treatment of the remains. Project-related activities in the vicinity of the find shall not resume until USACE provides written authorization.

FURTHER INFORMATION:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

   (x) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. Section 403).
   (x) Section 404 of the Clean Water Act (33 U.S.C. Section 1344).
   ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. Section 1413).

2. Limits of this authorization:

   a. This permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.

   b. This permit does not grant any property rights or exclusive privileges.

   c. This permit does not authorize any injury to the property or rights of others.

   d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability: In issuing this permit, the Federal Government does not assume any liability for the following:

   a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

   b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

   c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

   d. Design or construction deficiencies associated with the permitted work.

   e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

   a. You fail to comply with the terms and conditions of this permit.

   b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate. (See Item 4 above.)

   c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

   Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 C.F.R. § 325.7 or enforcement procedures such as those contained in 33 C.F.R. §§ 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 C.F.R. § 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions: General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE) February 23, 2016 (DATE)

Len Materman
San Francisquito Creek Joint Powers Authority

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

John C. Morrow for
Lieutenant Colonel, U.S. Army
District Commander

23 Feb 2016 (DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) (DATE)

PROJECT STATUS

Please use the forms below to report the dates when you start and finish the work authorized by the enclosed permit. Also if you suspend work for an extended period of time, use the forms below to report the dates you suspended and resumed work. The second copy is provided for your records. If you find that you cannot complete the work within the time granted by the permit, please apply for a time extension at least one month before your permit expires. If you materially change the plan or scope of the work, it will be necessary for you to submit new drawings and a request for a modification of your permit.

(cut as needed) ----------

Date:_____

NOTICE OF COMPLETION OF WORK under Department of the Army Permit No. 2013-00030S
TO: District Engineer, US Army Corps of Engineers, Regulatory Division, 1455 Market Street, 16th Floor, San Francisco, CA 94103-1398

In compliance with the conditions of Permit No. 2013-00030S, this is to notify you that work was completed on _____.

Permittee: Len Materman, San Francisquito Creek Joint Powers Authority
Address: 615 B Menlo Avenue, Menlo Park, CA 94025

(cut as needed) ----------

Date:_____

NOTICE OF RESUMPTION OF WORK under Department of the Army Permit No. 2013-00030S
TO: District Engineer, US Army Corps of Engineers, Regulatory Division, 1455 Market Street, 16th Floor, San Francisco, CA 94103-1398

In compliance with the conditions of Permit No. 2013-00030S, this is to notify you that work was resumed on _____.

Permittee: Len Materman, San Francisquito Creek Joint Powers Authority
Address: 615 B Menlo Avenue, Menlo Park, CA 94025

(cut as needed) ----------

Date:_____

NOTICE OF SUSPENSION OF WORK under Department of the Army Permit No. 2013-00030S
TO: District Engineer, US Army Corps of Engineers, Regulatory Division, 1455 Market Street, 16th Floor, San Francisco, CA 94103-1398

In compliance with the conditions of Permit No. 2013-00030S, this is to notify you that work was suspended on _____.

Permittee: Len Materman, San Francisquito Creek Joint Powers Authority
Address: 615 B Menlo Avenue, Menlo Park, CA 94025

(cut as needed) ----------

Date:_____

NOTICE OF COMMENCEMENT OF WORK under Department of the Army Permit No. 2013-00030S
TO: District Engineer, US Army Corps of Engineers, Regulatory Division, 1455 Market Street, 16th Floor, San Francisco, CA 94103-1398

In compliance with the conditions of Permit No. 2013-00030S, this is to notify you that work was commenced on
_____.

Permittee: Len Materman, San Francisquito Creek Joint Powers Authority
Address: 615 B Menlo Avenue, Menlo Park, CA 94025

PRELIMINARY JURISDICTIONAL DETERMINATION FORM
San Francisco District

This Preliminary Jurisdictional Determination finds that there *"may be"* waters of the United States in the subject review area and identifies all such aquatic features, based on the following information:

Regulatory Division: South Branch **File Number:** 2013-00030-S **PJD Completion Date:** 02-18-2016

Review Area Location
City/County: Palo Alto, Santa Clara Cnty. State: California
Nearest Named Waterbody: San Francisquito Creek
Approximate Center Coordinates of Review Area
Latitude (degree decimal format): 37.46055°N
Longitude (degree decimal format): -122.12123°W
Approximate Total Acreage of Review Area: 263.5 acres

File Name: San Francisquito Creek Flood Protection

Applicant or Requestor Information
Name: Kevin Murray
Company Name: San Francisquito Creek JPA
Street/P.O. Box: 615 B Menlo Avenue
City/State/Zip Code: Menlo Park, CA 94025

Estimated Total Amount of Waters in Review Area

Non-Wetland Waters: lineal feet feet wide and/or
23.88 acre(s) Flow Regime: Perennial

Wetlands: lineal feet feet wide and/or
116.93 acre(s) Cowardin Class: Multiple Classes

Name of Section 10 Waters Occurring in Review Area
Tidal: San Francisquito Creek
Non-Tidal:

☐ Office (Desk) Determination
☒ Field Determination:
Date(s) of Site Visit(s): 02-06-2013

SUPPORTING DATA: Data reviewed for Preliminary JD (check all that apply – checked items should be included in case file and, where checked and requested, appropriately reference sources below)

☒ Maps. Plans, plots or plat submitted by or on behalf of applicant/requestor (specify): PRELIMINARY DELINEATION: SAN FRANCISQUITO CREEK FLOOD PROTECTION PROJECT, EAST BAYSHORE ROAD TO SAN FRANCISCO BAY, dated June 2012

☒ Data sheets submitted by or on behalf of applicant/requestor (specify): included with above

- ☒ Corps concurs with data sheets/delineation report.
- ☐ Corps does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps.
☐ Corps navigable waters' study (specify):
☒ U.S. Geological Survey Hydrologic Atlas:
- ☒ USGS NHD data.
- ☒ USGS HUC maps.

☒ U.S. Geological Survey map(s) (cite quad name/scale): Palo Alto, CA 1:24000
☐ USDA Natural Resources Conservation Service Soil Survey.
☒ National wetlands inventory map(s) (specify): web data
☐ State/Local wetland inventory map(s) (specify):
☐ FEMA/FIRM maps.
☐ 100-year Floodplain Elevation (specify, if known):
☐ Photographs: ☐ Aerial (specify name and date):
☐ Other (specify name and date):
☐ Previous JD determination(s) (specify File No. and date of response letter):
☐ Other information (specify):

IMPORTANT NOTE: If the information recorded on this form has not been verified by the Corps, the form should not be relied upon for later jurisdictional determinations.

2-18-16
Signature and Date of Regulatory Project Manager
(REQUIRED)

Kevin Murray February 18, 2016
Signature and Date of Person Requesting Preliminary JD
(REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

Aquatic Resource I.D.	Latitude (degree decimal format)	Longitude (degree decimal format)	Cowardin Class and Flow Regime	Estimated Area or Lineal Feet of Aquatic Resource	Type of Aquatic Resource
dm	37.45958°N	-122.12256°W	Palustrine-emergent Flow: Perennial	lineal ft ft wide 4.34 acre(s)	Brackish Marsh
fm	37.45343°N	-122.12008°W	Palustrine-emergent Flow: Perennial	lineal ft ft wide 0.33 acre(s)	Pond or Lake w/ Emergent Vegetation
tsm	37.46216°N	-122.12398°W	Estuarine Flow: Perennial	lineal ft ft wide 112.26 acre(s)	Salt Marsh
fp	37.45340°N	-122.12009°W	Lacustrine Flow: Perennial	lineal ft ft wide 1.13 acre(s)	Pond or Lake
tc	37.46052°N	-122.12379°W	Estuarine Flow: Perennial	lineal ft ft wide 22.38 acre(s)	Estuary
tp	37.46300°N	-122.12375°W	Estuarine Flow: Perennial	lineal ft ft wide 0.37 acre(s)	Estuary
	°Select	- °Select	Select Flow: Select	lineal ft ft wide acre(s)	Select
	°Select	- °Select	Select Flow: Select	lineal ft ft wide acre(s)	Select
	°Select	- °Select	Select Flow: Select	lineal ft ft wide acre(s)	Select
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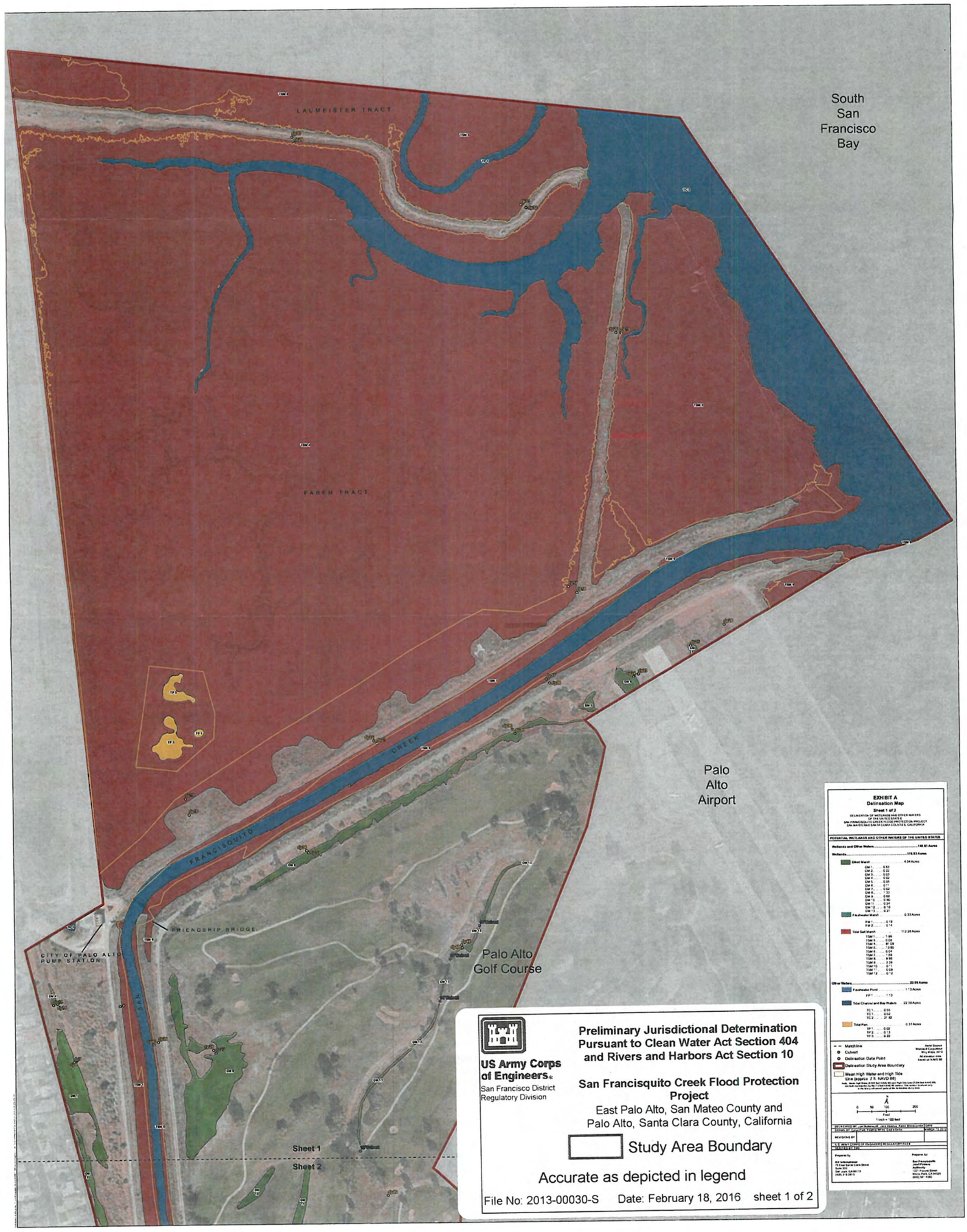
South
San
Francisco
Bay
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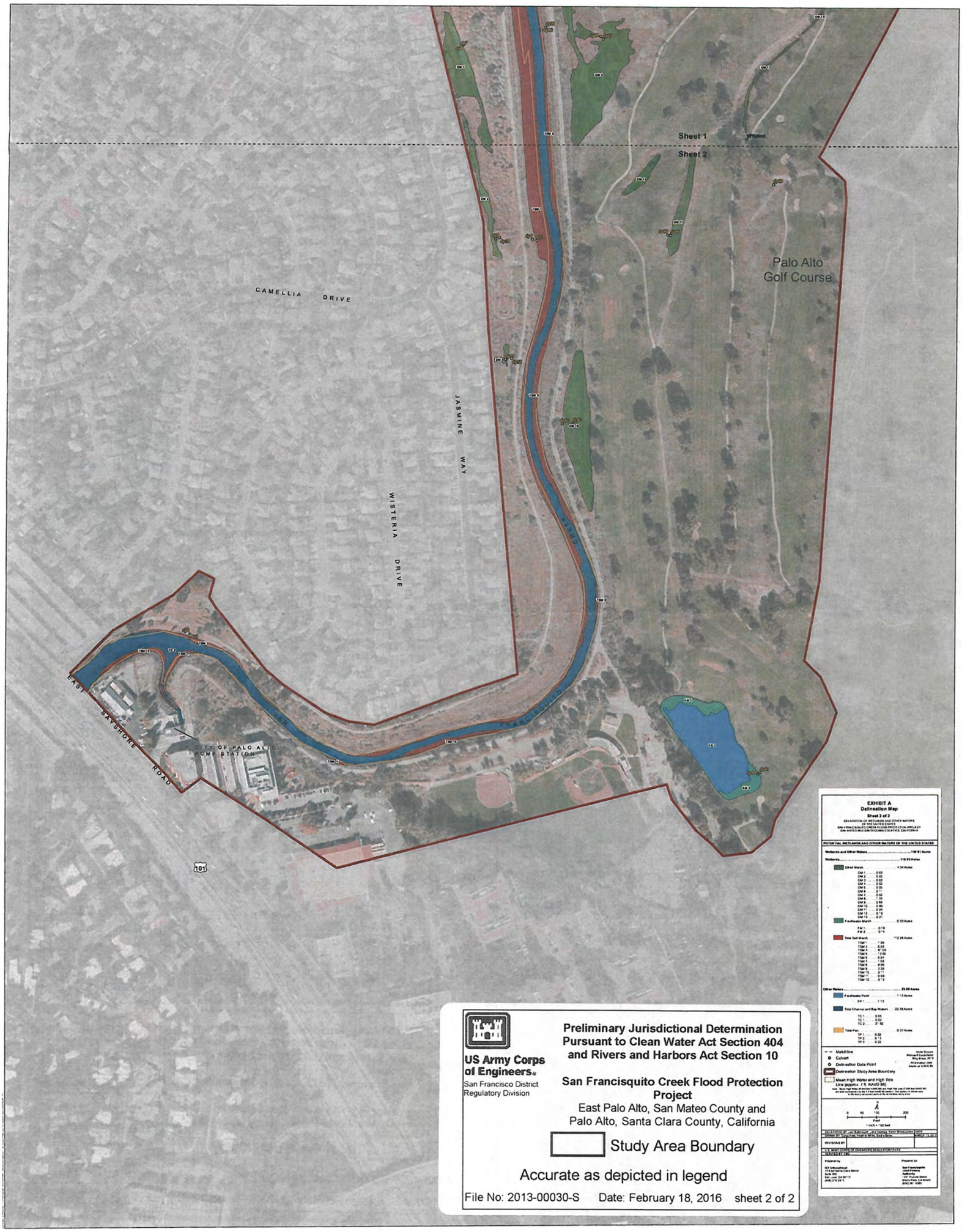
Palo
Alto
Airport
FRANCISQUITO
CREEK
FRIENDSHIP BRIDGE
CITY OF PALO ALTO
PUMP STATION
Palo Alto
Golf Course
Sheet 1
Sheet 2
EXHIBIT A
Delineation Map
Sheet 1 of 2
US Army Corps
of Engineers
San Francisco District
Regulatory Division
Preliminary Jurisdictional Determination
Pursuant to Clean Water Act Section 404
and Rivers and Harbors Act Section 10
San Francisquito Creek Flood Protection
Project
East Palo Alto, San Mateo County and
Palo Alto, Santa Clara County, California
Study Area Boundary
Accurate as depicted in legend
File No: 2013-00030-S
Date: February 18, 2016
sheet 1 of 2



US Army Corps of Engineers
San Francisco District
Regulatory Division

Preliminary Jurisdictional Determination Pursuant to Clean Water Act Section 404 and Rivers and Harbors Act Section 10

San Francisquito Creek Flood Protection Project

East Palo Alto, San Mateo County and
Palo Alto, Santa Clara County, California

Study Area Boundary

Accurate as depicted in legend

File No: 2013-00030-S Date: February 18, 2016 sheet 2 of 2

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

Regulatory Division

FEB 23 2016

SUBJECT: File Number 2013-00030S

Mr. Len Materman
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

Dear Mr. Materman:

Enclosed are two copies of a Department of the Army (DA) permit to construct the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, along the border between the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California.

You are advised that the Corps has established an Administrative Appeal Process, as described in our regulations at 33 C.F.R. Part 331 (65 Fed. Reg. 16486; March 28, 2000) and outlined in the enclosed flowchart and Notification of Administrative Appeal Options, Process, and Request for Appeal (NAO-RFA) form. The following two options are available to you in your evaluation of the enclosed permit:

1) You may sign and date both copies of the permit on the line designated for "Permittee". Your signature on the permit indicates that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions. Both copies of the permit must be returned to this office for final authorization. We will then forward one copy of the fully executed permit for your records, at which time you will be authorized to commence work.

2) You may decline to sign the permit because you object to certain terms and conditions, and you may request that the permit be modified. If you decline the permit, you must return the permit to the District Engineer and may not proceed with your project until notified by the District Engineer. You must outline your objections to the terms and conditions of the permit by completing Section II of the NAO-RFA form. Your objections must be received by the District Engineer within 60 days of the date of this letter, or you will forfeit your right to request changes to the terms and conditions of the permit.

Upon receipt of the completed NAO-RFA form, the District Engineer will evaluate your objections, and may: (a) modify the permit to address all of your objections, (b) modify

the permit to address some of your objections, or (c) not modify the permit, having determined that the permit should be issued as previously written. In any of these three cases, the District Engineer will send you a final permit for your reconsideration, as well as a second NAO-RFA form. Should you decline the final proffered permit, you can appeal the declined permit by submitting the completed NAO-RFA form to the Division Engineer. The NAO-RFA form must be received by the Division Engineer within 60 days of the date of the second transmittal letter, or you will forfeit your right to pursue an appeal.

If you fail to sign and return both copies of this permit or fail to request a modification of the permit within 60 days from the date of this letter, your permit application may be withdrawn pursuant to our regulations at 33 C.F.R. Section 325.2(d)(5).

Should you have any questions regarding this matter, please call Greg Brown of our Regulatory Division at 415-503-6791. Please address all correspondence to the Regulatory Division and refer to the File Number at the head of this letter.

Sincerely,

John C. Morrow for
Lieutenant Colonel, U.S. Army
Commander and District Engineer

Enclosures

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Len Materman, San Francisquito Creek Joint Powers Authority	File No. 2013-00030S	Date: 02/23/2016
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
✓	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the DISTRICT ENGINEER for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this Notice and return the Notice to the DISTRICT ENGINEER. Your objections must be received by the DISTRICT ENGINEER within 60 days of the date of this Notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your NOTICE, the DISTRICT ENGINEER will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the DISTRICT ENGINEER will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the DISTRICT ENGINEER for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this NOTICE and sending the NOTICE to the DIVISION ENGINEER. This Notice must be received by the DIVISION ENGINEER within 60 days of the date of this Notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this Notice sending the Notice to the DIVISION ENGINEER. This Notice must be received by the DVISION ENGINEER within 60 days of the date of this Notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this Notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this Notice and sending the Notice to the DIVISION ENGINEER. This Notice must be received by the DIVISION ENGINEER within 60 days of the date of this Notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

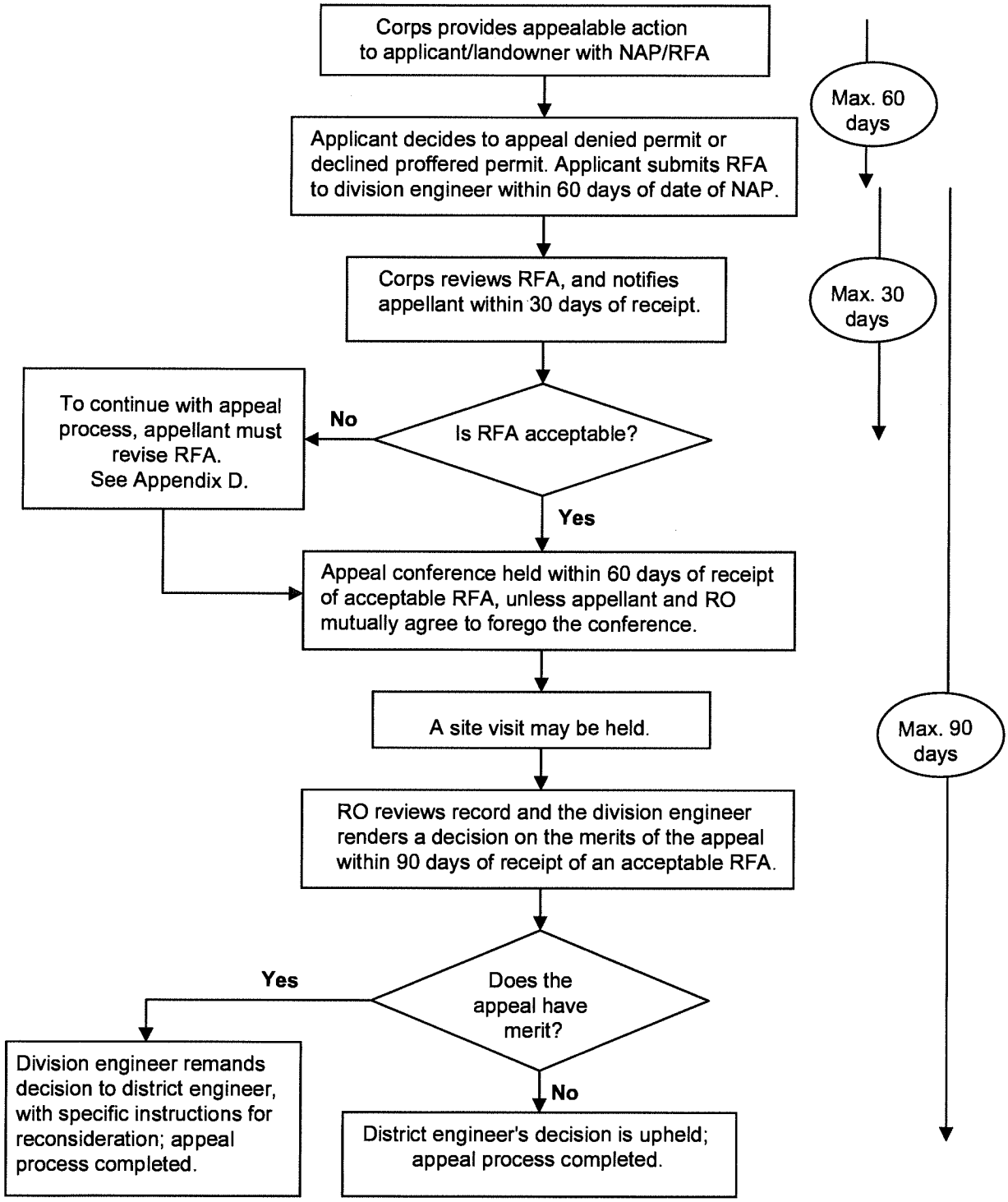
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Katerina Galacatos, Chief, South Branch, Regulatory Division U.S. Army Corps of Engineers, San Francisco District 1455 Market Street, 16th Floor, Attn: CESPN-R-S San Francisco, CA 94103-1398 Tel. (415) 503-6778 FAX (415) 503-6690	If you only have questions regarding the appeal process you may also contact: Thomas J. Cavanaugh, Appeal Review Officer U.S. Army Corps of Engineers, South Pacific Division 1455 Market Street, 20th Floor, Attn: CESPD-PDS-O San Francisco, CA 94103-1399 Tel. (415) 503-6574 FAX (415) 503-6646

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

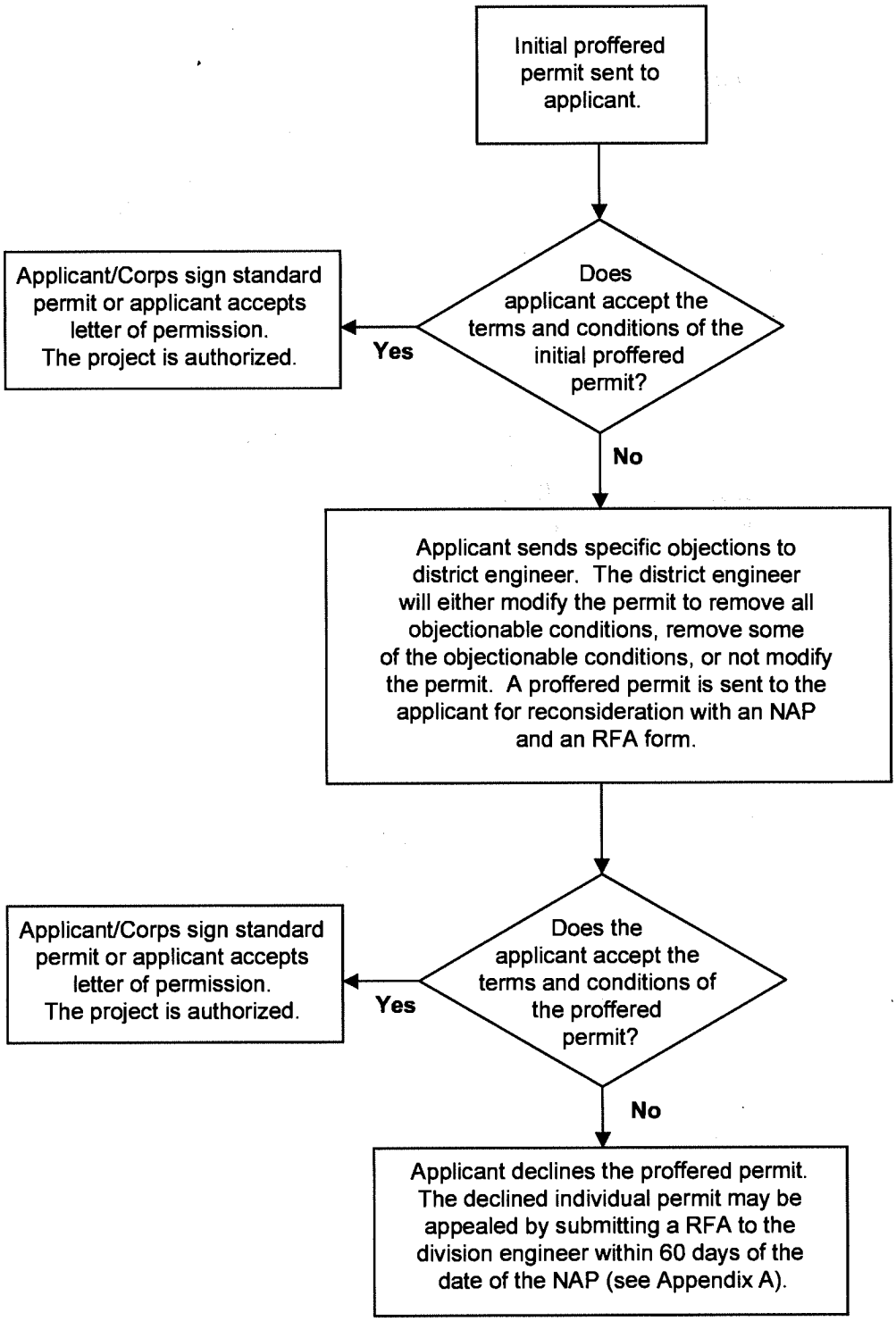
Administrative Appeal Process for Permit Denials and Proffered Permits



NOTE: If new information is provided to the Corps, the applicant will be asked if the applicant wishes to revise the project or record. If so, the appeal will be withdrawn and the case returned to the District for appropriate action. If not, then the Division Engineer will rule on the merits of the appeal based on the administrative record without consideration of the new information. However, the new information may cause the District Engineer to take action under 33 CFR 325.7, independent of the appeal process.

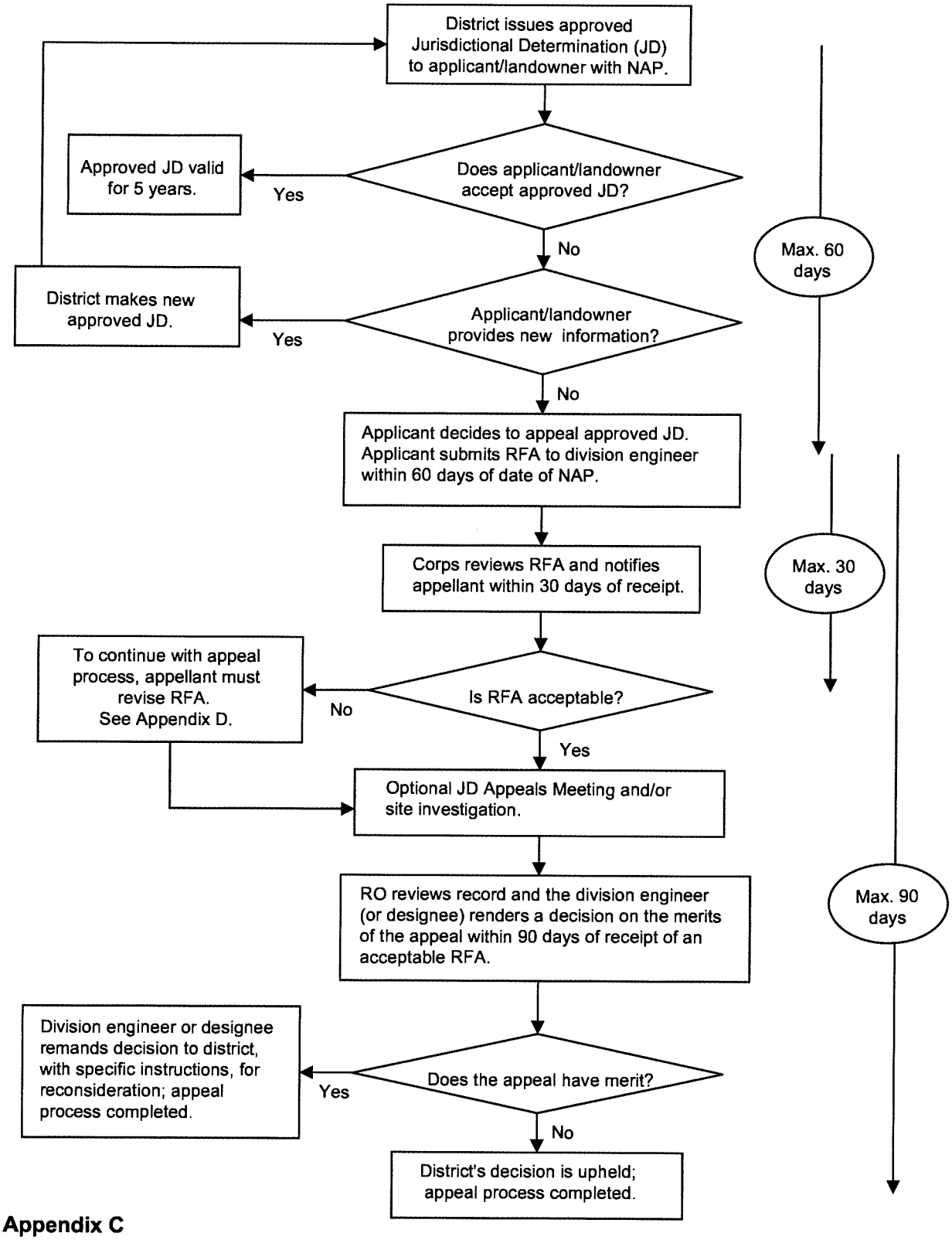
Appendix A

Applicant Options with Initial Proffered Permit



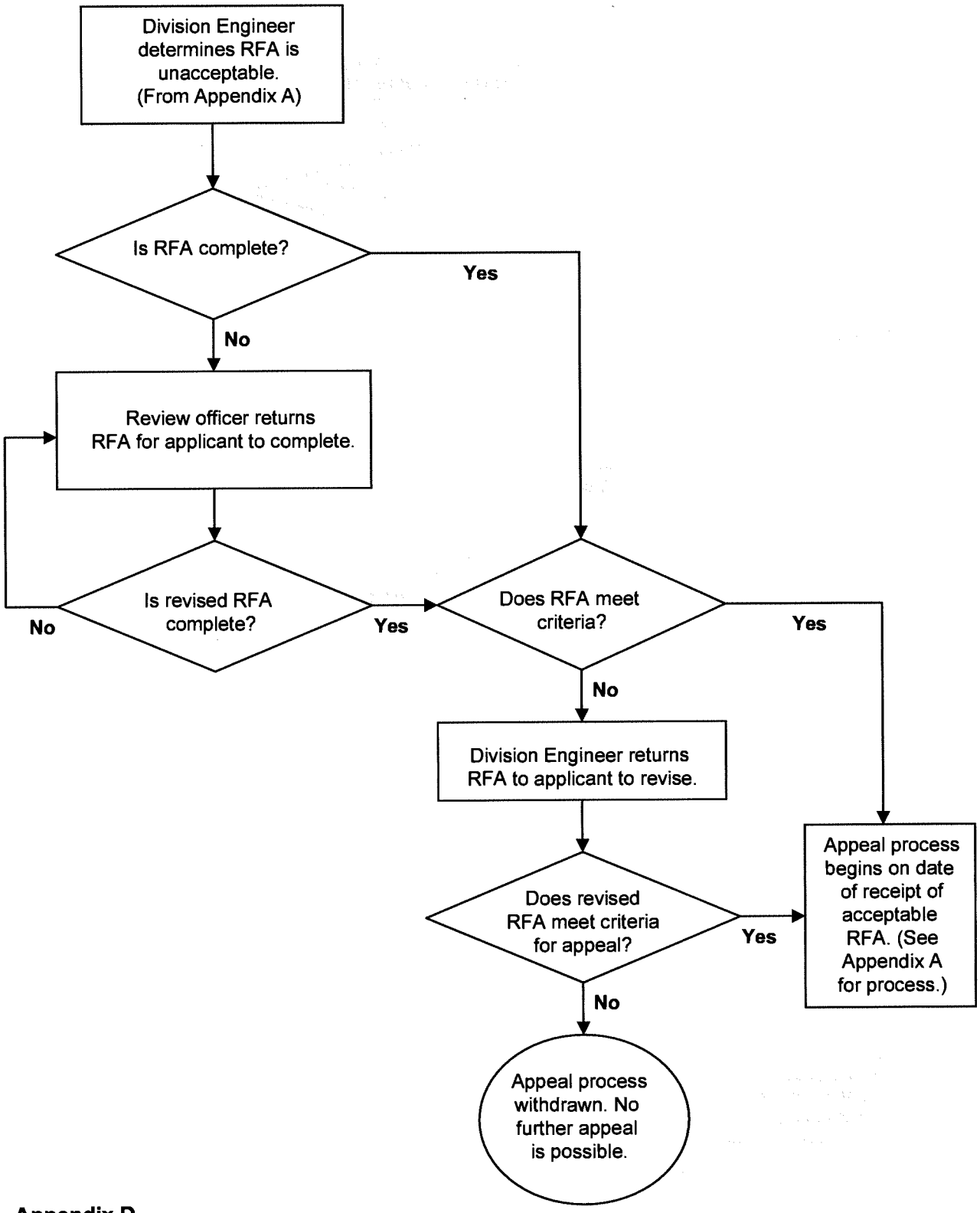
Appendix B

Administrative Appeal Process for Approved Jurisdictional Determinations



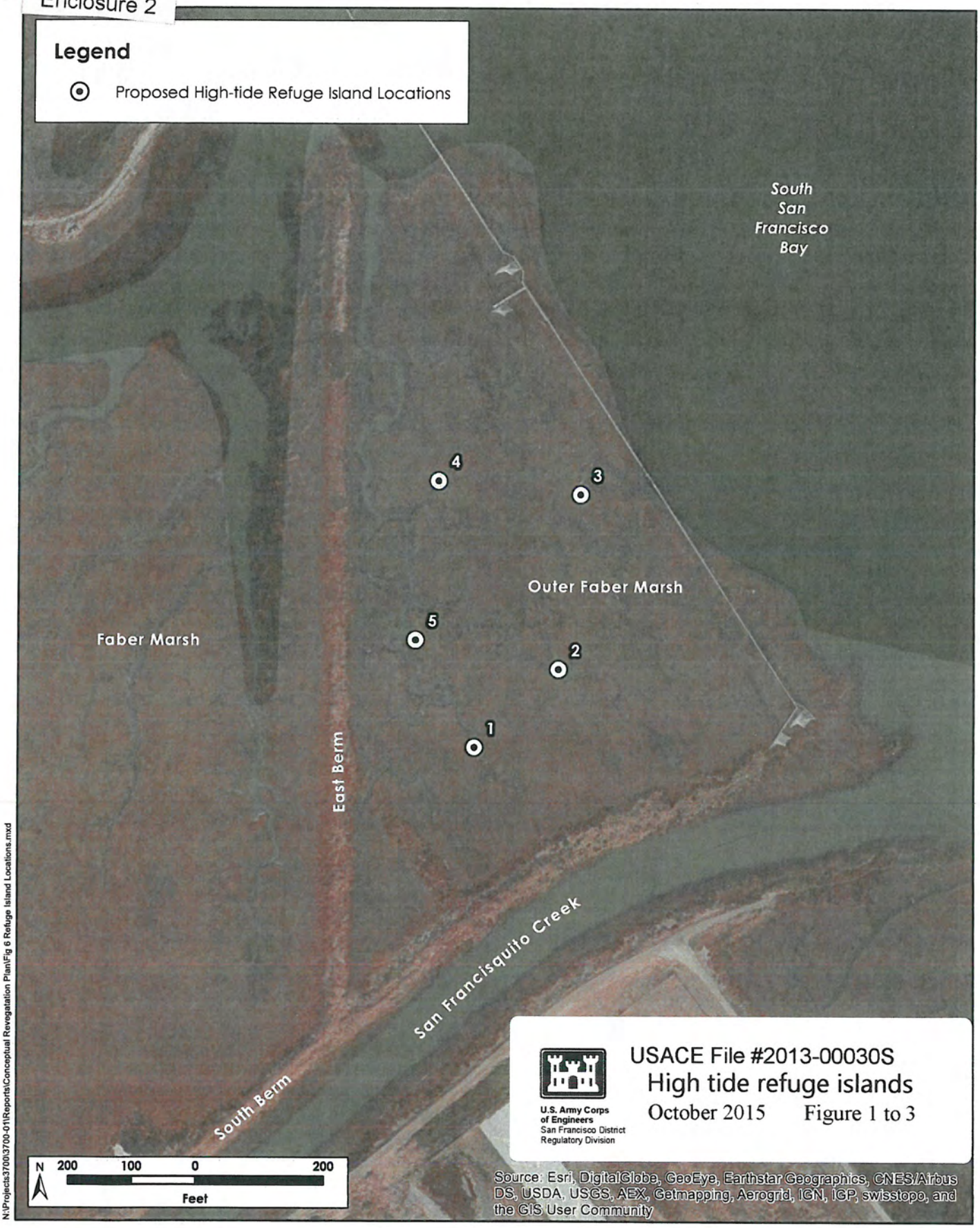
Appendix C

Process for Unacceptable Request for Appeal



Appendix D

Enclosure 2



N:\Projects3700\3700-01\Reports\Conceptual Revegatation Plan\Fig 6 Refuge Island Locations.mxd

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 6. Refuge Island Locations

San Francisquito Creek Flood Protection Project
Conceptual High Tide Refuge Habitat Enhancement Plan (3700-01)
October 2015

1. PURPOSE AND SCOPE

This defines District policies and procedures for pesticide approval, purchasing, acquisition, handling, use, storage, transportation, disposal, and reporting in a manner consistent with all Districts' permits, the California Environmental Quality Act (CEQA), and the California Department of Pesticide Regulation. These policies and procedures do not replace the need for regulatory permits and only apply to District work activities once these permits are in place.

These policies and procedures apply to all District-owned or operated facilities and staff, contractors, permittees, and suppliers. The District goal is to minimize the environmental risk and exposure resulting from its pesticide use by employing Best Management Practices (BMPs) and alternatives to their use to the maximum extent practicable and to facilitate the safe use of pesticide by qualified staff and contractors.

2. POLICY

1. Only pesticides included on W751D01 Pesticides Products Approved for District Use (Product List) are allowed to be used, in the appropriate categories for product application on District facilities.

   1.1. District staff is prohibited from purchasing over the counter pesticides

   1.2. The product lists will be updated, as needed, by the Pesticide Review Team to ensure compliance with these practices.

   1.3. All pesticide products not on the approved list that are desired to be used on District facilities (by employees, contractors, or permittees) will need first to be reviewed and approved by the Pesticide Review Team (PRT) prior to their use in accordance with Section 8 of this document and be verified as being in accordance with any relevant regulatory agency review.

2. **State-certified Qualified Applicator** (see definition in Section 4) with the appropriate current certification categories must be onsite for entire application of all pesticides.

3. Products listed on the State Department of Pesticide Regulation (DPR) "A" list of known groundwater contaminants will not be used. Detailed information on DPR regulations can be found on their web site at http://www.cdpr.ca.gov/docs/legbills/calcode/040101.htm#a6800

4. Category I and II pesticides will not be used for routine projects without prior review and approval by the Pesticide Review Team and per regulatory authorizations.

5. To minimize the use of pesticides in the work place, pesticides derived from non-toxic natural ingredients should be used as repellants when appropriate.

6. Insecticides are used after other methods, such as prevention or natural nontoxic control methods, have been shown to be ineffective in similar situations. Where use is needed, the product with the lowest toxicity is used in accordance with the manufacturer's label.

7. Herbicides are used only when alternatives use such as mowing, hand removal, disking, or grazing, has been shown to be ineffective or inefficient to meet the needs and requirements of this program.

   7.1. No herbicide shall be used by District staff without a written recommendation from a Pest Control Advisor in accordance with State Department of Pesticide Regulation (DPR) www.cdpr.ca.gov

8. Rodenticides are used only after trapping to control burrowing rodents has been shown to be ineffective in similar situations or deemed impractical, unless regulatory permits are required.

9. ☐Pesticides containing the following are prohibited without exception:
   9.1. Copper based products on or around any body of water.
   9.2. Organophosphate or Carbamate products.

3. REFERENCE DOCUMENTS

External Reference Documents

REFERENCE DOCUMENT	DOCUMENT LOCATION(S)
State Department of Pesticide Regulation (DPR)	www.cdpr.ca.gov http://www.cdpr.ca.gov/docs/dept/quicklinks/compliance/lawsregs.htm
State Department of Pesticide Regulation (DPR) - pesticides that are known to cause groundwater contamination	http://www.cdpr.ca.gov/docs/legbills/calcode/040101.htm#a6800
State Department of Pesticide Regulation (DPR) - Keeping Pesticides Out Of Floodwaters – Container Labeling	http://www.cdpr.ca.gov/docs/pressrls/archive/1998/980213.htm
California Environmental Quality Act (CEQA)	http://ceres.ca.gov/ceqa/
California Food and Agricultural Code for Non-Production Agricultural Use	http://www.cdfa.ca.gov/phpps/LBAMeir/CH%207_Public%20Svcs%20&%20Haz%20Resp.pdf http://www.cdpr.ca.gov/docs/enforce/bulletins/ag_nonag.pdf
State Department of Fish and Game Code relative to stream alterations	http://www.dfg.ca.gov/habcon/1600/
Environmental Protection Agency regulations	http://www.epa.gov/pesticides/regulating/laws.htm http://www.epa.gov/pesticides/regulating/containers.htm
Spill Cleanup on The Pesticide Environmental Stewardship (PES) website supported by Center for Integrated Pest Management	http://pesticidestewardship.org/spill/Pages/SpillCleanup.aspx

Internal Reference Documents

REFERENCE DOCUMENT	DOCUMENT LOCATION(S)
Q520D01 Environmental Management System Environmental Planning	District QEMS
Q741D03 Procurement of General Services	District QEMS
Q830D01 HAZMAT Emergency Response Procedures	District QEMS
W751M01 Best Management Practices (BMP) Handbook	District QEMS
W640D07 Contractor Safety Program	District QEMS
W640D36 Chemical Purchasing	District QEMS
W640D23 Personal Protective Equipment	District QEMS

REFERENCE DOCUMENT	DOCUMENT LOCATION(S)
W751D01 Pesticides Products Approved for District Use	District QEMS
F751D01 Pest Control Recommendation & Spray Operators Report	District QEMS
WQ75101 Field Operations Work Order Process	District QEMS - Watersheds
WQ75103 Review of Community Projects	District QEMS - Watersheds
Pesticide Safety Training Record	Process Owner Files
SMP BMPs (Modified by Permit Conditions)	
National Pollutant Discharge Elimination System (NPDES) permit requirements	
Countywide Urban Runoff permit requirements	

4. DEFINITIONS

Integrated Pest Management – Integrated pest management (IPM), is a process that is used at the Santa Clara Valley Water District (District) to solve pest problems through a combination of techniques such as biological control, cultural controls, mechanical and physical controls, and chemical control while minimizing risks to people and the environment. IPM is practiced at the District to manage a variety of pests such as algae, weeds, and squirrels.

Permitting – The process to acquire regulatory permits from state and federal agencies that have legal jurisdiction with the application of pesticides. Permitting and receiving permits allows the District to legally apply pesticides per the directives in the permits. An environmental planner needs to be engaged to discuss the potential permitting issues.

Pest Control Advisor (PCA) – As defined by the State of California, the Pest Control Advisor is an individual who meets the minimum educational requirements to qualify for examination and who passes the State examination in the categories relative to the area of pesticide work for which they will be making written recommendations for pesticide use. Categories relative to this policy include: Insects, Mites and Other Invertebrates, Vertebrate Pests, and Weeds. The licensed Pest Control Advisor is the authority making written recommendations for pesticide use.

Pest Control Operator (PCO) – The Pest Control Operator possesses a valid Qualified Applicator License from the State of California, supervises the pesticide application (restricted use and/or general use) made by a licensed pest control business, and is responsible for the safe and legal operation of that business relative to pesticide use.

Pesticide – A product formulated specifically for the purpose of controlling pests. The generic term "pesticide" refers to a broad spectrum of products, including herbicides, insecticides, algaecide, rodenticides, etc. The following pesticides are used by the District:

- **Algaecide** – Algae control in percolation ponds.
- **Fungicides** – Chemical that controls fungi. The District does not use fungicides
- **Herbicides** – Control of weeds and undesirable vegetation to minimize fire hazards, control invasive species, maintains flood conveyance of waterways, and complies with State and Federal requirements.

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- **Insecticides** – Control of insects in and around District buildings or worksites, or in the case of a serious pest outbreak,

- **Rodenticides** – Control of rodents on flood control levees, dams, and other facilities.

Pesticide Review Team (PRT) –is a five member committee consisting of the following functional roles: District PCA, Health and Safety Program Administrator, Watershed Biologist, Water Utility Support Program Administrator, and Facilities Maintenance Administrator.

Product Lists – W751D01 Pesticides Products Approved for District Use approved by Pesticide Review Team

Qualified Applicator – As defined by the State of California is an individual who has passed the State examination for application of various pesticide products and is certified to do so. A Qualified Applicator must be certified in the appropriate certification categories to perform the pesticide application. Categories relative to this policy include: Landscape Maintenance, Right of Way, Aquatic, and Residential, Industrial and Institutional.

Toxicity – The Environmental Protection Agency and the State Department of Pesticide Regulation define pesticides in the following categories:

- **Category I** – highest pesticide toxicity, or poses specific health hazards such as a severe eye hazard.
  - Signal Word(s) - ***Danger/Poison; Skull & Crossbones***

- **Category II** – Moderate toxicity pesticides 1-10 times less toxic than Category I.
  - Signal word ***- Warning***

- **Categories III and IV** – least toxic, 1-10 times less toxic than Category II, and Category IV is considered practically non-toxic.
  - Signal word – **Caution**

5. ROLES AND RESPONSIBILITIES

District's Pest Control Adviser (PCA): Is responsible for coordinating, reviewing, tracking, documenting and reporting pest control practices at the District. Additionally, the PCA provides updates on policy changes and modifications to all District staff. The PCA works with the Watersheds Environmental Health and Safety Program Administrator on the aspects of employee training. This role is filled by the Vegetation Program Senior Field Operations Administrators and the Vegetation Program Specialist II's in the Vegetation Management Unit.

Pesticide Policy Process Owner: Is responsible for resolving any issues with related pesticide use that could not be resolved by working with the PRT and Management. This role is filled by the Vegetation Unit Manager.

Pesticide Review Team (PRT): The purpose of this operational team is to oversee compliance to the pesticide program. The team will also be responsible for meeting on an as needed basis to determine the following:~~Meeting annually and as-needed which will be decided by the Team~~

- Evaluating the District's pesticide use
- Revision, as needed, of the Pesticides Products Approved for District Use list.

- Responding to issues relative to the use of pesticides
- Recommending changes to the pesticide program including training and procedures
- Reviewing, evaluating, and approving the use of new products including those to be used by contractors and permittees. These approvals do not override the legal requirements for CEQA compliance
- Researching alternatives to pesticides using staff and consultant services

Unit Manager of Units with Oversight of the Use of Pesticides - these units include, but are not limited to: Vegetation Management Unit, Facilities, Watershed Field Operations Units, Water Utility Raw Water Field Operations and Pipeline Maintenance Unit, and Watershed Stream Stewardship

- Provide training on pesticide use, MSDS labeling, and BMPs relating to pesticide use
- Maintaining original training records in accordance with District Record Retention Policy
- Sending copies of training records to the Training Unit

Unit Manager with Oversight of Pesticide Contractors – these units include: Vegetation Management Unit, Facilities, and Watershed Stream Stewardship are responsible for

- Ensuring that any contracts involving pesticides comply with this document and contain all project specific requests, restrictions, and BMPs for limitation on pesticide use prior to signing contract
- Ensuring that any contractors using pesticides have immediate oversight by a State-Certified Qualified Applicator
- Oversight of the pesticide contractor from the time the contract is in effect to the end of the contract service
- Training contractors on District BMPs, District Environmental Management System including Policy and aspects, Pesticide Policies (this document), and W751D01 Pesticide Products Approved for District Use
- Acquiring the appropriate approvals, permits, any environmental reviews, biological surveys, and clearances before beginning work
- Providing a report after the use of pesticides back to the Vegetation Management Unit Manager with the exact names of pesticides applied and the amounts used

Qualified Applicator* – Is responsible for:

- Being certified by the State of California with the appropriate certification categories (see definition, section 4)
- Annual training of District BMPs, Pesticide Policies (this document), and W751D01 Pesticide Products Approved for District Use.
- Must be onsite for entire application “immediate oversight” of all pesticide use.
- Responsible for the storage, handling, transportation, labeling, disposal, and clean up of spills according to State Department of Pesticide Regulation, District standards, and Hazardous Materials regulations.
- Posting on the project site and notifying the appropriate parties of the pesticide use
- Completing a Spray Operators Report (F751D01) for each pesticide application and then submitting report to the appropriate review body of by the applicable due dates.
  *The following classifications in Unit 295 are required to be Qualified Applicators:
  - Maintenance Worker Series (MW II, III, Senior)
  - Senior Field Operations Administrators
  - Vegetation Program Specialists
  - Vegetation Unit Manager

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Vegetation Unit Manager:

- Is the Pesticide Policy Process Owner
- Is responsible for resolving any issues with related pesticide use that could not be resolved by working with the PRT and Management.
- Is responsible for monthly reporting to the Agricultural Commissioner

6. REQUIREMENTS

6.1 ISO Requirements

- **ISO 9001 Quality Management System Requirements**
  - 7.5.1 Control of Production and Service Provision

- **ISO 14001 Environmental Management System**
  - 4.4.6 Operational Control

6.2 Other Requirements

- California Environmental Quality Act (CEQA) and other applicable Federal and State Regulations
- Board Governance Policies and Executive Limitations
- Best Management Practices of the various environmental documents covering the District's work on streams, water utility facilities, buildings, and grounds

7. MONITORING AND MEASUREMENT

The Pesticide Review Team will review and report on this process annually.

8. PROCEDURE

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
(1) Review of Pesticide Use (Pesticide Review Team)	• The Team will meet annually in January and as-needed to: o Evaluate the District's pesticide use. o Revise, as needed, the W751D01 Pesticide Products Approved for District Use list. o Respond to requests to add pesticides to W751D01 Pesticide Products Approved for District Use list. o Respond to issues relative to the use of pesticides. o Recommend changes to the pesticide program including training and procedures. o Review, evaluate, and approve the use of new products including those to be used by contractors and permittees. o Research alternatives to pesticides. • W751D01 Pesticide Products Approved for District Use will be released in accordance with Q423D01 District Document Control Process o Release announcement will be sent to all District Staff	W751D01 Pesticide Products Approved for District Use

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ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
(2) Purchase of Pesticides (District Staff)	• District Staff is prohibited from purchasing pesticides over the counter, as these are designated for home use only • See W751D01 Pesticide Products Approved for District Use for acquiring pesticides • If a pesticide is not listed on W751D01 Pesticide Products Approved for District Use, a request may be made to the PRT o Send the request through Access Valley Water to PCA o PCA will review the request and forward to PRT o Requestor will be notified of decision	Request using Access Valley Water
(3) Certification Requirements for Using Pesticides (District Staff, Contractors, Permittees)	• All applicable District staff, contractors, and permittees shall provide proof of State Certification performing pesticide applications. • As defined by the State of California, **State-certified Qualified Applicator** is an individual who has passed the State examination for application of various pesticide categories and is certified to do so. Categories relative to this policy include: Landscape Maintenance, Right of Way, Aquatic, and Residential, Industrial and Institutional. • Any pesticide use by District Staff, contractors, or permittees in the course of District business must be done with immediate oversight by a **State-certified Qualified Applicator with the appropriate certification categories**. o Only pesticides listed on W751D01 Pesticide Products Approved for District Use list can be used. • There is an exemption of Aerosol for Yellow Jackets and Spiders. See step 8.	Contractors and Permittee Proof of State Certification
(4) Pesticide Use with Permits, Agreements, or Licenses (Community Review Projects Unit (CPRU))	• Permits, agreements, and licenses will be issued by CPRU in accordance with WQ75103 Review of Community Projects. CPRU will work with Vegetation Management Unit on any pesticide request. o Any pesticide use by District Staff, contractors, or permittees in the course of District business must be done with immediate oversight by a **State-certified Qualified Applicator with the appropriate certification categories**. • Only pesticides listed on W751D01 Pesticide Products Approved for District Use list can be used. • If a pesticide is not listed on W751D01 Pesticide Products Approved for District Use, CPRU can make a request to add the product to the PRT by sending the request to the PCA using Access Valley Water	

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ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
(5) Training Requirements for Using Pesticides (Unit Managers of units who use or oversee the use of Pesticides)	• All Unit Managers of units who use or oversee the use of pesticides will provide trainings on pesticide, MSDS labeling, and BMPs for any staff that use or oversee the use of pesticide in the course of their duties. o Optionally, Unit Managers can contract Process Owner for training or alternatives. • The training shall include: o Review of laws and regulations o Updates on new products o Pesticide Policies (this document) o W751D01 Pesticide Products Approved for District Use o Review of proper procedures for use and handling o Review of W640D23 Personal Protective Equipment o Review of impacts of pesticides on the environment o Label/MSDS training – Proper reading and use o Impacts of pesticides on the environment o Updates on project-specific operating procedures and BMPs o Process for identifying and responding to potential secondary impacts (carcass discovery) o Proper emergency response procedure for accidental ingesting or spilling of pesticides • The Unit Manager providing the training is responsible for maintaining the original training records and for providing a copy to the Training & Employee Development Unit for entry into the Training Wizard	Staff Training Records
(6) Contractor Pesticide Use (i.e. landscape, rodent control) (Unit Manager requesting contracting services)	• The selection of contractors who use pesticides in the course of the contract will be in accordance with Q741D03 Procurement of General Services, W640D07 Contractor Safety Program, and this document. • RFP package includes the requirement that only **State-certified Qualified Applicator** with the appropriate current certification categories will provide immediate oversight for application of all pesticides. • Per Q741D03 Procurement of General Services, Procurement will verify the contractor is a **State-certified Qualified Applicator** with the appropriate current certification categories will provide immediate oversight for application of all pesticides to be used within the contract • Unit Manager requesting the pesticide contracting services is responsible for: o Oversight of the contract from the time the contract is in effect to the end of the contract service o Training the contractor on:	Contractor Training Records

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ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
	• The District's environmental policy, environmental management system, and the environmental aspects of the activities • District BMP's • Pesticide Policies (this document) • W751D01 Pesticide Products Approved for District Use • Safety training, see W640D07 Contractor Safety Program o Acquiring the appropriate approvals, permits, any environmental reviews, biological surveys, and clearances before beginning work o Providing an after use report with the exact pesticides used and amounts back the Vegetation Management Unit Manager within a week of application. This is necessary for tracking District pesticide use.	
(7) Processing Pesticide Use Recommendations for Internal Use (Pest Control Adviser (PCA))	• Staff pesticide requests are initiated, entered, and tracked in Maximo in accordance with WQ75101 Field Operations Work Order Process • The request will be evaluated for: o Any questions or issues will be resolved by the Pesticide Review Team o Environmental clearances and permits must be obtained, as required o Biological Survey and clearance must be obtained before proceeding with application of pesticides, when required by permit or regulation o BMPs must be followed • A proposed use is evaluated based on: o Regulatory restrictions including CEQA and BMPs o Anticipated effectiveness of the proposed methods o Public health aspects o Long and short term environmental impacts o Financial cost o Consistency with other District's policies • All herbicide use by District staff require a written recommendation from the PCA in accordance with State Department of Pesticide Regulation (DPR) www.cdpr.ca.gov • PCA develops a written Pest Control Recommendation (F751D01) for use in accordance with requirements of the California Food and Agricultural Code and forwards the request and recommendation to the Qualified Applicator. • The Qualified Applicator reviews the request and	F751D01 Pest Control Recommendation & Spray Operators Report

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ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
	recommendation and completes the work.	
(8) Use of Aerosols for Yellow Jackets and Spiders (Staff)	• District Staff is prohibited from purchasing pesticides over the counter as these are designated for home use only • Aerosols for yellow jackets and spiders can be obtained from PCA o Contact PCA via email and specify whether the use will be outdoors or indoors, date planned, and if training is needed. o Only employees that have been trained on the MSDS and label are allowed to use the aerosols for yellow jackets and spiders. Contact PCA for more details o Proper PPE (eye goggles and gloves) is required when handling these pesticides. o Aerosol cans will be individually issued. New cans can be issued only after empty cans are returned. • Reporting on the usage of the use of these pesticides: o Will be done after each can is emptied and returned to the PCA o Report will be submitted to the Agricultural Commissioner. See step 11 of this section.	Request
(9) Handling, Labeling, Storage, Disposal, Transportation, and Spills of Pesticides (Qualified Applicator)	• **Handling.** Mixing and loading should never be done without a full understanding of the pesticide label and with the use of all recommended personal protective equipment (PPEs-See W640D23 Personal Protective Equipment) The label will identify the dangers involved and the precautions to follow, may indicate the signs and symptoms of poisoning and recommend first aid practices, should one be exposed to the product. o Pesticide handling includes the following activities: • Mixing, loading transferring, applying or assisting with an application of pesticides, • Servicing, repairing or handling contaminated equipment, • Incorporating pesticides into soil or entering treated area during an application • **Labeling**. Containers containing pesticides will be labeled according to State Department of Pesticide Regulation (DPR) - Keeping Pesticides Out Of Floodwaters – Container Labeling http://www.cdpr.ca.gov/docs/pressrls/archive/1998/980213.htm o Each pesticide service container must be labeled with 1. Pesticide name	

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
	2. Signal word (Danger/Poison, Warning, or Caution) 3. Who the container belongs to (SCVWD) • **Storage.** Pesticides must be stored according to the properties set forth in the MSDS. See http://www.epa.gov/pesticides/regulating/containers.htm This includes: o Pesticides must be stored in labeled containers o Pesticides should be stored in a designated storage room that has secondary containment on earthquake secured shelves. o Pesticides should not be stored in a location that would expose them to direct sunlight. o **Disposal** of unused pesticides and associated containers will be handled in compliance with hazardous waste regulations o **Transportation** of Pesticides - o Never carry pesticides in the passenger compartment of any vehicle. o All pesticides containers should be secured in the cargo area of the vehicle. o Do not leave pesticides unattended in a vehicle unless they are inside a locked compartment. o A current inventory of all pesticides, along with MSDS's for each pesticide to be transported, should be available. o **Spills**. Any spilled pesticide will be cleaned up in accordance with Spill Cleanup on The Pesticide Environmental Stewardship (PES) website supported by Center for Integrated Pest Management (http://pesticidestewardship.org/spill/Pages/SpillCleanup.aspx) and Q830D01 HAZMAT Emergency Response Procedures	

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ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)

(10) Posting, Notification, and Application of Pesticides
 	
(Qualified Applicator)
	• Posting of areas where pesticides are used shall be performed in compliance with this policy as follows:
	  • Posting shall be performed in compliance with the label requirements of the product being applied.
	  • In addition, the District shall provide posting for **any** products applied in areas used by the public for recreational purposes, or those areas readily accessible to the public, regardless of whether the label requires such notification. In doing this, the District ensures that exposure risk is minimized by adopting practices that go beyond the product label requirements.
	  • Sign postings shall include the date and time of application, the product's active ingredients, common name, and the time of allowable re-entry into the treated area. A District staff contact phone number shall be posted on the sign.
	  • Signs shall not be removed until after the end of the specified re-entry interval.
	  • Right-to-know literature on the product shall be made available upon request to anyone in the area of the application.	

	• The District maintains records of neighbors with specific needs relative to notification prior to treatment of an adjacent area to ensure such needs are accommodated. These records are maintained in Maximo with the pest control recommendation.	Pest Control Recommendation & Spray Operators Report

	• A Spray Operators Report (F751D01) shall be completed for each pesticide application performed by District staff. This report shall be submitted with each daily work order in accordance with WQ75101 Field Operations Work Order Process and include:
	  • Pesticide common name and active ingredient
	  • Method of application
	  • Dilution rate, if applicable
	  • Total amount of product applied, **plus** the total amount of diluted material
	  • For outdoor applications, weather conditions, including temperature and wind speed
	  • Specific pests controlled with each application	

	• Unit Managers overseeing pesticide contractors must supply a monthly use report with the exact pesticides used and amounts (Spray Operators Report) to the Vegetation Management Unit Manager by the 5th day of the following month. This is necessary for tracking all pesticide use on District facilities. The contractor's use report is an internal document only and will not be submitted to the Agricultural Commissioner.	Pesticide Contractor's Spray Operators Report
	• Contractor is responsible for submitting their monthly use report to the Agricultural commissioner in accordance with the State Certification requirements.	

ACTION STATEMENT & ROLE	DETAILS (DESCRIBE STEPS)	QUALITY RECORDS (OUTPUT FROM STEP)
(11)Reporting (Vegetation Unit Manager)	• ☐A report will be run monthly from Maximo listing the total amount of products used for pest control including the common name. • ☐This listing will be submitted to the Agricultural commissioner no later than the 10th day of each month.	Maximo Report Report send to Agricultural Commissioner

9. QUALITY RECORDS

QUALITY RECORD	LOCATION KEPT	FILING ORDER	RECORDS RETENTION SCHEDULE SERIES NO.	COMMENTS
Pesticide Products Approved for District Use List	District Document Control	Document ID	RS-0226	
Maximo Database Record (including reports)	Network Server	Work Order Number	RS-0052	
Pest Control Recommendation & Report	Work Order	Facility Number & Date	RS-0221	
Report send to Agricultural Commissioner	Process Owner Files	Date	RS-0026	
Original Training Records	Process Owner Files	Date	RS-0076	

10. CHANGE HISTORY

Date	Revision	Comments
02/10/10	A	Initial release into QEMS, effective 1/27/10. Supersedes Administrative Policy and Procedure Ad-8.2 Pesticide Use. This document was sent to be reviewed by: Bill Smith; Geoffrey Weigand; David Matthews; Marc Klemencic; Liang Lee; Mike Martin; Debra Caldon; Mike Cresap; Melanie Richardson (Maryann O'Brien); Ann Draper; Chris Elias; Jim Fiedler; Michael Hamer; Frank Maitski; and Neddal Ali-Adeeb.
04/29/11	B	Major rewrite of document. Document was sent for the first stakeholder review in September 2010 and a second stakeholder review in December 2010. Comments were provided by Michael Sanchez; Jennifer Castillo; David Dunlap; Joe Chavez; Jim Crowley; Jamie McLeod; David Matthews; Bill Smith; Kenneth McKenzie; John Chapman, Sunny Williams, Lisa Porcella, and Nina Merrill. A meeting with held with Larry Lopez, Geoffrey Weigand, Mike Cresap; and Tom Spada to collect comments. Stakeholder comments have been responded to and incorporated into the document where appropriate.
09/21/11	C	Minor editorial changes: incorporated W640D23 Personal Protective Equipment in Procedure Steps 5 and 9 and added a link to Spill Cleanup.
09/13/12	D	Minor editorial changes: added definition of IPM, corrections of spelling and language.
12/23/15	D	Minor editorial change: clarified roles and responsibilities of classifications in Unit 295 and requirements for Licensing and Certifications in the Unit

11. ADDENDA

None

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Trade Name	Common Name	Pesticide Type	Target	Label	MSDS
Aquamaster®	Glyphosate	Post-emergent Herbicide	Non-selective	http://www.cdms.net/LDat/ld4BL000.pdf	http://www.cdms.net/LDat/mp4BL002.pdf
Roundup Pro® Concentrate	Glyphosate	Post-emergent Herbicide	Non-selective	http://www.cdms.net/LDat/ld5EH008.pdf	http://www.cdms.net/LDat/mp5EH006.pdf
Habitat®	Imazapyr	Post-emergent Herbicide	Aquatic	http://www.cdms.net/LDat/ld6H2005.pdf	http://www.cdms.net/LDat/mp6H2007.pdf
Gallery® 75 Dry	Isoxaben	Post-emergent Herbicide	Broadleaf	http://www.cdms.net/LDat/ld638000.pdf	http://www.cdms.net/LDat/mp638003.pdf
Garlon® 4	Triclopyr	Post-emergent Herbicide	Broadleaf	http://www.cdms.net/LDat/ld0B0010.pdf	http://www.cdms.net/LDat/mp0B0012.pdf
Transline®	Clopyralid	Post-emergent Herbicide	Broadleaf	http://www.cdms.net/LDat/ld0BB014.pdf	http://www.cdms.net/LDat/mp0BB021.pdf
Pendulum® AquaCap™	Pendimethalin	Post-emergent Herbicide	Non-selective Broadleaf/ grasses	http://www.cdms.net/LDat/ld3BO006.pdf	http://www.cdms.net/LDat/mp3BO007.pdf
Competitor®	Dialkyl Polyoxyethylene Glycol	Surfactant		http://www.cdms.net/LDat/ld6G2007.pdf	http://www.cdms.net/LDat/mp6G2001.pdf
Sonar*	Fluridone	Aquatic Herbicide	Aquatic vegetation	http://www.sepro.com/documents/SonarSRP_Label.pdf	http://www.sepro.com/documents/SonarSRP_MSDS.pdf
chlorophacinone Bait*	Chlorophacinone / Diphacinone	Rodenticide	Ground Squirrels	http://www.slocounty.ca.gov/Assets/AG/assets/Chorophacinone.pdf http://www.slocounty.ca.gov/Assets/AG/assets/Diphacinone.pdf	
Gopher Bait*	Strychnine	Rodenticide	Gophers	http://www.wilcodistributors.com/pdf/AG50_bait.pdf	http://www.wilcodistributors.com/pdf/360297_new.pdf
EcoEXEMPT ® KO	2-Phenethyl Propionate	Insecticide	Insects	http://www.biconet.com/crawlers/infosheets/ecoExemptKOLabel.pdf	http://www.biconet.com/crawlers/infosheets/ecoExemptKOMSDS.pdf

* Products used by contractors

Note: Other products might be used if approved by the Pesticide Review Team. See Q751D02 Control and Oversight of Pesticide Use

1. PURPOSE AND SCOPE:

The purpose of this document is to define and substantiate vegetation control activities on creeks and rivers of the Santa Clara Valley Water District (District). This document will be used for the following purposes:

1. Training of field staff on vegetation control activities and the goals of the program.
2. Annual review of program goals by field staff, supervisors, and technical staff.
3. Education of District employees outside of the Vegetation Management Unit on the goals of the program.
4. As a source of information for the general public and other public agencies.

The District has a wide variety of modified channel types, as well as unmodified, or natural channels under its jurisdiction. The vegetation control program is designed to fit the flood control designs of the improved facilities and to assist in the minimization of potential problems in the unimproved facilities. The basic premise behind the program is to control unwanted vegetation while minimizing damage to desirable vegetation. By succeeding, engineering standards, flood control designs, environmental concerns and habitat requirements for riparian and wetland species can all be ensured in both a timely, environmentally sensitive and economic manner.

2. REFERENCE DOCUMENTS:

External References:
None

Internal References:
Q751D02 Control and Oversight of Pesticide Use
WQ75101 Field Operations Work Order Process
WF75123 BMP Daily Checklist – SR/BP
WF75124 BMP Project Checklist – SR/BP
WF75125 BMP Checklist – Concrete
WF75126 BMP Checklist – Herbicide (Chemical)
WF75127 BMP Checklist – Mech Veg Removal (Non-Chemical)
Stream Maintenance Program EIR
Stream Maintenance Program BMP's
Maintenance Guidelines
Habitat Conservation Plan
O&M Manuals

3. DEFINITIONS:

DEFINITION OF VEGETATION CONTROL ACTIVITIES
The general definition of vegetation control as it will be used in this document includes:

1. The selective control of undesirable vegetation from top of bank to top of bank in a stream to meet maintenance guidelines or engineering standards.

2. The control of non-native species from top of bank to top of bank. **Non-native species targeted, unless otherwise specified in the work order and pesticide recommendation are Tree Tobacco, Castor Bean, Pampas Grass, Arundo donax, Eucalyptus, Ailanthus, Tamarisk, Spartina, Lepidium Ditrichia and Broom species.**

3. The control of upland vegetation for fire prevention or maintenance access. Control of vegetation for these purposes is performed by a combination of mechanical, chemical or hand removal activities.

4. ROLES AND RESPONSIBILITIES:

N/A

5. REQUIREMENTS:

5.1. ISO 9001

7.5.1 Control of Production and Service Provision

5.2. ISO 14001

4.4.6 Operational Control

5.3. Other Requirements

Q751D02 Control and Oversight of Pesticide Use
SMP Permits & CEQA documents

6. MONITORING AND MEASUREMENT:

None

7. PROCEDURE:

PLANNING OF VEGETATION CONTROL WORK

The Vegetation Program Specialist, bases the recommendations for vegetation control activities on the following criteria:

1) Channel type and size of channel
2) Engineering and/or flood control/hydrology standards for the facility
3) Right of way access needs
4) Combustible fuel loads (fire protection)
5) Environmental considerations (including regulatory compliance with other agencies)
6) Avoidance/minimization of damage to existing desirable vegetation (including revegetation areas, native vegetation, sensitive or listed plants, sensitive habitat, in the targeted application area)

Each **work order** (Quality Record) for a vegetation control activity will be in accordance with WQ75101 Field Operations Work Order Process and contains the following information:

1. A computer generated description of the facility, specific location(s) of work areas, and specific work to be performed (vegetation types, etc)
2. A channel cross section showing the locations of the vegetation to be controlled
3. A BMP checklist
4. If herbicides are used for the work, a pest control recommendation containing all of the application information required by the State Department of Pesticide Regulation. This recommendation also provides further specifics regarding the type of treatment for the facility.
5. Maps and photos of the area which include further description of work to be performed, areas to leave undisturbed, etc.
6. Written clearances by Environmental Services staff relative to bird nesting, fisheries, amphibians, etc.

METHOD

The following pages describe the methods of work performed on District facilities. The methods vary in relation to the type of channel. A list of each facility or portion of facility that falls into each category follows the category description.

DESCRIPTION OF CHANNEL TYPES

The following description begins with the largest modified facilities and ends with the smallest unmodified facilities.

IN STREAM WORK DESCRIPTIONS

In stream work descriptions are specific to the facility type(s) as defined in this section.

1) LARGE IMPROVED EARTHEN CHANNELS (WITH OR WITHOUT LEVEES)

In general, all of the larger channels under the District's jurisdiction can tolerate flexible aquatic vegetation and some large trees . For this reason, unless otherwise specified by formal standards or guidelines, the work performed on these facilities is limited to the following:

1. Control of woody volunteers or riparian species that exceed the hydraulic standard criteria for the facility. Treatment with aquatic herbicides is limited to trees less the 2 inches DBH, or less than 10 feet in height. Removal by hand or mechanical methods is limited to trees less than 6 inches DBH. Unless specified in the engineering standards, mitigation documents, or O&M Guidelines for the facility, woody riparian species will be allowed to remain within ten feet of both sides of the existing low flow channel to maintain appropriate water temperatures for fisheries. Application is made in the channel bottom by foliar application (spray to wet coverage of all of the plant's foliage). In areas where herbicide drift may affect desirable species, the trees will be cut by chainsaw or other hand methods and the fresh stumps will be treated with aquatic herbicide (Aquamaster) immediately after the cut is made.

2. Selected pruning of in stream vegetation to an identified height to allow flows to pass below the canopy. This design feature will be noted on the specific work order. Types of

vegetation, height of pruning and estimated frequency will be noted in Maintenance Guidelines for specific facilities and will serve as a reference for the work order.

3. Clearance of woody vegetation from toe to toe within 100 feet upstream and downstream of bridges or as defined in Maintenance Guidelines or Engineering Standards.

4. Control of non native species described earlier in this document within the entire right of way. Any additional species of concern specific to the facility will be outlined in the work order or pest control recommendation. If the applicator discovers undesirable species not listed in this document or in the work order package, approval of treatment must be made in writing by the Pest Control Adviser.

5. Larger trees are left in the channel bottom and on the slopes of these facilities to establish and maintain a riparian canopy. Large non native species may be removed and the stumps chemically treated. Any large tree removal must be cleared by the appropriate Watershed Environmental Planner and permitted by local municipalities where applicable.

The channels included in this category are:
STEVENS CREEK
SAN FRANCISQUITO CREEK
CALABAZAS CREEK (HWY 101 D/S TO HWY 237)
SAN TOMAS CREEK (SARATOGA CREEK TO HWY 237)
SARATOGA CREEK (PRUNERIDGE D/S TO SAN TOMAS CREEK)
GUADALUPE RIVER (ALAMITOS CREEK TO D/S UPRR)
LOS GATOS CREEK
ALAMITOS CREEK
GUADALUPE CREEK (NON NATIVES ONLY)
COYOTE CREEK
BERRYESSA CREEK (CALAVERAS BLVD TO LOWER PEN)
THOMPSON CREEK (QUIMBY RD. U/S TO CADWALLADER)

2) SMALL IMPROVED EARTHEN CHANNELS

Generally, smaller improved earthen channels cannot tolerate woody vegetation. There are limitations on the amounts of upright aquatic vegetation allowed in the channel bottom to meet engineering standards and maintenance guidelines. Work performed on these facilities includes the following:

1) Control of woody volunteers from toe to toe.
2) Control of excessive upright aquatic vegetation (cattails, bulrush etc.) from toe to toe.
3) Control of non natives from top of bank to top of bank.

Native trees and shrubs are left untreated on the slopes of these facilities unless identified in writing to be removed as part of each individual project.

The channels included in this category are:
PERMANENTE CREEK (HWY 101 D/S TO CHARLESTON)
SUNNYVALE EAST
SUNNYVALE WEST
CALABAZAS (LAWRENCE EXPRESSWAY U/S TO MILLER)
CONTACT THE REVEG SECTION (ext 3867)FOR AREAS TO AVOID
RODEO CREEK
REGNART CREEK

PROSPECT CREEK
EL CAMINO STORM DRAIN
JUNIPERO SERRA CHANNEL (D/S WOLFE RD. TO CALABAZAS)
SAN TOMAS CREEK (POLLARD ROAD TO McCOY)
SARATOGA CREEK (PRUNERIDGE U/S TO PROSPECT RD.)
SMITH CREEK (U/S GRANADA WAY TO END OF ACCESS)
CANOAS CREEK
GOLF CREEK
GREYSTONE CREEK (ALAMITOS CREEK U/S TO ALMADEN EXPRESSWAY)
ROSS CREEK
RANDOL CREEK
BERRYESSA CREEK (OLD PIEDMONT RD. TO CALAVERAS BLVD.)
CALERA CREEK
RUBY CREEK
LOS COCHES CREEK (BERRYESSA CREEK U/S TO DEMPSEY)
SILVER CREEK
MIGUELITA CREEK
PIEDMONT CREEK (BERRYESSA CREEK U/S TO HWY 680)
UPPER PENITENCIA CREEK
LOWER PENITENCIA CREEK
SIERRA CREEK
TULARCITOS CREEK
NORWOOD CREEK
QUIMBY CREEK
THOMPSON CREEK (SILVER CREEK U/S TO QUIMBY RD.)
FLINT CREEK
EAST PENITENCIA CREEK

3) CONCRETE LINED CHANNELS

Concrete lined U-frame or trapezoidal channels require vegetation control for both flood control and to maintain the structural integrity of the concrete lining. Work on these facilities includes the following:

1) Control of woody volunteers from toe to toe.
2) Control of upright aquatic vegetation from toe to toe.
3) Control of all vegetation in weep holes, expansion joints and any areas which may damage the structural integrity of the concrete.
4) Control of non natives within the right of way.

The channels included in this category are:

ADOBE CREEK (EL CAMINO D/S TO HWY 1O1)
BARRON CREEK (EL CAMINO D/S TO HWY 101)
MATADERO CREEK (EL CAMINO D/S TO HWY 101)
STANFORD CHANNEL
HALE CREEK (PERMANENTE CREEK U/S TO ROSITA)
PERMANENTE CREEK (HWY 101 U/S TO HALE CREEK)
CALABAZAS CREEK (HWY 1O1 U/S TO LAWRENCE)
JUNIPERO SERRA CHANNEL (WOLFE RD. U/S TO HWY 85)
SAN TOMAS CREEK (WILLIAMS RD. U/S TO McCOY)
SMITH CREEK (SAN TOMAS CREEK U/S TO VASONA CANAL)
DAVES CREEK (WILD WAY U/S TO FIRST DROP STRUCTURE)
GREYSTONE CREEK (ALMADEN EXPWY TO OLIVE BRANCH)

LONE HILL CREEK (ROSS CREEK U/S TO LOS GATOS ALMADEN)
ROSS CREEK (BLOSSOM HILL RD. TO DEL CARLO CT.)
NORTH BABB CREEK
SOUTH BABB CREEK
LOS COCHES CREEK (S. PARK VICTORIA U/S TO EVANS)
PIEDMONT CREEK (HWY 680 U/S TO PARK VICTORIA)
SILVER CREEK DIVERSION

4) UNIMPROVED (NATURAL) CHANNELS

Aquatic work in unimproved channels is limited to the following:

1) Areas where the District has legal right of way.
2) Non-native vegetation (this is limited to cut stump treatments only)
3) Poison oak control as requested by the public or which impedes maintenance work. Due to the high habitat value of poison oak, requests from the public will be handled on a case by case basis.
4) Control of woody and aquatic vegetation from toe to toe as needed.

All work in unmodified channels must meet the requirements of the unmodified channel appendix of the District's Stream Maintenance EIR.

The channels included in this category are:

ADOBE CREEK (EL CAMINO U/S TO THE U/S END OF THE DIVERSION)
BARRON CREEK (DEBRIS BASIN U/S TO ARASTRADERO RD.)
HENEY CREEK
PERMANENTE CREEK (HALE CREEK U/S TO FOOTHILL EXPWY)
SUMMERHILL CREEK
CALABAZAS CREEK (MILLER AVE. U/S TO CHIQUITA)
SARATOGA CREEK (PROSPECT RD. U/S TO CRESTBROOK)
WILDCAT CREEK
CALERO CREEK
SANTA TERESA CREEK

UPLAND WORK DESCRIPTIONS

Upland work activities include weed abatement, and removal of vegetation to provide maintenance access and fire prevention. The level of fire prevention work is determined through a collaborative process between Unit staff and staff from the County Fire Marshall's office.

These activities are more general in nature and do not vary significantly based on the specific channel type. Upland work activities include:

1. Herbicide applications on Maintenance Roads and top of bank areas
2. Pruning of overhanging growth to provide maintenance access
3. Mowing of creek banks and levee slopes
4. Mechanical Disking, mowing or hand removal of weeds on floodplains and larger upland parcels.

Each of these activities are performed under specific work orders for each facility after being reviewed by the Vegetation Program Specialist and cleared by Environmental Services staff.

Standard operating procedures for both in stream and upland vegetation control activities are included in the following section.

STANDARD OPERATING PROCEDURES (SOP'S)

In addition to the formal Best Management Practices of the Stream Maintenance Program EIR, the District's vegetation management program incorporates the following standard operating procedures into its day to day operation:

1. Application of herbicides from the downstream end of a project to the upstream end. This minimizes the potential of the herbicide concentration increasing, which may happen if the application is being made in the direction of the current.

2. Minimizing drift by using anti-drift agents and applying the herbicide from the upwind side of the target. Jobs are shut down when winds exceed 10 mph. All applicators carry anemometers to measure wind speed prior to and during an application. Target species are treated from as close a distance as possible to minimize drift to off site species. Whenever possible, applicators wash off any off target drift from desirable foliage.

3. Training of all Unit staff and contractors in the identification of native and non native species, special status species, desirable and undesirable vegetation prior to the start of each work season.

4. Requiring that all employees, contractors etc. who apply herbicides do so only under the immediate oversight (must be on site during application) of a Qualified Applicator as defined by the State Department of Pesticide Regulation and only with a written recommendation by a licensed Pest Control Adviser (PCA) in accordance with Q751D02 Control and Oversight of Pesticide Use.

5. Evaluation of each site by a Vegetation Program Specialist of which activity (chemical, mechanical or hand removal) best suits the job based on environmental criteria, etc. In cases where herbicides will be used, such evaluation must be performed by a Pest Control Adviser.

6. Routine monitoring of channels for changes in vegetation types and invasive species so that control can be obtained with minimum impact to desirable species.

7. Application of aquatic herbicides or mechanical control of in stream vegetation is performed only during the time of year between the end of bird nesting season (usually when cleared by District Biological staff) and the commencement of anadromous fish migration. (Usually around October 15th, or as described in the Stream Maintenance Program). In addition, further avoidance is taken regarding any listed species in specific areas as defined by biological staff. In specific areas of concern, no activities during these periods will occur without an accompanying biological survey by District biologists.

8. Mechanical and hand removal of upland weeds and removal or pruning of overhanging growth for maintenance access shall not be performed during nesting season (as defined by biological staff) without accompanying nesting or botanical surveys by qualified staff. If nests are found in the work area, work may only proceed after the nests have been marked and an appropriate buffer zone has been clearly identified as described in the BMP document. Work shall not be performed within the buffer zone until approved by a District biologist. In areas with special plant species, work shall not proceed until a qualified botanist has cleared work (upon completion of seed set and dispersal)

9. Discontinuing applications when out of season activities are noticed (e.g. early migration of fish, early or late nesting of upland species, late nesting waterfowl, or the presence of endangered or threatened species.)

10. Any removal or control of native vegetation within the channel banks or in upland areas is prohibited without **written** direction from the Vegetation Specialist or the Senior Field Operations Administrator. In cases where selective vegetative thinning is to occur, each plant or plant type to be removed will be required to be clearly identified prior to the start of work through pre construction meetings, or site surveys.

11. Continual research of new methods, equipment, products and ongoing development of staff.

This document will be reviewed by staff at the start of each work season as part of their training. Failure to follow the guidelines in this or any other documents defining the restrictions and requirements for vegetation management will result in progressive disciplinary measures up to and including dismissal of the employee.

8. QUALITY RECORDS:

QUALITY RECORD	LOCATION KEPT	FILING ORDER	RECORDS RETENTION SCHEDULE SERIES NO.	COMMENTS
BMP Checklists	BMP Binder (SR. FAO)	Activity, Facility Number & Date	RS-0219	
Work Order Package	SOS	Facility Number & Date	RS-0172	
Maximo – Work Order	Maximo	Facility Number & Date	RS-0052	

9. CHANGE HISTORY:

Date	Revision	Comments
09/07/05	R1	New Release
01/25/11	R2	Update of template

10. ADDENDA:

None

Downloaded or printed copies are for reference only. Verify this is the current version prior to use. See the District website for released version.

This document records the **Established Level of Service** for a reach of waterway based on the sources cited as approved below:

Watershed	**Lower Peninsula**	**Waterway**	**San Francisquito Creek**
Reach	**San Francisco Bay to Hwy 101**	**Modified**	**San Francisquito Creek Flood Risk Reduction, Ecosytem Enhancement and Recreation Project**

Established Level of Service by Category:

1. Board Ends Policy E-3, Natural Flood Protection:	***Conveyance*** 1.1 The 100% riverine flow rate between East Bayshore Road, Station 77+71.49, and San Francisco Bay is 7400 cfs. The post-project flow, without additional work upstream of Highway 101, is 7400 cfs. This is derived from documents listed under 'Sources". ***Stability*** Structural stability of banks, as referenced in Board Ends Policy **(***S 4.1.1.7. "Stabilize creek banks that pose an imminent impact to water quality or public health and safety"),* require maintaining stable banks to protect property, water quality.
Source	Hydraulic Review Update,Technical Memorandum, Floodwater Conveyance Improvements from San Francisco Bay to Highway 101, July 2014

Level of Service Owner: _____

[Name]
[Title]

2. Board Ends Policy E-2, Reliable Water Supply	N/A
Source(s)	

Level of Service Owner: _____
[Name]
[Title]

3. Board Ends Policy E-4, Healthy Creek Ecosystems	Required Maintenance work will be performed in accordance with current Stream Maintenance Program BMPs. Each time a maintenance activity is performed in this creek, a biologist should review the type of work, the method proposed, and the equipment to be used (to determine clearances, vegetation to be cut, etc). The biologist will determine if the work falls within a habitat layer or its buffer zone, and if a biological survey needs to be conducted. Based on this review, the biologist will review and recommend any changes to the method proposed for the work to comply with the most current requirements of the species referenced in the habitat layer.
	Fire protection (required by State code on SCVWD fee property; as determined on SCVWD easement) in accordance with the following: **SECTION 301 California State Fire code: GENERAL** **301.1 Scope.** The provisions of this chapter shall govern the occupancy and maintenance of all structures and premises for precautions against fire and the spread of fire and general requirements of fire safety. ***[California Code of Regulations, Title 19, Division 1, §3.14] Fire Hazard.*** *No person, including but not limited to the State and its political subdivisions, operating any occupancy subject to California Code of Regulations, Title 19, Division 1 regulations shall permit any fire hazard, as defined in this article, to exist on premises under their control, or fail to take immediate action to abate a fire hazard when requested to do so by the enforcing agency.* ***Note:*** *"Fire Hazard" as used in California Code of Regulations, Title 19, Division 1 regulations means any condition, arrangement, or act which will increase, or may cause an increase of, the hazard or menace of fire to a greater degree than customarily*

	recognized as normal by persons in the public service of preventing, suppressing or extinguishing fire; or which may obstruct, delay, or hinder, or may become the cause of obstruction, delay or hindrance to the prevention, suppression or extinguishment of fire. *(e) No dry vegetation shall be permitted to exist within 20 feet of any building or occupancies subject to California Code of Regulations, California Code of Regulations, Title 19, Division 1 regulations.*
	Endangered species Salt Marsh Harvest Mouse and Ridgway's Rail are present within project reach. Operations and maintenance will be performed in accordance with SMP BMP's.

Level of Service Owner: _____
[Name]
[Title]

Approvals:

Asset Owners:

_____
Norma Camacho
Chief Operating Officer
Watersheds

_____
Jim Fiedler
Chief Operating Officer
Water Utility

CHANGE HISTORY		
DATE	**REVISION**	**COMMENTS**
9/10	Draft	For Review

26.03 Protective Coating — Bid Item No. 22

A. Scope of Work

1. Provide all labor, materials, equipment and incidentals required to coat the buried and above ground portions of the steel sheet pile wall components, using a combination of coating systems as specified herein. Perform all surface preparation and coating application at a controlled shop facility. Field coating operations shall only consist of touchup coating repairs during and after erection as specified herein. Field operations shall be in accordance with coating environment and surface temperature during surface preparation and coating application per coating manufacturer product specification. The dimensions of the piles are shown on the Drawings.

2. Qualifications

   a. The Contractor shall be regularly engaged in the application of similar coatings and structures for at least five years immediately prior to this work: The Contractor shall provide evidence of this experience by providing the name of previous projects with owner’s name, owner’s phone numbers, and years that coating application as performed.

   b. All contractors and subcontractors that perform surface preparation or coating application shall be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of SSPC QP 1 and QP 3 prior to contract award, and shall remain certified while accomplishing any surface preparation or coating application. The painting contractors and painting subcontractors must remain so certified for the duration of the project. If a contractor's or subcontractor's certification expires, the company will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Owner of any change in contractor certification status. Contractor shall provide documentation certifying that the company is QP 1 and QP 3 Certified.

   c. Foreman and workers in the shop and on the project site shall be experienced and knowledgeable in preparation for and application of high performance industrial coatings. All work shall be accomplished by Applicators qualified to accomplish the required work in a manner comparable with the best standards of practice.

Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Engineer.

d. Workmanship shall conform to standards and recommendations of Society of Protective Coatings SSPC Vol. 1.

B. Materials and Placement

1. The coating system for buried and concrete-encased sections shall be one of the following systems:

   a. System 1: Carboline 1209 – Polyamido-Amine Epoxy applied at 20 – 40 mils total dry film thickness.

   b. System 2: Devoe International Interzone 1000 applied at 20 – 40 mils total dry film thickness.

2. The coating system for atmospherically exposed sections shall be one of the following systems:

   a. System 1:

      1) Base Coat: Carboline 1209 – Polyamido-Amine Epoxy applied at 20 – 40 mils total DFT.

      2) Top Coat: Carboline Carbothane 133VOC (UV Resistant) Polyurethane applied at a minimum dry film thickness of 5 mils total DFT.

   b. System 2:

      1) Base Coat: Devoe International Interzone 1000 Epoxy applied at 20 – 40 mils total DFT.

      2) Top Coat: Devoe International Interthane 990 SG Polyurethane applied at a minimum dry film thickness of 5 mils total DFT.

3. Coating materials for touchup shall be the same products used for application.

4. All coating color(s) to be selected and approved in writing by the Owner prior to procurement.

5. All coating products that will be used for the piles shall be provided from a single coating manufacturer. Any deviation will require prior approval from the Engineer; appropriate warranties will be required. Deviation from

specified mil thickness or product type is not allowed without written authorization of Engineer.

6. Blasting media shall be sized (graded) to achieve the profile and level of cleanliness as recommended by the coating manufacturer. Blasting media shall be new, clean and free of contaminants, and containing no hazardous materials.

7. Deliver coating system materials in original, unopened containers with seals unbroken and labels intact. Labels shall identify the following:

   a) Name or type number of material.

   b) Manufacturer's name and item stock number.

   c) Manufacturer's name, batch number, specification number.

   d) Contents, by volume, of major constituents.

   e) Warning labels.

   f) Application instructions

   g) Color name and number

   h) Date of manufacture and expiration date

8. Coating materials shall be labeled and used in accordance with SSPC-PA 1, paragraph 5.1.1 through 5.1.5, except all coating system materials without a stated shelf life shall be delivered and used within 6 months of the date of manufacture; and certification, from any source, that the coating system materials are still suitable for use beyond the stated shelf life or beyond the 6 month period specified above will not be accepted.

9. Store materials in a single, approved location. All containers shall be handled and stored in such a manner as to prevent damage or loss of labels or containers. All coating materials shall be stored in an enclosed, dry, well-ventilated place, protected from sparks, flame, direct rays of the sun, or from excessive heat. The Contractor shall be solely responsible for the protection of the materials stored at the shop coating facility and project job site. Maintain temperature inside the structure within the temperature range recommended by the manufacturer.

10. Safety Requirements

    a. Contractor shall comply with all Federal, State, and Local applicable safety regulations and requirements.

b. The Contractor shall submit a notarized letter signed by a principal officer certifying the Contractor fully complies with the California Code of Safety Regulations and the Federal Code of Regulations pertaining to the scope of this project, but not limited to the following; as well as any other applicable orders, codes, ordinances, or laws, State, Federal, and Local. (GISO-General Industry Safety Orders, CSO-Construction Safety Orders, CFR-Code of Federal Regulations).

c. General – Ventilation, electrical grounding, and care in handling paints, solvents and equipment are important safety precautions during painting projects. Contractor shall conform with safety requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals. The Contractor shall provide and require use of personal protective life-saving equipment for persons working in or about the project site. All compressors, bag houses, fuel storage tanks and generators shall be placed in secondary containment.

Title	Code Regulation	Section
Illness Injury Prevention Program	CSO/GISO	1508-3203
Hazard Communication	GISO	5194
Lead	CFR	1926.62
Safety Instructions for Employees	CSO	1510
Dust, Fumes, Mist, Vapors, and Gases	CSO	1528
Metal Scaffolding	CSO	1644
General Industry Standards	29 CFR	1910.1025
Respiratory Protection	CSO/GISO	1531-5144

d. Access Facilities – All ladders, scaffolding, and rigging shall be designed for their intended uses.

e. Ventilation – Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof, of industrial design, and shall be approved by the Engineer. Household-type venting equipment will not be acceptable.

f. Head and Face Protection and Respiratory Devices – Equipment shall include protective helmets, which shall be worn by all persons while in the vicinity of the work. During cleaning operations, nozzle men shall wear U.S. Bureau of Mines approved air-supplied helmets; other persons who are exposed to blasting dust shall wear NIOSH-approved filter-type respirators and safety goggles suitable for the work. When paints are applied in confined areas, all persons exposed to toxic vapors shall wear

approved air-supplied masks. Barrier creams shall be used on any exposed areas of skin.

g. Grounding – Spray and air hoses shall be grounded to prevent accumulation of charges of static electricity.

h. Illumination – Spark-proof artificial lighting shall be provided for all work in contained spaces. Light bulbs shall be guarded to prevent breakage. Lighting fixtures and flexible cords shall comply with the requirements of NFPA 70 "National Electric Code" for the atmosphere in which they will be used. Whenever required by Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer.

i. Toxicity and Explosiveness – The solvents used with specified protective coatings are explosive at low concentrations and are highly toxic. Because of toxicity, the maximum allowable concentration of vapor shall be kept below the maximum safe concentration for an eight-hour exposure, plus Lower Explosive Limit (LEL) must be strictly adhered to. If coatings or paints contain lead or other hazardous materials, all regulations related to safety of personnel and handling of such materials shall be strictly adhered to.

j. Protective Clothing – Paint materials may be irritating to the skin and eyes. When handling and mixing paints, workmen shall wear gloves and eye shields.

k. Fire – During mixing and application of all materials, all flames, welding, and smoking shall be prohibited in the vicinity. Appropriate type fire abatement devices shall be provided by CONTRACTOR, and be readily available at the job site during all operations.

l. Sound Levels – Whenever the occupational noise exposure exceeds the maximum allowable sound levels, the CONTRACTOR shall provide and require the use of approved ear protective devices.

m. General sound levels for the project shall be those which will not affect routine facility or neighborhood activities. Whenever levels are objectionable, they shall be adjusted as directed by the Engineer.

n. Warranty inspections of remedial work shall be at the expense of the Contractor.

11. Environmental Requirements

a. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 DegF for 24 hours before, during, and 48 hours after application of coatings, unless otherwise required by manufacturer's instructions.

b. Do not apply coatings when relative humidity is above 85 percent, unless otherwise required by manufacturer's instructions.

c. Minimum application temperatures for paints shall be 50°F unless otherwise required by manufacturer's instructions.

d. Inspector will examine surfaces after blast cleaning to verify that deposits of contaminants have been removed.

e. No paint shall be applied if the substrate/steel is wet or damp, or if the temperature is less than 5°F above the dew point.

12. Items To Be Painted

a. Steel sheet pile wall

1) Landside: Top of the pile wall to 15 feet below finished grade or 10 feet below the groundwater table (elevation -2 NAVD 88), whichever is greater.

2) Creekside: Top of the pile wall to 15 feet below finished grade or 10 feet below the groundwater table (elevation -2 NAVD 88), whichever is greater.

13. General Preparation

a. Verify that air supply is free of oil and moisture contamination. Effective oil and water separators shall be used in all main compressed air lines and shall be placed as close as practical to the equipment. Prior to using compressed air, quality of air downstream of the separator shall be tested at suitable outlets by blowing the air on clean white blotter (minimum size, 8-1/2 by 11 inch, or as approved) for 2 minutes to check for any contamination, oil, or moisture.

b. Measure air temperature, humidity, relative humidity, and metal surface temperature, and determine dew point prior to blasting or

painting each day. Repeat measurements and determination of dew point as often as the Inspector deems necessary, but not less often than every 4 hours.

c. Maintain a written record of measurements and dew points, and time that measurements were taken. Make record available to Inspector immediately on request.

d. Inspector will also measure air temperature, humidity, relative humidity, and metal surface temperature, and determine dew point at least once each day that blasting or painting is performed.

e. All abrasive-blasted ferrous metal surfaces shall be inspected and approved in writing by Inspector immediately prior to application of paint coatings.

f. Inspection shall be performed to determine cleanliness and profile depth of blasted surfaces and to certify that surface has been prepared in accordance with these Specifications.

g. Schedule the abrasive blasting operation so blasted surfaces will not be wet after blasting and before painting.

h. Perform additional blasting and cleaning as required to achieve surface preparation required. Prior to painting, reblast surfaces allowed to set overnight and surfaces that show rust bloom.

i. Surfaces allowed to set overnight or surfaces which show rust bloom prior to painting shall be reinspected and approved by Inspector prior to paint application.

j. Profile depth of blasted surface: Not less than 3.0 mil or greater than 4.0 mils unless required otherwise by coating manufacturer.

k. Provide compressed air for blasting that is free of water and oil. Provide accessible separators and traps.

l. Confine blast abrasives to area being blasted. Provide shields of polyethylene sheeting or other such barriers to confine blast material.

m. Re-blast surfaces not meeting requirements of these Specifications.

n. Prepare surfaces to be painted in accordance with coating manufacturer's instructions and this Section unless noted otherwise in the Specification. Inspector will evaluate surface

preparation using accepted abrasive blasting standard, and replica tapes. Evaluation will include inspection of blasted surfaces for dust and abrasive residue, using adhesive coated tape. Evaluation will be made immediately prior to coating application.

o. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of coating to surface.

p. Verify cleanliness of all spray application equipment prior to, or no later than, time of mixing coating material.

q. Measure wet film coating thickness during application of coating to ensure adequate coating thickness. Take at least four measurements on every steel pile.

r. Measure dry film coating thickness after each coat using non-destructive magnetic dry film gauges. Inspector will also measure coating thickness, at random locations, after each coat.

s. Contractor shall test all coated surfaces in accordance with NACE SP0188 for pinholes and holidays after application of the epoxy system, prior to application of the UV resistant polyurethane final coat where applicable and the following:

1) Perform test after coating has cured as recommended by the manufacturer.

2) Perform test in presence of Inspector.

3) Use an appropriate model holiday detector, as approved by the Inspector.

t. Retest after coating repairs.

u. Disposal of Spent Abrasive Blast Media

1) Disposal of spent abrasive blast media and removed coating materials shall be in accordance with the disposal plan approved by the Construction Administrator.

2) Coordinate and pay all costs for all sampling and testing of spent abrasive blast media and removed coating materials in order to document waste class. Minimum sampling and testing requirements are listed previously in this Section.

3) Before any wastes are removed from the job site, Contractor shall allow the Construction Administrator time for review of laboratory test results, as well as the time required to obtain a Hazardous Waste Generator's U.S. EPA ID Number if required.

4) Construction Administrator will give Contractor written notice to dispose of all or a portion of the spent abrasive blast media and/or removed coating materials as hazardous waste if the Construction Administrator determines that such disposal is required.

5) Contractor shall be responsible for all costs associated with accumulating, transporting, and disposing of spent abrasive blast media and removed coating materials.

14. Surface Preparation for Steel Pile

a. All grease, sludge and debris shall be removed from the pile surfaces prior to abrasive blast cleaning. Any chemical contamination shall be eliminated by means of neutralization and/or flushing, prior to surface preparation. Solvent and rags shall be changed frequently.

b. The anchor pattern of the blasted surface shall be sharp and angular, not peened. The anchor profile shall be 3.0 – 4.0 mils. Verify compliance with anchor profile requirements by testing in accordance with ASTM D4417.

c. Testing of Surface Profile after Abrasive Blasting: shall be tested with the use of Press-o-Film as manufactured by Testex, or other RP0287 approved equal, at locations to be determined by the Inspector. The replica tape thickness shall be measured using a dial micrometer manufactured by Testex, or other ASTM D4417 Type C approved equal. For each test area, three replica tape tests shall be performed within a single test area 12 inches in diameter. For each test area, the three replica tape thickness values shall be recorded and shall be of the coating manufacturer's recommended profile.

d. The proper abrasive to obtain the specified profile (anchor pattern) designated in the coating manufacturers most recent printed Product Data Sheet shall be used.

1) Care must be taken so as not to use an abrasive that is contaminated with oil or chlorides.

2) Recycled steel abrasives will be allowed for shop operations provided the blast media is clean and of a size and shape to create a sharp and angular surface profile. Abrasives shall be replaced or mixture adjusted using only fresh unused media, when they no longer create the specified surface profile as determined by the Inspector.

3) Do not reuse any contaminated abrasive.

4) After abrasive blasting, dust and spent abrasive shall be removed from the surfaces by brushing or vacuum cleaning.

5) Abrasive blasting shall not be performed concurrent with coating operations and shall be sequenced so that freshly coated surfaces will not be contaminated by abrasive particles or airborne dust.

e. The compressed air used for blasting shall be free of water and oil as per ASTM D4285. Adequate moisture traps, oil waste separators, and air dryers shall be used to ensure elimination of all contaminants.

15. Coating Application

a. Mix and apply all coatings in accordance with the manufacturer's recommendations and instructions, the applicable requirements of SSPC good painting practices, and as specified herein.

b. Obtain Inspector's evaluation and approval of steel surface preparation immediately prior to application

c. Contractor will coat a test section on the first day of coating as per the coating manufacturer’s specifications, and the manufacturer’s representative will evaluate. Obtain Inspector’s approval before commencing coating operations.

d. Obtain Inspector's evaluation and approval of cleanliness of previous coat immediately prior to application of a subsequent coat.

e. Care shall be exercised to prevent coating or paint from being spattered onto surfaces, which are not to be coated or painted. Surfaces from which such material cannot be removed satisfactorily shall be refinished as required to produce a finish satisfactory to the Construction Administrator.

f. Apply coatings at a temperature recommended by manufacturer.

g. Discard all catalyzed coatings at the end of each working day or at the end of manufacturer's recommended pot life, whichever is first.

h. After each coat and immediately prior to application of a subsequent coat, clean surface as required to remove dirt, dust, over-spray, and other contaminants that may affect adhesion of the subsequent coat.

i. Finish coat shall be uniform in color and gloss over the entire surface. Finish coat shall be smooth to touch with no sags, runs, over-spray, cracks, pinholes, drips or any other surface defects.

j. Coating Repairs

1) Touch-up or refinish all chipped, abraded, or otherwise unsatisfactory portions of the work in accordance with the manufacturer's recommendations.

2) Re-coating or touch-up or areas that have cured beyond the maximum time recommended by the manufacturer require special preparation, including amine testing.

3) Coating shall be applied free of runs, dry spray, drips, and fish eyes.

16. Surface Preparation, Specific Field Touchup

a. All damaged surfaces shall be prepared to a level acceptable to the coating manufacturer and in accordance with (SSPC-SP11) Power Tool Cleaning to Bare Metal with a minimum Surface profile of 1.5 mils, or (SSPC-SP10) Near White Metal Blast.

b. A smooth transition shall be achieved between sound existing coating and spot prepared substrate in accordance with SSPC good painting practices in preparation for spot touchup.

17. Spot Repair Application, Specific Field

a. Areas of damaged coating: (Spot Touch Up)

b. All coating components shall be mixed in exact proportions specified by the Manufacturer. Care shall be exercised to ensure all material is removed from containers during mixing and metering operations. Manufacturers published induction times and pot life requirements shall be strictly adhered to.

c. All properly prepared bare steel surfaces shall receive the proper number of coats as required of the epoxy applied by brush in multiple passes to achieve a minimum dry film thickness of 20 mils. Care shall be exercised to ensure that the coating is not over worked with the brush during application.

d. All spot touch up locations in the atmospherically exposed section shall be over-coated with the polyurethane at a minimum dry film thickness of 5 mils.

18. Cleanup and Protection

a. During the course of the work, remove from site discarded paint materials, rubbish, cans and rags at the end of each work day.

b. Clean paint spattered surfaces. Use proper cleaning agents and methods, and use care not to damage finished surfaces.

c. Remove surplus materials, scaffolding, and debris.

d. Protect the work of other trades, whether to be painted or not, against damage by painting and finishing work. Protect surrounding off-site property from damage and over spray.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2013-F-0401

JAN 1 5 2016

Ms. Tori White
Attn: Greg Brown
Department of the Army
San Francisco District, U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Subject: Formal Consultation on the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, from San Francisco Bay to Highway 101, in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California (U.S. Army Corps of Engineers (Corps) file number 2013-00030S)

Dear Ms. White:

This letter is in response to the Corps' April 25, 2013, request for initiation of consultation for the San Francisquito Creek Joint Powers Authority's (SFCJPA) proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project (proposed project), from San Francisco Bay to Highway 101, in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California (Corps file number 2013-00030S). Your request for consultation was received in our office on April 29, 2013. At issue are the proposed project's effects on the federally threatened California red-legged frog (*Rana draytonii*), endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), threatened Pacific Coast population of the western snowy plover (western snowy plover) (*Charadrius alexandrinus nivosus*), endangered California clapper rail (*Rallus longirostris obsoletus*), endangered salt marsh harvest mouse (*Reithrodontomys raviventris*), endangered California least tern (*Sternula antillarum browni*), and endangered California seablite (*Suaeda californica*). Critical habitat has been designated for the California red-legged frog and western snowy plover but does not occur within the action area for the proposed project. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

Recent genetic analyses of rail species resulted in a change in the common name and taxonomy of the large, "clapper-type" rails (*Rallus longirostris*) of the west coast of North America to Ridgway's rail (*Rallus obsoletus*) (Maley and Brumfield 2013, Chesser *et al.* 2014). Thus the California clapper rail is now referred to in the scientific community as the California Ridgway's rail (*Rallus obsoletus obsoletus*). The change in the common name and taxonomy of the California clapper rail, however, does not change the listing status of the species.

The Federal action we are consulting on is the Corps' issuance of a permit to SFCJPA pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C Section 403) and Section 404 of the

Clean Water Act of 1973 (33 U.S.C. Section 1344) to reduce flooding risks and increase ecosystem functionality by widening the floodplain of San Francisquito Creek through levee de-construction and construction of floodwalls, degrading the Bay levee between Outer Faber Marsh and the creek's mouth, filling in low spots in portions of the unmaintained Faber Tract (Main Faber Marsh) southern levee, and sediment excavation of the creek channel. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is likely to adversely affect the salt marsh harvest mouse and California clapper rail. These findings conclude that the proposed project may affect, but is not likely to adversely affect the California red-legged frog, San Francisco garter snake, western snowy plover, California least tern, and California seablite.

In considering your request, we based our evaluation on the following: (1) your letter requesting consultation on the proposed project dated April 25, 2013; (2) the November 2012 *Draft Biological and Essential Fish Habitat Assessment for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project San Francisco Bay to Highway 101* (ICF International 2012); (3) the January 17, 2013 letter from ICF International responding to the Service's July 3, 2013, request for additional information (M. Jones, ICF International, *in litt.* 2013); (4) the August 27, 2014, *Amended Biological Assessment for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, from San Francisco Bay to Highway 101 in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California* (L. Materman, SFCJPA, *in litt.* 2014); (5) the December 2015 *San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Mitigation and Monitoring Plan* (MMP) (SCVWD 2015); (6) protocol-level surveys for the California clapper rail (PRBO Conservation Science 2012; Point Blue Conservation Science 2014; Point Blue Conservation Science, *in litt.* 2014); (7) the March 5, 2015, memorandum from the Santa Clara Valley Water District (SCVWD) summarizing listed species habitat impacts (SCVWD, *in litt.* 2015); (8) the July 24, 2015, September 9, 2015, October 5, 2015, and October 26, 2015, memoranda from SFCJPA responding to the Service's requests for additional information (K. Murray, SFCJPA, *in litt.* 2015a, 2015b, 2015c, 2015d, 2015e); (9) the October 6, 2015, *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a); (10) electronic mail and conversations among the SFCJPA, ICF International, SCVWD, the Corps, California Department of Fish and Wildlife (CDFW), the San Francisco Bay Regional Water Quality Control Board (SFRWQCB), Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS), the City of Palo Alto, the City of East Palo Alto, Bay Conservation and Development Commission (BCDC), H.T Harvey & Associates, U.S. Geological Survey, and the Service; (11) site visits conducted on February 28, 2013, April 16, 2013, and October 22, 2014; and (12) other information available to the Service.

The Service has determined that the proposed project is not likely to adversely affect the California red-legged frog and San Francisco garter snake because: (1) the portion of San Francisquito Creek within the action area is predominately tidally influenced and thus less suitable for the California red-legged frog and San Francisco garter snake; (2) the nearest known occurrences of the California red-legged frog and San Francisco garter snake are more than five miles upstream from the action area; (3) the potential for injuring or killing a California red-legged frog and San Francisco garter snake will be minimized by having a qualified biologist onsite during project construction; (4) all proposed project construction staff will be trained in identifying the California red-legged frog and San Francisco garter snake and their habitats and the avoidance and minimization measures; and (5) the potential for degrading aquatic habitat for the California red-legged frog and San Francisco garter

snake will be minimized by implementing water quality best management practices, a Storm Water Pollution Prevention Plan, and a hazardous material/spill prevention plan.

The Service has determined that the proposed project is not likely to adversely affect the western snowy plover and California least tern because: (1) the western snowy plover and California least tern are not known to breed within the action area; (2) the potential for injuring or killing a western snowy plover and California least tern will be minimized by having a qualified biologist onsite during project construction; (4) all proposed project construction staff will be trained in identifying the western snowy plover and California least tern; and (5) the potential for degrading foraging habitat for the western snowy plover and California least tern will be minimized by implementing water quality best management practices, a Storm Water Pollution Prevention Plan, and a hazardous material/spill prevention plan.

The Service has determined that the proposed project is not likely to adversely affect the California seablite because: (1) the listed plant is thought to have been extirpated from the action area; and (2) the California seablite was not seen during protocol-level surveys within the action area in August 2013.

The remainder of this document provides our biological opinion on the effects of the proposed project on the salt marsh harvest mouse and California clapper rail.

CONSULTATION HISTORY

October 24, 2012:	The Service participated in a conference call among staff from the Refuge, SFCJPA, and ICF International discussing the proposed project.
February 28, 2013:	The Service attended a site visit along with staff from SFCJPA, ICF International, SCVWD, CDFW, and SFRWQCB.
April, 16, 2013:	The Service attended a second site visit along with staff from SFCJPA, ICF International, and the Refuge.
April 29, 2013:	The Service received from the Corps the Biological Assessment (ICF International 2012) and the request for consultation on the proposed project.
July 3, 2013:	The Service sent a letter to the Corps commenting on the Biological Assessment and requesting additional information on the proposed project. The letter mentioned the Service's major concerns regarding the loss of high tide refugia habitat and increased flooding of tidal marsh habitat for the salt marsh harvest mouse and California clapper rail within Faber Marsh if the levee between San Francisquito Creek and Main Faber Marsh were degraded.
September – December 2013:	The Service attended multiple interagency meetings among staff from SFCJPA, ICF International, SCVWD, CDFW, SFRWQCB,

BCDC, NMFS, and the Refuge discussing the Service's concerns about the effects of the proposed project on the large population of California clapper rails within Faber Marsh due to the proposed lowering of the levee along the southern edge of Main Faber Marsh. At the December 12, 2013, meeting, ICF International and SFCJPA proposed revising the proposed project to avoid lowering the levee along Main Faber Marsh.

January 23, 2014: The Service received the letter from ICF International responding to the Service's July 3, 2013, request for additional information on the proposed project.

February – July 2014: The Service attended multiple interagency meetings for the proposed project among staff from the Refuge, the Corps, SCVWD, SFCJPA, CDFW, SFRWQCB, NMFS, and BCDC discussing the various alternatives for the proposed project including filling in low spots in the Main Faber Marsh levee, degrading the Bay levee adjacent to Outer Faber Marsh near the mouth of San Francisquito Creek, and further setting back the levee into the Palo Alto Municipal Golf Course.

August 28, 2014: The Service received the amended Biological Assessment from the Corps and SFCJPA for the proposed project (L. Materman, SFCJPA, *in litt.* 2014).

September 3, 2014: The Service responded via electronic email to the Corps and SFCJPA that the proposed project should include additional avoidance and minimization measures to address predation on salt marsh harvest mice and California clapper rails and the loss of high tide refugia cover (*e.g.*, avian and mammalian predator management, transition zone habitat enhancement, and installation of high-tide refuge islands in Faber Marsh).

October 20, 2014: The Service submitted via electronic mail to SFCJPA and the Corps comments on the draft MMP (SCVWD 2014) and the Draft Operations and Maintenance (O&M) Plan (SFCJPA 2014) for the proposed project.

October 22, 2014: The Service attended a site visit with staff from SFCJPA, the Refuge, CDFW, SFRWQCB, and U.S. Geological Survey to discuss measures to enhance habitat for salt marsh harvest mice and California clapper rails and minimize the levels of predation within Faber Marsh.

December 2, 2014: The Service sent a letter to the Corps and SFCJPA commenting on the August 2014 amended Biological Assessment (L. Materman, SFCJPA, *in litt.* 2014), the draft MMP (SCVWD

	2014), and the Draft O&M Plan (SFCJPA 2014) and requesting additional information on the proposed project.
April 15, 2015:	The Service received from SFCJPA and SCVWD the revised estimates of habitat disturbance (SCVWD *in litt.* 2015).
April 29, 2015:	The Service attended a meeting with staff from SFCJPA, the Corps, CDFW, and the Refuge to discuss avoidance and minimization measures.
July - December 2015:	The Service participated in biweekly conference calls with staff from SFCJPA, the Corps, the Refuge, NMFS, CDFW, and SCVWD to discuss the information needed to initiate formal consultation.
July 24, 2015:	The Service received via electronic mail from SFCJPA the memoranda responding to the Service's December 2, 2014, request for information on the proposed project (K. Murray, SFCJPA, *in litt.* 2015a, 2015b).
July 27, 2015:	The Service provided via electronic mail to SFCJPA and the Corps comments on the July 24, 2015, memoranda from SFCJPA.
August 20, 2015:	The Service attended a meeting with staff from H.T. Harvey & Associates, the Refuge, SFCJPA, CDFW, and the U.S. Geological Survey to discuss the restoration actions for the proposed project (*e.g.*, permanent high-tide refuge islands in Outer Faber Marsh, transition zone habitat enhancement along the Faber Marsh levees, invasive plant species control).
September 9, 2015:	The Service received via electronic mail from SFCJPA (K. Murray, SFCJPA, *in litt.* 2015c) the responses to the Service's comments on the July 24, 2015, memoranda from SFCJPA (*e.g.*, revised estimates of habitat disturbance and restoration; the predator management plan; the draft MMP; the revised Draft O&M Plan (SFCJPA 2015); the description of the proposed levee mowing activities for O&M; and the draft proposal for installation of high-tide refuge islands in Outer Faber Marsh).
September 15 and 24, 2015:	The Service provided via electronic mail to SFCJPA and the Corps comments on and requests for clarification of the information provided by SFCJPA on September 9, 2015 (*e.g.*, clarification of California clapper rail habitat disturbance estimates and habitat restoration/creation estimates within the widened San Francisquito Creek channel; clarification of proposed project levee mowing O&M activities; and a request for

	information on the cumulative effects of other levee mowing O&M activities within the action area).
October 5, 2015:	The Service received via electronic mail from SFCJPA the responses to the Service's September 15 and 24, 2015, comments and request for clarification.
October 7, 2015:	The Service received via electronic mail from SFCJPA the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a).
October 26, 2015:	The Service received via electronic mail from SFCJPA (K. Murray, SFCJPA, *in litt.* 2015e) responses to the Service's October 19, 2015, comments on the information provided by SFCJPA on October 5 and 7, 2015 (K. Murray, SFCJPA, *in litt.* 2015d; H.T. Harvey & Associates 2015a).
November 18, 2015:	The Service, the Refuge, and U.S. Geological Survey provided via electronic mail to SFCJPA, the Corps, SCVWD, NMFS, CDFW, H.T. Harvey & Associates, and SFRWQCB comments on the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a).
December 3, 2015:	The Service received from SFCJPA the draft plan for the installation of steelhead passage features within the proposed project footprint in San Francisquito Creek.
December 17, 2015:	The Service received from SFCJPA the final project description and the revised MMP for proposed project revegetation and monitoring activities (SCVWD 2015).

BIOLOGICAL OPINION

Description of the Proposed Project

Location of the Proposed Project

The San Francisquito Creek watershed encompasses a 45-square-mile basin, extending from Skyline Boulevard to San Francisco Bay. San Francisquito Creek represents the boundary between San Mateo and Santa Clara counties, California, in the lower watershed. Figure 1 below shows the location of the proposed project. The proposed project area as a whole extends about 7,450 feet along San Francisquito Creek from San Francisco Bay upstream to the U.S. Highway 101/East Bayshore Road Bridge. The right bank refers to the San Mateo County (City of East Palo Alto) side of San Francisquito Creek, and the left bank refers to the Santa Clara County (City of Palo Alto) side of San Francisquito Creek. The lower reach of the proposed project extends about 2,850 feet from San Francisco Bay upstream to the Friendship Bridge; the tidal marshes of the Refuge-managed Main Faber Marsh and Outer Faber Marsh (the triangular-shaped tidal marsh downstream (east) of Main Faber Marsh) occur on the right bank, and the Palo Alto Municipal Golf Course and Palo Alto

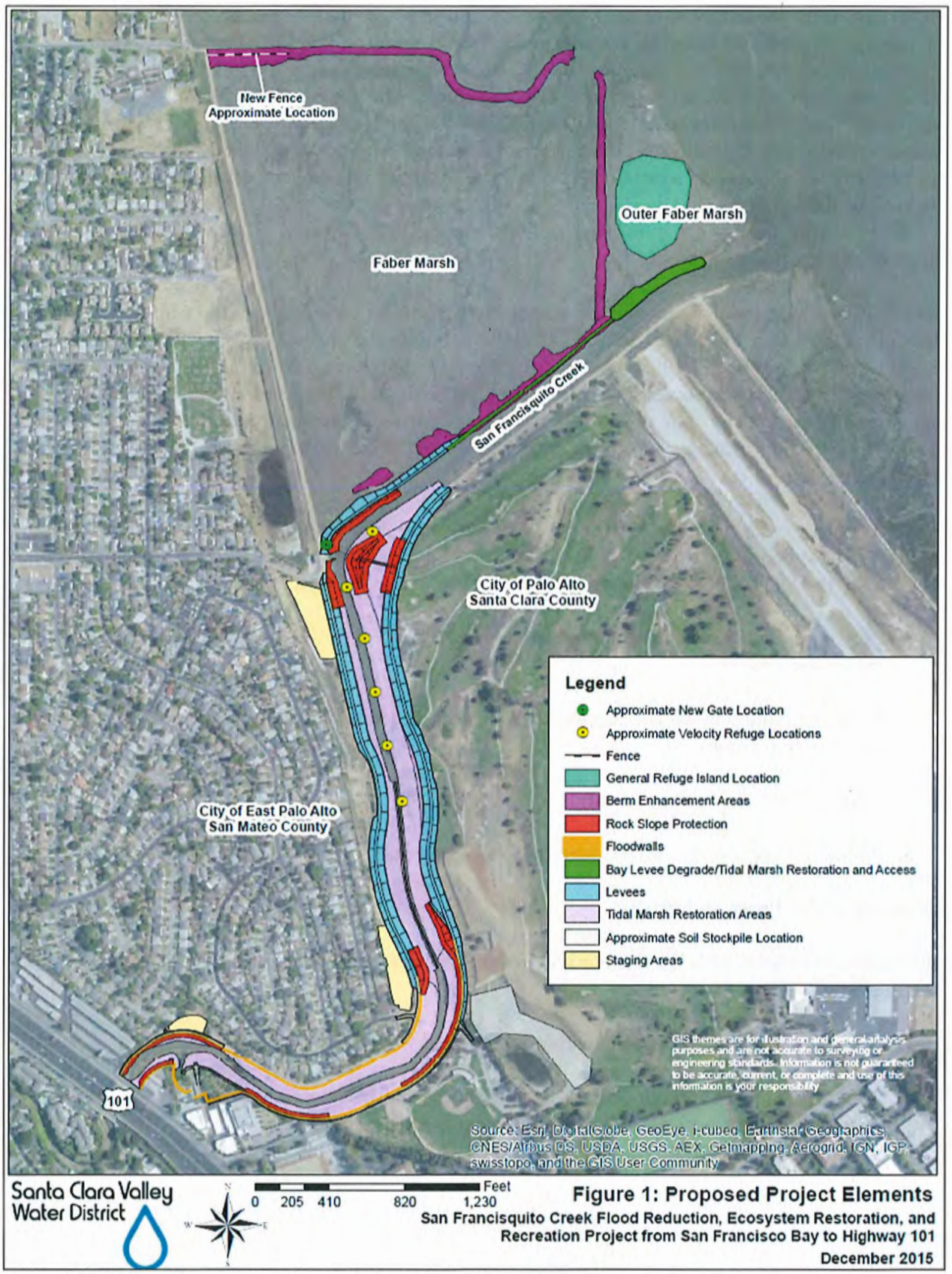

Figure 1. Action area and proposed project elements.

Airport occur on the left bank of the lower reach. The middle reach of the proposed project extends about 2,600 feet from the Friendship Bridge upstream to Daphne Way; a residential neighborhood of the City of East Palo Alto occurs on the right bank, and the Palo Alto Municipal Golf Course occurs on the left bank of the middle reach. The upper reach of the proposed project extends about 2,000 feet upstream from Daphne Way to the U.S. Highway 101/East Bayshore Road Bridge; a residential neighborhood of the City of East Palo Alto occurs on the right bank, and a baseball field, an elementary school, and commercial, Federal, and municipal buildings occur on the left bank of the upper reach.

Goals of the Proposed Project

The SFCJPA is a regional government agency whose members include the Cities of Palo Alto, Menlo Park, and East Palo Alto; the San Mateo County Flood Control District, and the SCVWD. The SFCJPA was formed in 1999 following the flood of 1998 to implement flood management, ecosystem restoration and recreational enhancements throughout the San Francisquito Creek watershed and floodplain. The proposed project's goals are to improve flood protection, habitat, and recreational opportunities within the proposed project reach with the following specific objectives:

1. Protect properties and infrastructure between San Francisco Bay and Highway 101 from a 100-year San Francisquito Creek fluvial flood flow occurring at the same time as a 10-year extreme high tide that includes projected sea level rise through 2065;

2. Accommodate future flood protection measures that might be constructed upstream of the proposed project;

3. Enhance habitat along the proposed project reach, particularly habitat for threatened and endangered species;

4. Enhance recreational uses; and

5. Minimize operational and maintenance requirements.

Elements of the Proposed Project

Increasing San Francisquito Creek's capacity from San Francisco Bay to East Bayshore Road would be achieved by:

1. Excavating sediment deposits within the channel to maximize conveyance;

2. Rebuilding levees and relocating a portion of the southern levee to widen the channel to reduce influence of tides and increase channel capacity; and

3. Constructing floodwalls in the upper reach to increase capacity and maintain consistency with the California Department of Transportation's (Caltrans) enlargement of the U.S. Highway 101/East Bayshore Road Bridge over San Francisquito Creek (Caltrans facility).

Major proposed project elements include:

1. Levee setback and improvements to widen the channel and increase levee height and stability between the City of East Palo Alto and the Palo Alto Municipal Golf Course;

2. Floodwalls in the upper reach downstream of East Bayshore Road;

3. Extension of Friendship Bridge via a boardwalk across new marshland within the widened channel;

4. Improving the stability of the Main Faber Marsh levee;

5. Degrading the Bay levee (levee on the right (north) bank of San Francisquito Creek along the southern edge Outer Faber Marsh near the creek's mouth); and

6. Rock-slope protection.

The majority of the proposed project elements would occur on properties in the cities of Palo Alto and East Palo Alto and owned by the City of Palo Alto or within SCVWD or City of East Palo Alto rights-of-way. The project elements proposed to improve management of flood flows along San Francisquito Creek from East Bayshore Road to San Francisco Bay include reconfiguring levees, creating a marsh plain terrace to convey high flows, installing floodwalls, widening of the creek channel, and constructing access roads for maintenance purposes. Proposed project levee and flood wall construction elements are summarized below in Table 1. Marshplain restoration elements are summarized in Table 2. A detailed overview of each project component is provided in the sections that follow.

The proposed project includes:

1. Excavation. Excavating about 106,000 cubic yards of sediment deposits within the channel to maximize conveyance including about 29,800 cubic yards of stripping, 18,700 cubic yards of rubble mound excavation, 11,600 cubic yards of off-haul material, and 46,600 cubic yards of material re-used from excavation.

2. Fill. Total fill of about 185,300 cubic yards consisting of about 46,600 cubic yards of material re-used from excavation and importing about 138,700 cubic yards from Stevens Creek Quarry.

3. Rebuilding and Setting Back Levees. Rebuilding levees and setting back a portion of the levee adjacent to the Palo Alto Municipal Golf Course by 50-100 feet to widen the channel, increase levee height and stability, reduce influence of tides, increase channel capacity, and restore tidal marsh along San Francisquito Creek.

4. Floodwalls. Constructing floodwalls in the upper reach downstream of East Bayshore Road to increase capacity.

Table 1. Summary of proposed levee and floodwall construction elements.

Project Component	Description
Levee and floodwall construction	
Levee raising on right bank	From the O'Connor Pump Station tie-in near Friendship Bridge to the floodwall.
Floodwall on right bank	The right floodwall would extend from just downstream of Daphne Way to the end of the project reach where it would connect with the Caltrans U.S. Highway 101/East Bayshore Road facility (Caltrans facility).
Levee raising on left bank and levee relocation	Levee relocation of the middle reach and a small portion of the upper and lower reaches. The levee would be relocated inland (currently occupied by the Golf Course), creating space on the left bank for a marshplain terrace. Except for a section around the eastern footings of Friendship Bridge, the existing levee along this stretch would be removed.
Floodwall on left bank	The left floodwall would extend from the end of the left levee, along the streambed, around the Palo Alto Pump Station, to the end of the project reach where it would connect with the Caltrans facility.
Downstream access road on right bank	The right bank downstream access road would be approximately 16 feet wide and extend from the crown of the right levee to street level to just downstream of Daphne Way.
Upstream access road on right bank	The right bank upstream access road would be approximately 12 feet wide and would extend from just downstream of Verbena Drive to the Caltrans facility at East Bayshore Road.
Access road on left bank	The left bank access road would be generally 12 feet wide and would extend from a point downstream of the International School of the Peninsula to the Palo Alto Pump Station. The access road would also be used as a public trail within the City of Palo Alto and would connect to the Baylands Athletic Center.
Friendship Bridge	The existing Friendship Bridge would be retained and extended as a boardwalk from the retained eastern footing across the new marshplain terrace to the relocated left bank levee.
Stabilize Main Faber Marsh levee	Fill in a low spot along about 400 feet of the Main Faber Marsh levee by raising the lowest levee crest elevation downstream of Friendship Bridge from a minimum elevation of 11 feet to 13 feet, and incorporating a 6H:1V (horizontal : vertical) levee side slope into Main Faber Marsh.
Degrade Bay levee	Removing about 600 feet of the existing right bank levee (STA 3+50 to 9+50) along Outer Faber Marsh near the mouth of San Francisquito Creek.
Rock slope protection	Installation of about 3.71 acres of rock-slope levee protection.

Table 2. Summary of proposed marshplain restoration elements.

Marshplain restoration	
Downstream of Friendship Bridge on right bank	High-marsh and transitional vegetation will be planted from the edge of the San Francisquito Creek channel to the toe of the levee from just upstream of San Francisco Bay to just downstream of Friendship Bridge.
Upstream of Friendship Bridge on right bank	High-marsh and transitional vegetation will be planted from the edge of the San Francisquito Creek channel to the toe of the levee from just upstream of Friendship Bridge to East Bayshore Road.
Left bank	High-marsh and transitional vegetation will be planted from the edge of the San Francisquito Creek channel to the base of the floodwall or the toe of the levee. In this area the marsh will be planted adjacent to the toe of the cut-and-fill area. The marsh will extend from the point at which the new levee would diverge inland from the existing levee to East Bayshore Road.

5. Overflow Terrace and Tidal Marsh Creation. Creating/restoring a total of about 15.14 acres of riparian, tidal marsh, and transition zone habitat along San Francisquito Creek and revegetating with native high marsh plantings, high marsh/transition zone plantings, and high marsh/ transition zone seed mix. This will create an overflow terrace at marsh elevation upstream and adjacent to Main Faber Marsh.

6. Extension of Friendship Bridge. Extension of the Friendship Bridge via a boardwalk across new marshland within the widened channel.

7. Relocating Utilities. Relocation of Pacific Gas and Electric Company (PG&E) electricity transmission lines and towers and gas transmission lines and the East Palo Alto Sanitary District sewer main.

8. Rodent Control. Controlling burrowing rodents on flood control levees within the proposed project area by use of rodenticides in areas outside of known and potential habitat for the salt marsh harvest mouse and California clapper rail. Only live trapping would be used to control burrowing rodents in areas near suitable habitat for the salt marsh harvest mouse and California clapper rail. The live traps will have openings measuring no smaller than two inches by one inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

9. Stabilize Main Faber Marsh Levee. Add fill to the levee separating San Francisquito Creek from Main Faber Marsh in order to reduce concerns regarding levee erosion and the potential for substantial levee failure. Raising the lowest levee crest elevation downstream of Friendship Bridge from a minimum elevation of 11 feet to 13 feet and incorporating a 6 horizontal (H):1 vertical (V) levee side slope into Main Faber Marsh. The 6H:1V levee side slope will help protect the levee toe from erosion due to flow overtopping over a 400-foot distance as the levee transitions upstream to a higher elevation (as part of the Original Application) closer to the

bridge. About 0.30 acre of tidal marsh within Main Faber Marsh will be permanently lost with the installation of the wider levee toe slope. The stabilized levee will be planted with high marsh and transitional vegetation that is consistent with the levee's location adjacent to bayland marsh.

10. Bay Levee Degrade. Downstream of Main Faber Marsh, in a marsh area (Outer Faber Marsh) that is subject to daily tides from San Francisco Bay, a levee separating San Francisquito Creek from San Francisco Bay will be degraded, removing approximately 600 feet of the existing levee (STA 3+50 to 9+50). This will improve the connection between Outer Faber Marsh and San Francisquito Creek and decrease the water surface elevation during large flow events, allowing the channel to expand out over the marsh area at a point further upstream than under existing conditions.

11. Rock-Slope Protection. Installation of about 3.71 acres of rock-slope protection along the San Francisquito Creek channel.

12. Levee Mowing for O&M. SCVWD will mow approximately 6.49 acres of grassland habitat along the San Francisquito Creek levee slopes one to three times per year (see map in Figure 2 for areas that will be mowed by the proposed project). In order to maintain acceptable channel roughness and comply with "Guidelines for . . . Vegetation Management at Levees" and County of Santa Clara Fire Marshal requirements for preventing fire hazards, the SCVWD will mow plants to a height of 3 to 4 inches, one to three times per year. The levees will remain vegetated and plants will grow between mowing cycles. Mowing is rarely necessary or conducted during the wet season, so higher amounts of more suitable habitat will be available during those four to six months. Project O&M may be transferred to the SCVWD Stream Maintenance Program in the future depending on agreements for work in San Mateo County (Service file number 08ESMF00-2012-F-0398, Service 2014).

13. Steelhead Passage Features. SFCJPA will install six velocity refuge features within the proposed project footprint in the San Francisquito Creek channel to improve steelhead passage including five rock and rootwad structures (constructed features including wood logs with and without rootwads and large rocks for anchoring) in the middle reach (upstream of Friendship Bridge) and one rock spur (partial weir) in the lower reach (immediately downstream of Friendship Bridge).

San Francisquito Creek Marshplain Restoration

The proposed project will restore approximately 11.41 acres of tidal marsh/transition zone habitat along San Francisquito Creek, and adjacent areas, in areas that have been identified as potentially supporting salt marsh harvest mouse and/or California clapper rail, effectively restoring tidal influence in the proposed project reach. The proposed marshplain restoration and monitoring is described in more detail in the SCVWD's MMP (SCVWD 2015). Marshplain restoration will span the entire proposed project extent on both banks from East Bayshore Road to San Francisco Bay. Habitat for salt marsh harvest mouse will be restored downstream of a line approximately corresponding to the southwest border of the Palo Alto Golf Course and the end of Geng Road and Daphne Way. Habitat for California clapper rail will be restored downstream of Friendship Bridge. After levee construction is complete, the tidal marsh area will be terraced and revegetated with high-marsh plants appropriate to the elevation relative to tidal levels. The high-marsh planting area will include alkali weed, saltgrass, alkali heath, marsh jaumea, and perennial pickleweed. The high-marsh

Figure 2. San Francisquito Creek proposed areas of levee mowing for O&M (not including existing mowing for the San Francisco Bay Trail) (copied from K. Murray, SFCJPA, *in litt.* 2015c).

transition planting area will include fat hen, alkali weed, saltgrass, alkali heath, gumweed, marsh jaumea, and western marsh rosemary. The high marsh transition seed mix area will include fat hen, marsh baccharis, alkali weed, hybrid wheatgrass, alkali heath, gumweed, salt heliotrope, meadow barley, alkali barley, western marsh rosemary, and pickleweed. Native marsh plants will be used to revegetate the terraced land. Plants appropriate to the high marsh will be planted near the stream channel. Plants native to marsh transition areas will be planted in areas more distant from the creek channel and in the upper half of the proposed project area as elevation gains.

Approximately 19,500 high marsh and high marsh transition wetland plants and cuttings are planned for installation. Plants will be sourced from the San Francisquito Creek watershed and Baylands areas. A temporary irrigation system will be installed for use during the planting and three-year establishment phase, in order to provide a back-up water supply to the newly-installed vegetation in the event of a period of drought during the winter or spring rainy season, and for irrigation as needed during the summer. Irrigation frequency is expected to be reduced as the site develops during the establishment phase.

The successful implementation of the marshplain restoration will mitigate for permanent and temporary impacts to diked marsh, tidal salt marsh habitat, tidal channel and bay waters, and riparian habitat, and enhance the habitat surrounding the lower reach of San Francisquito Creek. To ensure these goals are met, annual monitoring will be conducted over a five-year period. Performance goals will aid in determining if the site is progressing incrementally toward meeting the Year 5 success criteria. Year 5 monitoring will determine if the success criteria have been achieved. Monitoring will be overseen or conducted by a qualified biologist with experience in mitigation monitoring. Final success will not be considered to have been achieved until temporary irrigation has been off for at least two years.

The performance criteria for restoration of the marshplain are:

1. Vegetative cover increases continuously throughout the period monitored for mitigation compliance;

2. Plant species composition consists of native tidal marsh species appropriate to the salinity regime; and

3. Net increase of waters and wetlands as shown in a Corps wetland delineation.

Qualitative monitoring will provide an opportunity to assess general site conditions and year to year trends based on reconnaissance-level field observations and photo-documentation. Qualitative monitoring will occur annually during the same time frame as specified for quantitative monitoring, and occur at low tide to enable the best viewing of the marsh vegetation. Observations will include impressions of overall plant health, apparent differences in conditions within and between planting zones, prevalence or particular locations of invasive weeds, any visible problems or damage to the site and potential causes. Photo-documentation of the site will be conducted annually from at least six fixed locations showing each planting zone and the overall site. Photo points and directions will be selected during the first year of monitoring and documented on a site planting plan. Observations from the qualitative monitoring will be presented in the form of a short narrative paragraph with photographs attached.

The success of the marsh vegetation mitigation will be quantitatively evaluated by measuring the following:

1. Final success criteria consist of achieving at least 13.67 acres of tidal marsh/transition zone habitat with at least 60 percent cover of wetland indicator species by Year 5; and

2. Invasive species shall not exceed a maximum of 5 percent cover.

A formal delineation of the created jurisdictional areas will be undertaken at the site five years following mitigation site construction. The mitigation will be considered a success if the wetland delineation reveals that at least 13.67 acres of tidal salt marsh, 0.80 acre of diked marsh, and 2.32 acres of tidal channel are restored. Percent cover will be used as the primary indicator of successful establishment of wetland habitat. The final goal is 60 percent cover of wetland indicator species by the end of the monitoring period (SCVWD 2014). Invasive species shall not exceed a maximum of 5 percent cover and shall be removed prior to going to seed. Weeds will be removed by hand tools, mechanical equipment, or herbicides that are approved by the U.S. Environmental Protection Agency for use in aquatic environments. Weed management activities will be conducted in accordance with the SCVWD's Stream Maintenance Program's current accepted practices at the time of the control work (Service file number 08ESMF00-2012-F-0398, Service 2014). Under the Stream Maintenance Program, use of herbicides is part of an integrated pest management approach targeting the use of proper tools to reach project objectives. The SFCJPA will be the permit holder and responsible for compliance monitoring.

Construction Schedule

Proposed project construction is expected to last two years with work estimated to begin in the spring of 2016. Post-construction monitoring will continue for at least five years.

Conservation Measures

As part of the proposed project, SFCJPA, SCVWD, and their contractors will implement the following conservation measures to avoid and minimize potential effects on the salt marsh harvest mouse and California clapper rail and their habitats.

General Construction Site Housekeeping

The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains or waterways. Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site. To prevent mosquito breeding on construction sites, the SFCJPA will require the construction contractor to ensure that surface water is gone within four days (96 hours). All outdoor grounds will be examined and unnecessary water that may stand longer than 96 hours will be drained. Construction personnel will properly dispose of unwanted or unused artificial containers and tires. If possible, any container or object that holds standing water that must remain outdoors will be covered, inverted, or have drainage holes drilled.

The following general construction site housekeeping measures will be implemented as necessary within staging areas.

1. Staging areas that are not already paved or covered with compacted aggregate base, and that are used for parking vehicles, trailers, workshops, maintenance areas, or equipment, piping, formwork, rebar, storing masonry on pallets, and metal product storage, will be graded as required, and surfaced with a minimum of three inches of compacted aggregate base rock over a high modulus, woven, and soil separation geo-textile. Areas storing aggregate base or other rock products will also be placed on this same geo-textile. The objective is to maintain separation between native and construction materials. Areas storing soils and sand are not required to be surfaced with aggregate base course.

2. Aggregate base will be removed from all staging areas prior to proposed project completion, and the surfaces will be re-graded to their original grades or matching surrounding conditions as directed by the Engineer.

3. Any soils contaminated with petroleum product or other hazardous materials by the contractor will be removed by the contractor and disposed of in accordance with local, State, and Federal laws.

4. The contractor is responsible for weed control in staging areas and material storage areas.

The spread of invasive nonnative plant species and plant pathogens will be avoided or minimized by implementing the following measures:

1. Construction equipment will arrive at the proposed project site clean and free of soil, seed, and plant parts to reduce the likelihood of introducing new weed species.

2. Any imported fill material, soil amendments, gravel, etc., required for construction and/or restoration activities that will be placed within the upper 12 inches of the ground surface will be free of vegetation and plant material.

3. Certified weed-free imported erosion control materials (or rice straw in upland areas) will be used exclusively.

4. To reduce the movement of invasive weeds into uninfested areas, the contractor will stockpile topsoil removed during excavation and will subsequently reuse the stockpiled soil for re-establishment of disturbed project areas.

<u>Water Quality Protection</u>

1. The following measures will be implemented as necessary to reduce and minimize storm water pollution during ground disturbing maintenance activities:

    a. Soils exposed due to maintenance activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized and water quality protected prior to significant rainfall.

b. The preference for erosion control fabrics will be to consist of natural fibers. No plastic monofilament or similar material will be used.

c. Appropriate measures include, but are not limited to, the following: silt fences, straw bale barriers, brush or rock filters, storm drain inlet protection, sediment traps, sediment basins, erosion control blankets and mats, soil stabilization (*i.e.* tackified straw with seed, jute or geotextile blankets, etc.), wood chips, and straw mulch.

2. All temporary construction-related erosion control methods will be removed at the completion of the proposed project (*e.g.*, silt fences).

3. Sediments will be stored and transported in a manner that minimizes water quality effects.

   a. Wet sediments may be stockpiled outside of a live stream or may be stockpiled within a dewatered stream so water can drain or evaporate before removal.

   b. This measure applies to saturated, not damp, sediments and depends on the availability of a stockpile site.

   c. For those stockpiles located outside the channel, water draining from them will not be allowed to flow back into the creek or into local storm drains that enter the creek, unless water quality protection measures recommended by SFRWQCB are implemented.

   d. Trucks may be lined with an impervious material (*e.g.*, plastic), or the tailgate blocked with dry dirt or hay bales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out.

   e. Water will not drain directly into channels (outside of the work area) or onto public streets without providing water quality control measures.

   f. Streets and affected public parking lots will be cleared of mud and/or dirt by street sweeping (with a vacuum-powered street sweeper), as necessary, and not by hosing down the street.

4. Oily, greasy, or sediment-laden substances or other material that originate from the proposed project operations and may degrade the quality of surface water or adversely affect aquatic life, fish, or wildlife will not be allowed to enter, or be placed where they may later enter, any waterway.

5. The proposed project will not increase the turbidity of any watercourse flowing past the construction site by taking all necessary precautions to limit the increase in turbidity as follows.

   a. Where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases will not exceed 5 percent.

   b. Where natural turbidity is greater than 50 NTU, increases will not exceed 10 percent.

c. Where the receiving water body is a dry creek bed or storm drain, waters in excess of 50 NTU will not be discharged from the proposed project.

d. Water turbidity changes will be monitored. The discharge water measurements will be made at the point where the discharge water exits the water control system for tidal sites and 100 feet downstream of the discharge point for non-tidal sites. Natural watercourse turbidity measurements will be made in the receiving water 100 feet upstream of the discharge site. Natural watercourse turbidity measurements will be made prior to initiation of proposed project discharges, preferably at least two days prior to commencement of operations.

6. No washing of vehicles will occur at job sites.

7. No fueling will be done in a waterway or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (*i.e.*, pumps, generators).

   a. For stationary equipment that must be fueled on the site, containment will be provided in such a manner that any accidental spill of fuel will not be able to enter the water or contaminate sediments that may come in contact with water.

   b. Any equipment that is readily moved out of the waterway will not be fueled in the waterway or immediate floodplain.

   c. All fueling done at the job site will provide containment to the degree that any spill will be unable to enter any waterway or damage riparian vegetation.

8. No equipment servicing will be done in a stream channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (*i.e.*, pumps, generators).

   a. Any equipment that can be readily moved out of the channel will not be serviced in the channel or immediate floodplain.

   b. All servicing of equipment done at the job site will provide containment to the degree that any spill will be unable to enter any channel or damage stream vegetation.

   c. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location will be done in a channel or floodplain.

   d. If emergency repairs are required, containment will be provided equivalent to that done for fueling or servicing.

9. Measures will be implemented to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means.

   a. Prior to entering the work site, all field personnel will know how to respond when toxic materials are discovered.
   b. The discharge of any hazardous or nonhazardous waste as defined in Division 2,

Subdivision 1, Chapter 2 of the California Code of Regulations will be conducted in accordance with applicable State and Federal regulations.

c. In the event of any hazardous material emergencies or spills, personnel will call the Chemical Emergencies/Spills Hotline at 1-800-510-5151.

10. Prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water.

    a. Field personnel will be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills.

    b. No fueling, repair, cleaning, maintenance, or vehicle washing will be performed in a creek channel or in areas at the top of a channel bank that may flow into a creek channel.

11. Spill prevention kits appropriate to the hazard will always be in close proximity when using hazardous materials (*e.g.*, crew trucks and other logical locations).

    a. Prior to entering the work site, all field personnel will know the location of spill kits on crew trucks and at other locations within SCVWD facilities.

    b. All field personnel will be advised of these locations and trained in their appropriate use.

12. Runoff from soil stockpiles will be avoided. If soil is to be stockpiled, no runoff will be allowed to flow to a creek.

13. Cofferdams will be used for tidal work areas. For tidal areas, a downstream cofferdam will be constructed to prevent the work area from being inundated by tidal flows. By isolating the work area from tidal flows, water quality effects are minimized. Downstream flows will continue through the work area and through pipes within the cofferdam.

    a. Installation of coffer dams will begin at low tide.

    b. Waters discharged through tidal cofferdam bypass pipes will not exceed 50 NTU over the background levels of the tidal waters into which they are discharged.

    c. Cofferdams shall not be constructed of earthen fill due to potential adverse water quality impacts in the event of a failure.

    d. Cofferdams constructed of gravel shall be covered by a protective covering (*e.g.*, plastic or fabric) to prevent seepage.

14. Groundwater will be managed at work sites. If high levels of groundwater in a work area are encountered, the water will be pumped out of the work site. If necessary to protect water quality, the water will be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment prior to the water re-entering a

receiving water body. Water pumped into vegetated areas will be pumped in a manner that will not create erosion around vegetation.

15. Sanitary/septic waste will be managed. Temporary sanitary facilities will be located on jobs that last multiple days in compliance with California Division of Occupational Safety and Health regulation 8 California Code of Regulations 1526. All temporary sanitary facilities will be placed outside of the creek channel and floodplain and removed when no longer necessary.

In addition, as part of the Santa Clara Valley Urban Runoff Pollution Prevention Program and the San Mateo Countywide Stormwater Pollution Prevention Program, required under Waste Discharge Requirements and National Pollutant Discharge Elimination System permits for the discharge of storm water runoff from the municipal separate storm sewer systems (MS4s) overseen by the SFRWQCB, all construction sites are required to have site-specific and seasonally and phase-appropriate effective best management practices (BMPs) (SFRWQCB 2009). SFCJPA will be responsible for ensuring compliance with all local and State regulations, including the SFRWQCB National Pollutant Discharge Elimination System permits and local BMPs for jurisdictions adjoining the proposed project site. The proposed project specifications require that the proposed project construction contractor prepare a Storm Water Pollution Prevention Plan (SWPPP) and erosion control and sedimentation plan showing placement of BMPs at various stages of construction in conformance with requirements, and all SWPPP documents and plans will be stamped by a State-certified Qualified SWPPP Developer. The proposed project will implement measures to accomplish objectives specified in SFCJPA's *San Francisquito Creek Watershed Analysis and Sediment Reduction Plan*, which fulfills National Pollutant Discharge Elimination System permit provisions that require the co-permittees of the Santa Clara Valley Urban Runoff Pollution Prevention Program and San Mateo Countywide Stormwater Pollution Prevention Program within the San Francisquito Creek watershed to assess and implement sediment management measures in the watershed (SFCJPA 2004). Water quality protection standards during construction will comply with the most protective BMPs of the local jurisdictions and the State of California.

<u>Safe Use of Herbicides and Pesticides</u>

1. Pesticides products are to be used only after an assessment has been made regarding environmental, economical, and public health aspects of each of the alternatives. The following types of pesticides are used by the SCVWD.

    a. Herbicides are used to: control algae, weeds, and undesirable vegetation; to minimize fire hazards; to maintain flood conveyance of waterways; and to maintain compliance with State and Federal requirements.

    b. Insecticides are used only in and around SCVWD buildings, or in the case of a serious pest outbreak, on landscape and re-vegetation facilities; only after all other methods, such as prevention or natural nontoxic control methods, have proven ineffective; and where required, the lowest toxicity will be used in accordance with the label and the details of this policy.

    c. No rodenticides or fumigants will be used within or near suitable habitat for the salt marsh harvest mouse or California clapper rail. Methods of rodent control within or

near salt marsh harvest mouse or California clapper rail habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than two inches by one inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line. In areas where rodenticides are used, carcass retrieval surveys will be conducted daily for acute toxins and weekly for anticoagulants to minimize secondary poisoning impacts during the use period. Any spilled bait will be cleaned up immediately. Alternatives such as trapping and smoke bombs are used wherever practical prior to rodenticide use.

2. All herbicide use will be consistent with approved product specifications and according to their labels. Applications will be made by, or under the direct supervision of, State-certified applicators under the direction of a licensed Pest Control Advisor.

3. Only herbicides and surfactants registered for aquatic use will be applied within the banks of channels within 20 feet of any water present. Aquatic herbicide use will be limited to July 1 through October 15. If rain is forecasted for the day, then application of aquatic herbicide will be rescheduled.

<u>Construction Dust Control</u>

1. Bay Area Air Quality Management District Basic Control Measures for construction emissions of particulate matter (PM10) will be implemented at all construction sites. Current measures stipulated by the Bay Area Air Quality Management District California Environmental Quality Act Guidelines include the following (Bay Area Air Quality Management District 2010):

    a. All exposed surfaces (*e.g.*, parking areas, staging areas, soil piles, graded areas, and unpaved access roads) will be watered two times per day under normal conditions. Watering periodicity can be increased or decreased as necessitated by site specific conditions as determined by the SFCJPA's designated construction manager and with the SFCJPA's approval.

    b. All haul trucks transporting soil, sand, or other loose material off the site will be covered.

    c. All visible mud or dirt track-out onto adjacent public roads will be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

    d. All vehicle speeds on unpaved roads will be limited to 15 miles per hour.

    e. All roadways, driveways, and sidewalks to be paved will be completed as soon as possible. Building pads will be laid as soon as possible after grading unless seeding or soil binders are used.

    f. Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California

airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage will be provided for construction workers at all access points.

g. All construction equipment will be maintained and properly tuned in accordance with manufacturer's specifications. All equipment will be checked by a certified mechanic and determined to be running in proper condition prior to operation.

2. A publicly visible sign will be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person will respond and take corrective action as soon as is feasible and no later than 24 hours after the complaint is made. The Bay Area Air Quality Management District's phone number, as well as the contact numbers for the SFCJPA Project Manager, Designated Construction Manager, and a designated contact with the City of East Palo Alto will also be visible to ensure compliance with applicable regulations.

Biological Resources Protection

1. Prior to construction, worker awareness training must be conducted to inform proposed project construction workers of their responsibilities regarding sensitive environmental resources. The training will include environmental education about the salt marsh harvest mouse and California clapper rail and other special-status species and sensitive habitats (*e.g.*, in-stream habitat, riparian habitat, wetlands). The training will include visual aids to assist in identification of regulated biological resources, actions to take should protected wildlife be observed within the action area, and possible legal repercussions of affecting such regulated resources.

2. Existing access ramps and roads to waterways will be used where possible. If temporary access points are necessary, they will be constructed in a manner that minimizes effects on waterways:

    a. Temporary proposed project access points will be created as close to the work area as possible to minimize running equipment in waterways and will be constructed so as to minimize adverse effects.

    b. Any temporary fill used for access will be removed upon completion of the proposed project. Site topography and geometry will be restored to pre-project conditions to the extent possible.

3. Migratory bird nesting surveys will be performed prior to any proposed project-related activity that could pose the potential to affect migratory birds during the nesting season.

4. Nesting exclusion devices may be installed to prevent potential establishment or occurrence of nests in areas where construction activities would occur. All nesting exclusion devices will be maintained throughout the nesting season or until completion of work in an area makes the devices unnecessary. All exclusion devices will be removed and disposed of when work in the area is complete.

5. Effects on native aquatic vertebrates will be avoided or minimized. If native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, an evaluation of the project site and the native aquatic vertebrates will be conducted by a qualified biologist. The qualified biologist will consider:

    a. Native aquatic species present at the site.

    b. The ability of the species to naturally recolonize the stream reach.

    c. The life stages of the native aquatic vertebrates present.

    d. The flow, depth, topography, substrate, chemistry, and temperature of the stream reach.

    e. The feasibility of relocating the aquatic species present.

    f. The likelihood the stream reach will naturally dry up during the work season. Based on consideration of these factors, the qualified biologist may make a decision to relocate native aquatic vertebrates. The qualified biologist will document in writing the reasons to relocate native aquatic species, or not to relocate native aquatic species, prior to installation of cofferdams, water bypass structures, or silt barriers. If the decision is made to relocate the native aquatic species, then the operation will be based on the SCVWD's Fish Relocation Guidelines.

6. Local ecotypes of native plants will be planted and appropriate erosion-control seed mixes will be chosen. Whenever native species are prescribed for installation on SCVWD fee properties or easements, the following steps will be taken by a qualified biologist or vegetation specialist:

    a. Evaluate whether the plant species currently grows wild in Santa Clara County.

    b. If the plant species currently grows wild in Santa Clara County, the qualified biologist or vegetation specialist will determine whether the plant installation must include local natives, *i.e.* grown from propagules collected in the same or adjacent watershed, and as close to the proposed project site as feasible.

    c. A qualified biologist or vegetation specialist will be consulted to determine which seeding option is ecologically appropriate and effective. The following guidelines will inform the biologist or vegetation specialist's determination.

    d. For areas that are disturbed, an erosion control seed mix may be used consistent with the SCVWD's Guidelines and Standards for Land Use Near Streams, Design Guide 5, "Temporary Erosion Control Options."

    e. In areas with remnant native plants, the qualified biologist or vegetation specialist may choose an abiotic application instead, such as an erosion control blanket or seedless hydro-mulch and tackifier to facilitate passive revegetation of native species.

f. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable.

g. If a gravel or wood mulch has been used to prevent soil compaction, this material may be left in place (if ecologically appropriate) instead of seeding.

h. Seed selection will be ecologically appropriate as determined by a qualified biologist, per *Guidelines and Standards for Land Use Near Streams, Design Guide 2: Use of Local Native Species; and, Supplemental Landscaping/Revegetation Guidelines* (ISO document WQ71001).

7. Animal entry and entrapment will be avoided.

a. All pipes, hoses, or similar structures less than 12 inches diameter will be closed or covered to prevent animal entry. All construction pipes, culverts, or similar structures, greater than 2 inches diameter, stored at a construction site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained construction personnel before the pipe is buried, capped, used, or moved.

b. If inspection indicates presence of sensitive or State- or federally-listed species inside stored materials or equipment, work on those materials will cease until a qualified biologist determines the appropriate course of action.

c. To prevent entrapment of animals, all excavations, steep-walled holes or trenches more than 6 inches deep will be secured against animal entry at the close of each day. Any of the following measures may be employed, depending on the size of the hole and method feasibility.

d. Holes will be securely covered (no gaps) with plywood or similar materials at the close of each working day, or any time the opening will be left unattended for more than one hour.

e. In the absence of covers, the excavation will be provided with escape ramps constructed of earth or untreated wood, sloped no steeper than 2:1, and located no farther than 15 feet apart.

f. In situations where escape ramps are infeasible, the hole or trench will be surrounded by filter fabric fencing or a similar barrier with the bottom edge buried to prevent entry.

8. <u>Identify and protect riparian habitats</u>. To avoid unnecessary damage to or removal of riparian habitat, the SFCJPA will retain a qualified biologist or ecologist to survey and demarcate riparian habitat on or adjacent to the proposed areas of construction in the upper reach of San Francisquito Creek. Riparian areas not slated for trimming or removal to accommodate proposed project construction will be protected from encroachment and damage during construction by installing temporary construction fencing to create a no-activity exclusion zone. Fencing will be brightly colored and highly visible, and installed under the supervision of a qualified biologist to prevent damage to riparian habitat during installation. The fencing will protect all potentially affected riparian habitat consistent with

International Society of Arboriculture tree protection zone recommendations and any additional requirements of the resource agencies with jurisdiction. Fencing will be installed before any site preparation or construction work begins and will remain in place for the duration of construction. Riparian vegetation that must be trimmed will be trimmed by an International Society of Arboriculture certified arborist who will minimize stress and potential damage to trees and shrubs. Construction personnel will be prohibited from entering the exclusion zone for the duration of proposed project construction. Access and surface-disturbing activities will be prohibited within the exclusion zone.

9. Replace riparian habitat. The SFCJPA will be responsible for replacing permanently affected riparian habitat at a mitigation-to-effect ratio of 2:1 and temporarily affected riparian habitat at a minimum mitigation-to-effect ratio of 1:1 through the restoration or creation of marsh habitats consistent with the historical ecology of the project area. The SFCJPA will develop a MMP that describes this habitat replacement. The MMP will be developed in the context of the Federal and State permitting processes under the Clean Water Act and California Department of Fish and Game Code, and will include success criteria as specified by the permitting agencies. The MMP will also include adaptive management guidelines for actions to be taken if the success criteria are not met.

California Clapper Rail Measures

1. Work activities within 50 feet of California clapper rail habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local high tides) or when the marsh plain is inundated, which could prevent individuals from reaching available cover.

2. If work is to be conducted during the California clapper rail's breeding season (February 1 – August 31) within 700 feet of suitable habitat, a permitted biologist will be retained to conduct California clapper rail protocol-level surveys at the proposed project site in appropriate habitat for the California clapper rail. The surveys will be conducted following the Service's June 2015 survey protocol during the appropriate protocol-level survey period (*i.e.*, late January – April) prior to commencement of construction and maintenance activities (http://www.fws.gov/sfbaydelta/documents/June_2015__Final_CCR_protocol.pdf). Proposed project activities occurring within 700 feet of California clapper rail activity centers will occur only between September 1 and January 31 outside of the California clapper rail's breeding season.

3. Outside of the California clapper rail breeding season, a permitted biologist will be retained to conduct surveys of appropriate habitat for California clapper rails within the work area, including all staging and access routes, no more than seven days prior to initiation of work within suitable habitat. If California clapper rails are observed during this survey, a biologist will conduct an additional survey immediately prior to initiation of construction activities. If California clapper rails are observed within or near the work area, a no-disturbance buffer (minimum 50 feet) will be implemented. If the daily work area is expanded, then a qualified biologist will survey the suitable habitat prior to initiation of work and movement of equipment that day. No work will occur within the buffer until the biologist verifies that California clapper rail individuals have left the area.

4. If California clapper rails are routinely observed in the work area, a species avoidance plan will be developed in coordination with the Service and CDFW. If no California clapper rails are observed in accordance with the survey protocols, no buffers will be required. All vegetation removal within suitable California clapper rail habitat, as determined by a biologist, will be done by hand to the extent possible. If movement of heavy equipment is necessary in suitable habitat or within 50 feet of habitat, then a Service-approved biological monitor will observe the area in front of the equipment from a safe vantage point. If California clapper rails are detected within the area in front of the equipment, then the equipment will stop and the biologist will direct the equipment on an alternative path. If this is not possible, then equipment will stop until a clear path can be identified.

5. Additional conservation measures during the construction period will include:

    a. An annual search for and subsequent destruction of any cat feeding stations along public walkways shall be conducted.

    b. Before the onset of winter high tides, an annual capture and removal effort of feral cats and rats in the surrounding disturbed areas shall be conducted.

6. The SFCJPA will conduct protocol-level surveys for California clapper rail where potential impacts to rail habitat occur along the Faber Marsh levee and in San Francisquito Creek for the duration of mitigation monitoring, which is a minimum of five years. The purpose of the surveys will be to evaluate the effectiveness of the measures to support the California clapper rail population.

<u>Salt Marsh Harvest Mouse Measures</u>

1. Since the salt marsh harvest mouse can breed year-round, a species avoidance plan will be developed in consultation with the Service and CDFW and implemented. The avoidance plan, at a minimum, will include the following.

    a. Hand removal of vegetation shall start at the edge farthest from the largest contiguous salt marsh area and work its way towards the salt marsh, providing cover for salt marsh harvest mice and allowing them to move towards the salt marsh as vegetation is being removed.

    b. In consultation with CDFW and the Service, salt marsh harvest mouse-proof exclusion fencing shall be placed around a defined work area immediately following vegetation removal and before proposed project activities begin. All supports for the exclusion fencing will be placed on the inside of the work area to prevent salt marsh harvest mice from climbing the stakes into the work area. The salt marsh harvest mouse-proof exclusion fencing shall be at least two feet high but no higher than four feet. The fencing will be made of a heavy plastic sheeting material that is too smooth for salt marsh harvest mice to climb. The toe of the fence will be buried approximately four inches in the ground to prevent salt marsh harvest mice from crawling or burrowing underneath it. A four-foot buffer will be maintained free of vegetation around the exclusion fencing and work areas. The final design and

proposed location of the fencing shall be reviewed and approved by CDFW and the Service prior to placement.

c. Prior to initiation of work each day within 300 feet of tidal or pickleweed habitats, a qualified biologist shall thoroughly inspect the work area and adjacent habitat areas to determine if salt marsh harvest mice are present. The biologist shall ensure the exclusion fencing has no holes or rips, and the base remains buried. The fenced area will be inspected daily to ensure that no mice are trapped.

2. Prior to initiation of work within suitable habitat, a Service-approved biologist will be retained to monitor the hand removal of pickleweed to avoid the injury or mortality of the salt marsh harvest mouse. Monitoring will occur for the duration of all clearing work within suitable habitat. If a salt marsh harvest mouse is observed during clearing activities, clearing will cease and workers will move to a new area. Clearing work may begin in the area of the observation one day or more after the observation date.

3. During the survey, if salt marsh harvest mouse individuals are observed, or if active nests of this species are observed, proposed project activities within 100 feet of the observation will be postponed and a no-disturbance buffer will be established. The buffer will remain in place until the biologist determines that the individuals have left the area (or if an active nest is found that all the salt marsh harvest mice have weaned) and are not present in or near (100 feet) of the work area. If no individuals are observed in accordance with the survey protocols, no buffers will be required.

4. Work activities within 50 feet of salt marsh harvest mouse habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local high tides) or when the marsh plain is inundated, which could prevent individuals from reaching available cover.

<u>Avoidance Measures during O&M Activities including Levee Mowing and Vegetation Management</u>

The following avoidance measures will be implemented during O&M activities including vegetation management and annual levee mowing to avoid the potential for injury and mortality of salt marsh harvest mice and California clapper rails.

1. Within seven days prior to work within the range of salt marsh harvest mouse or California clapper rail habitat, the proposed project area will be surveyed by a qualified biologist to identify specific habitat areas. Surveyed areas will include work locations and access routes.

2. To minimize or avoid the loss of individuals, activities within or adjacent to salt marsh harvest mouse and California clapper rail habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local high tides) when the marsh plain is inundated, because protective cover for those species is limited and activities could prevent them from reaching available cover.

3. Mowing will not occur at night.

4. Specific habitat areas are vegetated areas of cordgass, marsh gumplant, pickleweed, alkali heath, and other high marsh vegetation, brackish marsh reaches of creek with heavy accumulations of bulrush thatch (old stands), and high water refugia habitat that may include annual grasses, and shrubs immediately adjacent to channels. Within the identified specific habitat areas, vegetation will be removed by hand from areas to be directly impacted by the work activities if possible (hand removal of vegetation in some channels may not be possible). If within the mapped range of the salt marsh harvest mouse, but outside of areas identified as specific habitat areas, then other methods may be possible.

5. Prior to the initiation of work each day for all vegetation management work, ground or vegetation disturbance, operation of large equipment, grading, sediment removal, and bank stabilization work and prior to expanding the work area, if suitable habitat occurs within the immediate work area, a qualified biologist will conduct a preconstruction survey of all suitable habitat that may be directly or indirectly impacted by the day's activities (work area, access routes, staging areas).

    a. If during the initial daily survey or during work activities a California clapper rail is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until the California clapper rail leaves the work area.

    b. If during the initial daily survey or during work activities a salt marsh harvest mouse or similar rodent is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until a *Site Specific Species Protection Form* to protect the salt marsh harvest mouse or similar rodent is developed and implemented by the qualified biologist. Acceptable plan activities may include one or more of the following activities: (1) establishment of a buffer zone at least 50 feet in radius from the rodent; (2) ongoing active monitoring; and (3) delay of work activity until the qualified biologist can provide CDFW and the Service a suggested course of action and seek concurrence.

6. If mowing with hand equipment is necessary within 50 feet of habitat areas, an on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. If salt marsh harvest mice are detected within the area to be mowed, no mowing will occur in that area. If a California clapper rail is detected within the area to be mowed, the mowing will stop until the individual(s) have left the work area.

7. If visual observation cannot confirm California clapper rails have left the work area, then it is assumed that the individual(s) remains in the work area and the work will not resume until the area has been thoroughly surveyed (and absence confirmed) or the Service has been contacted for guidance.

8. No rodenticides or fumigants will be used within the range of the salt marsh harvest mouse or California clapper rail as identified on SCVWD range maps. Methods of rodent control within salt marsh harvest mouse or California clapper rail habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

Predator Management

The SFCJPA will take the following actions to assist the Refuge and U.S. Department of Agriculture Wildlife Services in its efforts towards predator management at Faber Marsh and the adjacent Laumeister Marsh as follows:

1. Predator Trapping Assistance

    a. Financial contributions towards predator management activities. Since predation is believed to represent the greatest threat and in order to provide the maximum benefit possible to the salt marsh harvest mouse and California clapper rail, the SFCJPA will provide funding to augment current predator trapping activities, so that the desired activities in and around Faber and Laumeister Tract marshes are fully funded. The SFCJPA will enter in to a formal agreement with U.S. Department of Agriculture Wildlife Services for the provision of $8,000 per year with a 5 percent annual increase, the first payment to be made within 30 days after a Clean Water Act Section 404 permit is issued for the proposed project, for a total of five years.

    b. Install features to deter the public from entering trapping areas. Currently, trapping activities are limited along the levee that separates the Faber and Laumeister Tracts because of human activity. This levee is open to the public, and U.S. Department of Agriculture Wildlife Services is reluctant to place traps in areas where people may tamper with them, or be harmed by them. To provide for greater trapping opportunities, the SFCJPA will install a pole and cable feature, subject to municipal and regional access codes, to designate a trail location and alignment for the public. This will provide some "off-trail" space between the pole and cable in the Laumeister Tract marsh for trapping activities and reduce the likelihood of accidental human/trap interface. Installation will take place at the time of revegetation of the Main Faber Marsh northern perimeter levee.

    c. Provide access to new areas for trapping activities. Currently, U.S. Department of Agriculture Wildlife Services is limited in its trapping activities to areas within the Refuge. Trapping would likely be more effective if these activities could also take place in known predator access areas to the Refuge, but lie outside of the Refuge. There are certain parcels along and adjacent to the levee separating the Faber and Laumeister Tract marshes from developed areas in East Palo Alto that are owned by the City of East Palo Alto or the City of Palo Alto. The SFCJPA will work with its municipal partners to provide access agreements between the Cities and U.S. Department of Agriculture Wildlife Services to allow for trapping activities in these areas. Discussions with the Cities will begin at the time that formal Section 7 consultation on the proposed project is initiated with the Service.

2. Exclusionary Fencing. The SFCJPA will install a chain-link fence and gate across the levee that separates San Francisquito Creek and Main Faber Marsh to inhibit predator and human access to the marsh. In addition to inhibiting predator access, the fence will allow for more aggressive trapping activities along this levee and the levee that separates Main Faber Marsh and Outer Faber Marsh. The fencing will be installed upon completion of construction of the project features along the southern Main Faber Marsh levee beyond the proposed fence

location. The fence and gate will have the following features: 1-inch mesh chain link; 8 feet tall; vehicular gate with chained lock to allow access to multiple agencies; anti-perching feature on top; the fence shall extend on the marsh (north) side to the outboard toe of the high marsh transition zone; and the fence shall connect on the creek (south) side to the rail structure of the Friendship Bridge.

3. Raptor Perching Deterrents. The SFCJPA will modify 12 bridge marker poles to deter raptor perching. A cone-shaped cap will be placed at the top of each pole, and the capped poles will be maintained in a condition that deters predator access and raptor perching. Caps will be placed on the poles at the time of construction of the boardwalk project feature.

4. Trail Signage. The SFCJPA will coordinate with staff from the Palo Alto Baylands Preserve to install signs informing the public of the need to keep dogs leashed, with applicable municipal code citations, and establish a local enforcement strategy. Signage will be installed upon completion of the proposed project.

High Tide Refuge Islands

The SFCJPA will install five high-tide refuge islands in Outer Faber Marsh near the San Francisco Bay. These islands will be similar to those installed as part of the Invasive Spartina Project effort, which have successfully provided refuge during king tides throughout San Francisco Bay (H.T. Harvey & Associates 2015b). Each island will have a footprint of 0.007 acre (300 square feet, 10 feet by 30 feet). The islands will be planted with marsh gumplant and/or other native marsh species, and placed at an elevation that retains wetlands in the marsh. The SFCJPA and its partners will develop final design and dimensions, and determine final location of these islands in coordination with the Service, the Refuge, and H.T. Harvey & Associates (the consultant for the Invasive Spartina Project). Further details on the high-tide refuge islands installation will be provided in the proposed project's MMP and are available in the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a). An example plan view and cross-section of a high-tide refuge island installed for the Invasive Spartina Project is illustrated in Figures 3 and 4 below. The approximate locations of the five high tide refuge islands to be installed in Outer Faber Marsh are shown in Figure 5 below.

Each of the five high-tide refuge island sites proposed for construction in Outer Faber Marsh will consist of one excavation area (if necessary), one refuge island, and an elevation control stake. Prior to construction, a restoration ecologist will ground-truth the location of refuge islands selected during the stakeholder meeting. Refuge island sites will be accessed on foot outside of the California clapper rail's breeding season (*i.e.*, after September 1). The restoration ecologist may adjust the location of refuge island sites based on field conditions in order to maximize the benefit of island sites for California clapper rail and facilitate construction.

During pre-construction ground-truthing, a white polyvinyl chloride (PVC) pipe will be installed at each island site so that the top of the PVC pipe is at Mean Higher High Water (MHHW). During refuge island construction, the elevation of each island and the maximum depth of the excavation area will be determined via measurement (with a laser level) to the elevation control stake.
The refuge islands will be built to be approximately 25-foot long by 10-foot wide with island tops approximately 2-3 feet above the marsh plain and located adjacent to a tidal marsh slough channel.

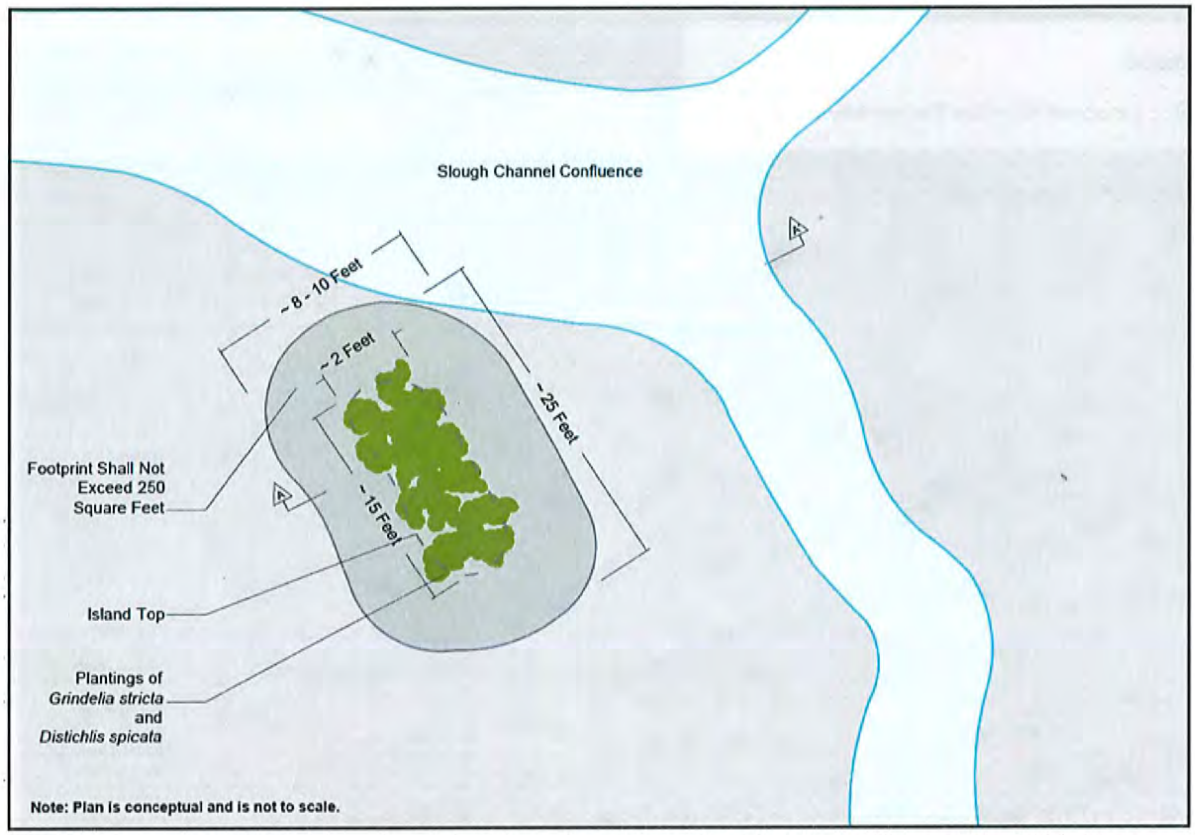

Figure 3. Typical plan view of a high-tide refuge island (copied from Figure 7 in H.T. Harvey & Associates (2015a)).

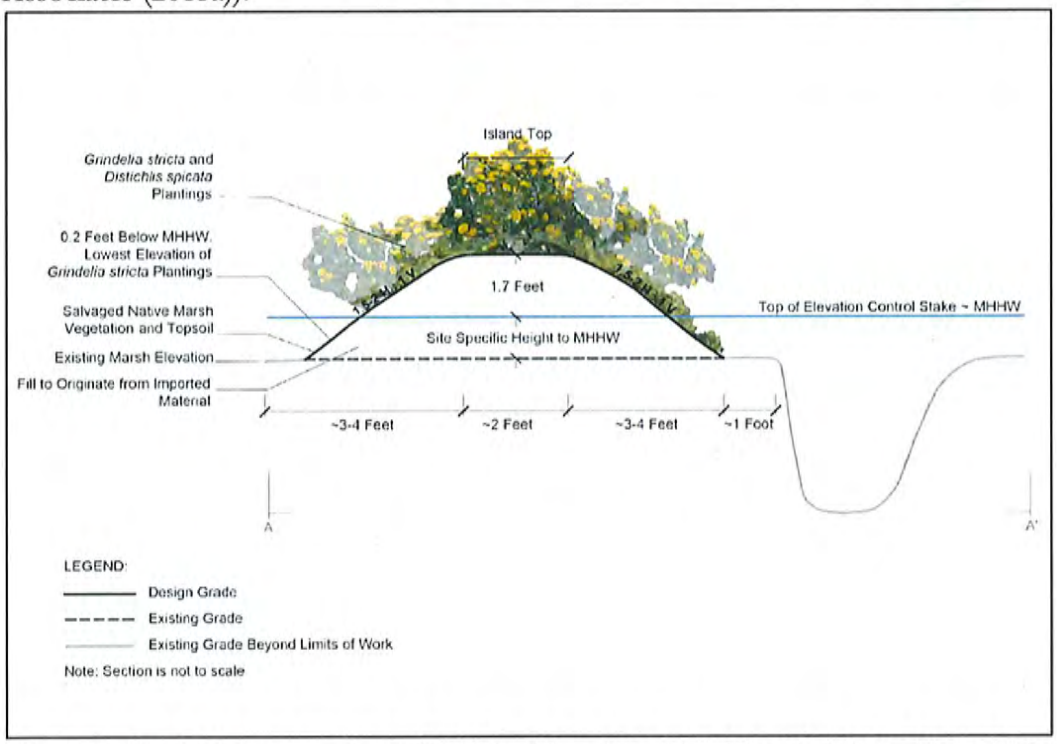

Figure 4. Typical cross-section of a high-tide refuge island (copied from Figure 8 in H.T. Harvey & Associates (2015a)).

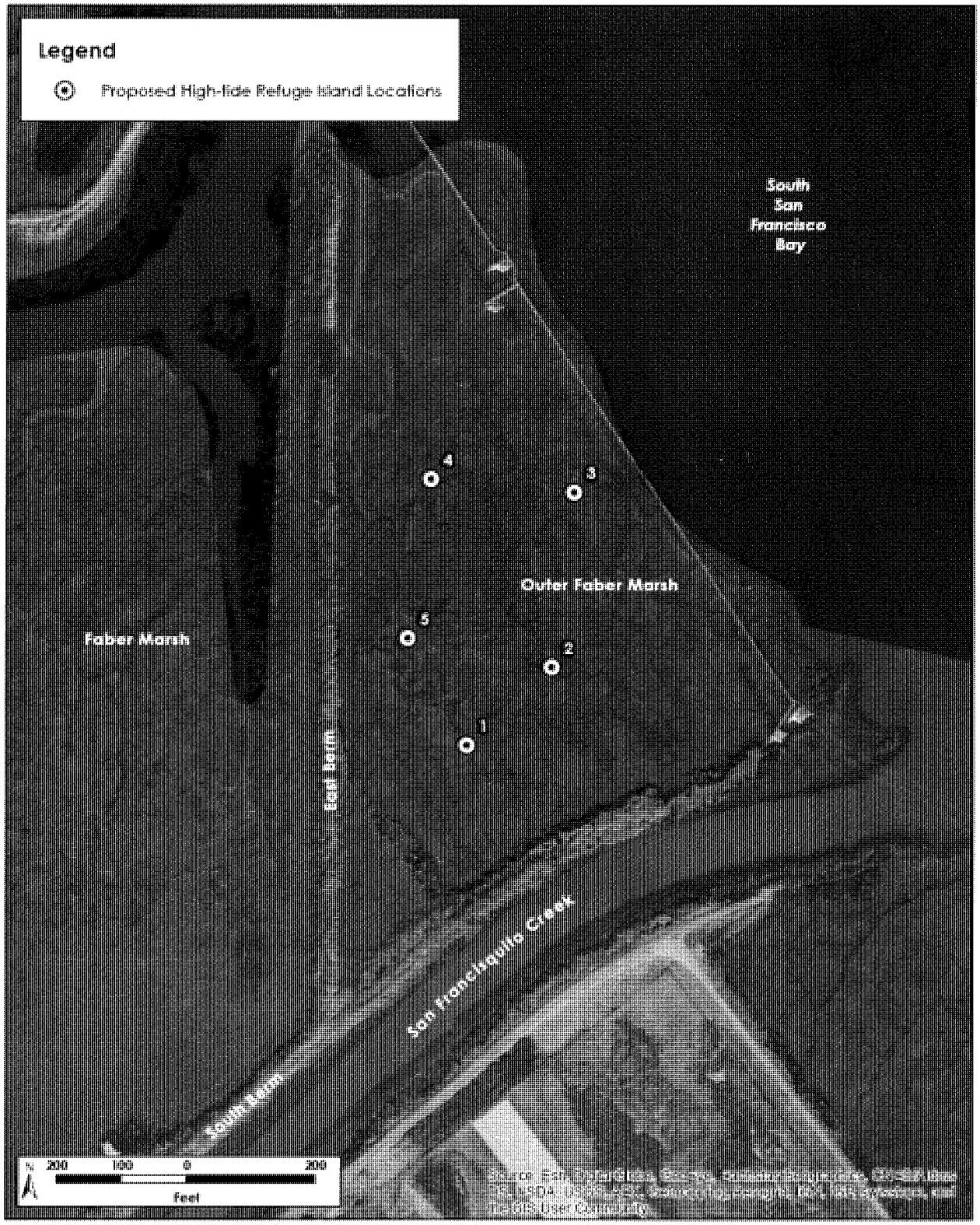

Figure 5. Approximate locations where high-tide refuge islands will be installed in Outer Faber Marsh (copied from Figure 6 in H.T. Harvey & Associates (2015a)).

There are two general methods that may be used for refuge island construction: the use of in-situ bay mud collected from the marsh or via the import of terrestrial soil. The construction methods will be determined based on soil conditions (particularly moisture content) and logistical considerations. If it is infeasible to use bay mud, clean terrestrial soil will be imported to each island site using hand-tools. The fill may be transported to the marsh by dump truck to the nearest feasible access point, but no vehicles will enter marsh habitats. The contractor may also use boats (*e.g.*, airboats) to import soil to Outer Faber Marsh, if that method is more logistically suitable. Ecologists for H.T. Harvey & Associates found that marsh mud in the footprint of the proposed refuge island locations in Outer Faber Marsh is too saturated and unconsolidated and therefore, not recommended for refuge island construction (H.T. Harvey & Associates 2015a). Instead, the ecologists for H.T. Harvey & Associates recommend that refuge islands be constructed using imported terrestrial fill. Use of terrestrial fill for construction will also reduce temporary impacts to Outer Faber Marsh which would have been caused by excavating in-situ marsh mud (H.T. Harvey & Associates 2015a).

Crews of approximately five to eight people will access and construct each refuge island over a one to two day period, during low tides. Refuge islands will be constructed by hand using shovels and other hand tools, from approximately 11 to 22 cubic yards of imported clean terrestrial fill meeting the specifications provided in Table 4 of H.T. Harvey & Associates (2015a). Terrestrial fill will be transported to island sites across the marsh from an adjacent berm using wheelbarrows (either hand operated or gas powered). A temporary plywood path will be laid down on the day of construction from the berm to the island site to protect marsh vegetation during transport of fill material. The surface area of fill at each refuge island site will be a maximum of 250 square feet (see Figures 4 and 5 for typical dimensions).

Prior to construction, approximately 4-6 vertical inches of the existing marsh vegetation, root structure, and sediment (hereafter, marsh sod) will be salvaged from the surface of the refuge island construction footprint. Following marsh sod removal, terrestrial fill will be placed in the island footprint, elevating an area of approximately 12 square feet (the island crest) to an elevation of approximately 1.7 feet above MHHW. Island tops will settle to approximately 1.3 feet above MHHW over a five-year period. Island tops will be flooded periodically during spring tides. Crews will make an effort to complete excavation and construction of each island during one low-tide cycle. However, if refuge island construction is not completed before the tide rises, measures such as tarping the excavated and salvaged materials will be employed to protect water quality until construction is completed during the following low-tide cycle. A total of about 8,250 square feet (0.19 acre) of tidal marsh habitat will be temporarily disturbed during construction of the five high-tide refuge islands in Outer Faber Marsh.

After the refuge island substrate is manually constructed and graded, salvaged marsh sod will then be placed on the top and side slopes of the constructed island to facilitate habitat establishment and erosion control. Moreover, the upper portion of each island will be densely planted with gumplant and saltgrass from container stock to facilitate establishment of refuge habitat. Marsh gumplant container stock (50, 1 gallon container plants per island) will be installed on 2-foot centers. Saltgrass will also be installed from container stock at all islands, next to each of the marsh gumplant plantings (50 saltgrass treeband container plants per island). Container plants will be purchased from a qualified plant nursery and collected from source populations located around the margins of southern San Francisco Bay (South Bay) (south of the San Mateo Bridge). An 8-12 month lead time prior to plant installation is typically necessary to contract grow the plants. Saltgrass planting is

intended to facilitate establishment of increased cover for refugia because saltgrass grows vertically into marsh gumplant canopies. Once mature, the planted marsh gumplant will provide high-tide refuge canopy extending approximately 2-3 feet above the highest predicted spring tides.

A qualified biologist will work with the contractor to reduce and minimize the impacts on wetlands from island construction access. Access to and from all refuge island sites will be conducted by foot from the nearest levee access point. During island construction, marsh vegetation roots and substrate will be thoroughly protected from damage. Protective materials such as plywood sheets (or equivalent) will be temporarily installed (for a maximum of two to three days) to completely cover all vegetated marsh areas that will be regularly accessed by workers and biologists during island construction, including the access pathways to construction sites and vegetation immediately surrounding the refuge island construction sites.

All dead marsh gumplant individuals will be replaced during the first two years of the plant establishment period. Additional plant replacement may occur in the third year if the Year 3 marsh gumplant performance criteria are not met. During the three year plant establishment period trash deposited within the planting areas will be removed when maintenance activities are performed.

The high-tide refuge islands will be monitored annually for five years. Monitoring will occur between September 1 and December 1 so that monitoring falls outside of the California clapper rail's breeding season (February 1 – August 31) and before mid-winter when high marsh vegetation has typically senesced. The first annual monitoring event will occur at the end of the first growing season following plant installation. High quality high-tide refuge habitat for California clapper rail and salt marsh harvest mouse should be at an appropriate elevation and sufficiently covered by native salt marsh vegetation to provide protection from flooding and predators during extreme high-tide events. Therefore, the final success criteria among high-tide refuge islands after five growing seasons will be as follows:

1. The average foliar cover among the refuge islands will be at least 70 percent provided by native plant species.

2. The average marsh gumplant canopy cover among the refuge islands will be at least 30 percent.

3. The average marsh gumplant height among the refuge islands will be at least 1.5 feet.

4. The average invasive plant foliar cover on each island will be less than 5 percent.

5. The average crest elevation of the ground surface among the refuge islands will be at least +0.8 feet above MHHW.

An Annual Monitoring Report will be submitted to the permitting agencies by February 1 following each monitoring year. Monitoring Reports will present the findings of the annual field surveys relative to the performance standards in the monitoring plan described above.

Transition Zone Habitat Enhancement along Faber Marsh Levees and Berms

The SFCJPA will remove invasive species from the levees and berms surrounding and within Main Faber Marsh and Outer Faber Marsh (with the exception of the western levee of Main Faber Marsh, which is being enhanced by the City of East Palo Alto as part of the habitat compensation requirements in the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project (Service file number 81420-2011-F-0103-2, Service 2013b)) and revegetate them with appropriate marsh transition zone vegetation. The planting plan and plant palette will be designed to restore vegetation structure and composition that will provide high tide refuge habitat for the California clapper rail and salt marsh harvest mouse and will be subject to review and approval by the Service and the Refuge. The approximate areas and lengths of Faber Marsh levees where transition zone habitat will be enhanced are: northern levee 2.44 acres, 2,210 linear feet; southern levee 1.87 acres, 1,530 linear feet; and eastern levee 1.35 acres, 1,380 linear feet (Figure 6) (note the original estimate of 2.77 acres of north levee enhancement shown in Figure 6 has been revised by SFCJPA to 2.44 acres based on recent field data provided by H.T. Harvey & Associates) (K. Murray, SFCJPA, *in litt.* 2015e). The 1,530 linear feet of south levee enhancement is parallel to construction impacts on top of the levee as shown in Figure 6. The total amount of high tide refuge habitat enhancement on the Faber Marsh levees proposed by the proposed project is about 5.66 acres and approximately 5,120 linear feet. Functions and values of the native plant patches existing on the levees and the adjacent tidal marsh will be enhanced by habitat connectivity. More details on the transition zone habitat enhancement are available in the *San Francisquito Creek Flood Protection Project: Conceptual High-Tide Refuge Habitat Enhancement Plan* (H.T. Harvey & Associates 2015a).

The three plant palettes for transition zone habitat enhancement are Upland Plant Palette, Ecotone Plant Palette, and High Marsh Plant Palette and are described below and in H.T. Harvey & Associates (2015a):

1. Upland Plant Palette. These species will be installed in the Upland Planting Zone. This zone is commonly located on the tops of berms beyond the reach of tides. The graminoid and shrub species selected are either salt-sensitive or moderately salt tolerant. The soils in this zone are generally non-saline. Forb and grass species to be planted in the Upland Plant Palette include western ragweed, saltgrass, creeping wild rye, western goldenrod, bee-plant, and Pacific aster. Shrub species to be planted in the Upland Plant Palette include California sagebrush, marsh baccharis, lizard tail, and marsh gumplant.

2. Ecotone Plant Palette. These species will be installed in the Ecotone Planting Zone. This zone is located above the pickleweed-dominated high marsh and below the Upland Planting Zone and is occasionally inundated by the tides. These species consist of tidal salt marsh upland ecotone specialists such as saltgrass and marsh gumplant but also include high marsh and upland plants. The soils in this zone are moderately saline. Forb and grass species to be planted in the Ecotone Plant Palette include western ragweed, saltgrass, creeping wild rye, alkali heath, and perennial pickleweed. Shrub species to be planted in the Upland Plant Palette include California sagebrush, marsh baccharis, lizard tail, and marsh gumplant.

3. High Marsh Plant Palette. These species will be installed in the High Marsh Planting Zone. This planting palette consists of marsh gumplant interplanted into the existing native

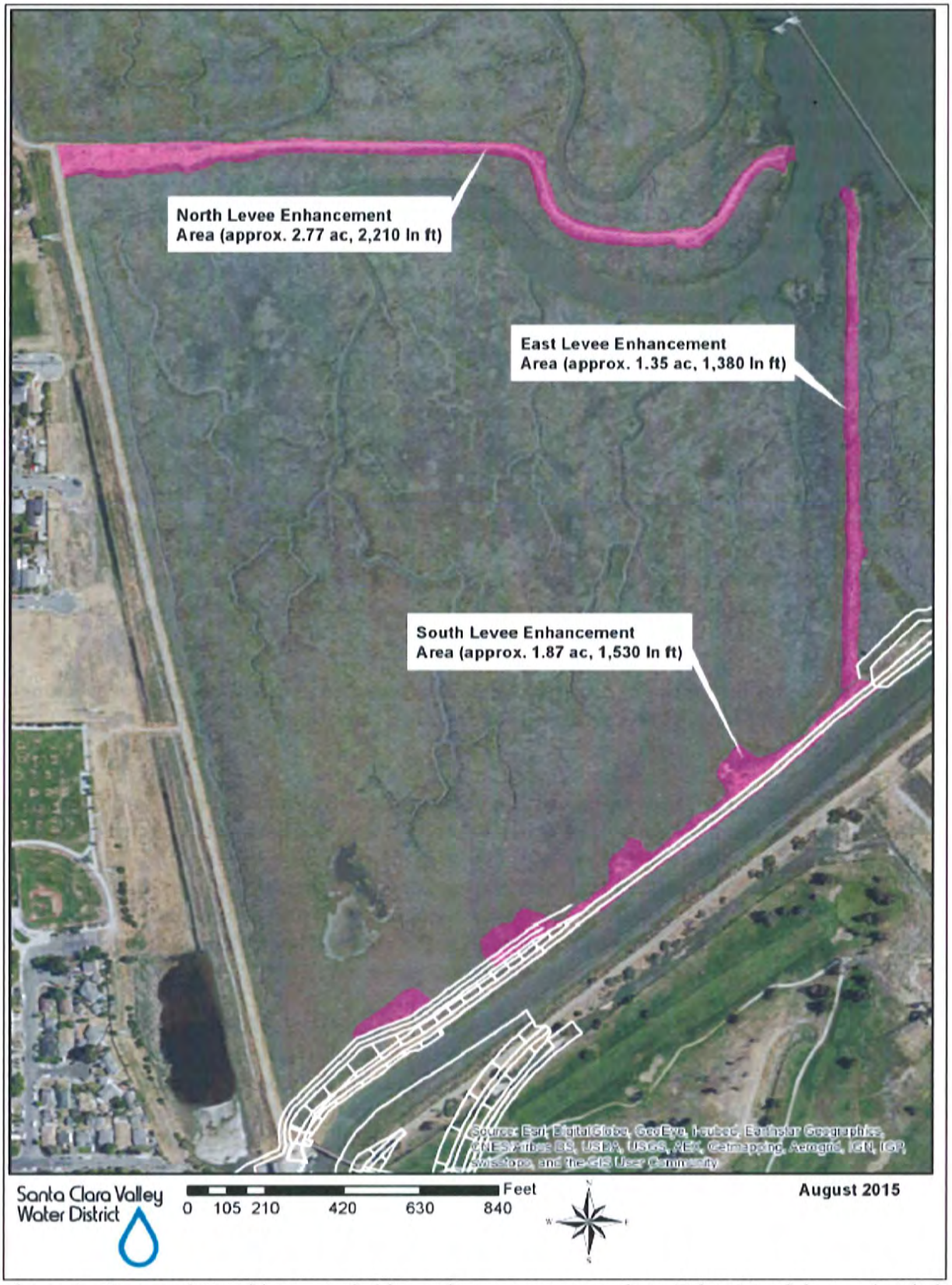

Figure 6. Proposed transition zone habitat enhancement areas along Faber Marsh levees (copied from Figure 1 in K. Murray, SFCJPA, *in litt.* 2015c).

pickleweed marsh to enhance high-tide refuge habitat. The soils in this zone are highly saline.

Plants will be installed between November 1 and January 31, during the rainy season and outside of the California clapper rail's breeding season. Plantings will require initial maintenance during a three-year plant establishment period following installation to become self-sustaining. The goal of habitat enhancement site maintenance is to facilitate the establishment of the target vegetation in the planting areas. Planting area maintenance during the three-year period will include dead plant replacement, irrigation, weed control, and trash removal. Irrigation will be placed that minimizes the access required to water the plants. A Service-approved biologist will be present if access is required during the California clapper rail's breeding season to the eastern berm of Main Faber Marsh.

In addition to this maintenance plan, annual site observations and data collected by a qualified restoration ecologist may be used to further specify maintenance actions necessary to establish the planting areas. All dead woody plants will be replaced during the first two years of the plant establishment period. Additional plant replacement may occur in the third year if the Year 3 percent shrub cover criterion is not met. Berm revegetation areas will require invasive plant control during the three-year plant establishment period. Potential weed removal treatments include hand-pulling and herbicide use. All herbicides used will be approved by the U.S. Environmental Protection Agency and the Refuge (*i.e.*, through a Refuge-approved Pesticide Use Proposal). Herbicide application will be guided by the Refuge's Comprehensive Conservation Plan for weed management (Service 2012c; Service, in prep.). Herbicides approved by the Refuge for terrestrial use include: Round-up, Glypro Plus, Roundup Pro, KleenUp Pro, Aquamaster and Rodeo (glyphosate), Garlon 4 Ultra (triclopyr), Habitat and Polaris (imazapyr), Milestone VM Plus and Capstone (aminopyralid and triclopyr), Telar (chlorsulfuron) and Transline (clopyralid). Herbicides approved by the Refuge for aquatic use include Habitat and Polaris (imazapyr) and Aquamaster, Roundup Custom, and Rodeo (glyphosate). The application of any pesticide, including herbicides, will be conducted in accordance with a Refuge-approved Pesticide Use Proposal. An annual pesticide use report will be completed for every Pesticide Use Proposal by January 31 each year for the previous year's activities. A qualified biologist will assess the type, distribution, and abundance of invasive plant species during annual monitoring and, when warranted, recommend effective control measures.

Non-native plant removal in breeding habitat during the California clapper rail's breeding season will be minimized to the maximum extent feasible. The eastern berm of Main Faber Marsh will not be accessed during the California clapper rail's breeding season unless a Service-approved biologist is present. Access to northern and southern berms of Main Faber Marsh during the California clapper rail's breeding season will be limited to the trail on the northern berm and the middle seeded area on the southern berm.

The transition zone habitat enhancement areas will be monitored for at least five years to ensure success criteria are met for the establishment of suitable native transition zone vegetation and the removal of invasive plant species. The forthcoming levee revegetation plan (to be included in the MMP) will be subject to the review and approval of the Service and the Refuge and will include the following vegetation success criteria to determine whether the revegetated levee(s) are on a trajectory to successfully establish high tide refuge habitat for California clapper rail and salt marsh harvest mice. The berm enhancement area should be sufficiently covered by a scattered patchwork of dense native shrubs within a matrix of non-invasive forb/grass-dominated vegetation to provide protection from flooding and predators for the California clapper rail and salt marsh harvest mouse

during extreme high-tide events. The shrub patches are intended to provide escape cover for California clapper rails and the intervening forb/grass vegetation between the shrub patches is intended to provide escape cover for salt marsh harvest mice. The shrub patches are also intended to remain discrete patches (rather than long, contiguous shrub habitat) to minimize use by mammalian predators. Therefore, the final success criteria among the upland, ecotone, and high marsh planting zones after five growing seasons will be as follows (H.T. Harvey & Associates 2015a; K. Murray, SFCJPA, *in litt.* 2015c):

1. Native shrub patches will be 20-80 feet long, at least 4 feet wide (as measured from the widest portions of the plant canopies), and have a minimum of 60 percent average canopy cover provided by native shrubs. Canopy cover includes the area within the general perimeter of the shrub canopy.

2. The distance between the outer boundaries of native shrub patches (with the characteristics described above) will be 25-200 feet; 200 feet is selected as a maximum as it equals the approximate radius of the California clapper rail's home range.

3. The forb/grass revegetation areas (located between the native shrub patches) will have at least 60 percent average foliar cover (all forb/grass areas combined) provided by non-invasive, herbaceous vegetation; non-invasive herbaceous species are those that are not listed as "high" negative ecological impact by the California Invasive Plant Council (Cal-IPC) (Cal-IPC 2015) and are also not listed as weed species with "highest priority" and "high priority" rankings for control by the Service's *South San Francisco Bay Weed Management Plan* (Marriott *et al.* 2013). Foliar cover is the absolute area of ground covered by plant species.

4. The berm enhancement area (shrub patches and forb/grass areas) will have less than 5 percent average foliar cover of invasive plant species. Invasive species are those that have "high" negative ecological impact as rated by Cal-IPC (Cal-IPC 2015) and weed species with "highest priority" and "high priority" rankings for control by the *South San Francisco Bay Weed Management Plan* (Marriott *et al.* 2013).

An Annual Monitoring Report will be submitted to the permitting agencies by February 1 following each monitoring year. Monitoring Reports will present the findings of the annual field surveys relative to the performance standards in the monitoring plan described above.

Revegetation and Monitoring and Invasive Plant Species Control

The SFCJPA will monitor the re-vegetation in the channel and on levees for a minimum of five years to ensure they are successfully established with suitable native plant species and meet the success criteria under a Service-approved MMP. Monitoring will include the removal of any invasive plants.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses all suitable tidal marsh, transition zone, and upland refugia habitat for the salt marsh harvest mouse and California clapper rail along the 7,450-foot length of San

Francisquito Creek between San Francisco Bay and the East Bayshore Road/Highway 101 Bridge. The action area also includes all suitable upland foraging/dispersal habitat and diked marsh habitat for the salt marsh harvest mouse contiguous with and within 328 feet of suitable tidal marsh habitat along San Francisquito Creek between San Francisco Bay and the East Bayshore Road/Highway 101 Bridge. The action area also includes all suitable tidal marsh, transition zone, and upland refugia habitat within the approximately 81.5-acre Refuge-managed Main Faber Marsh and the adjacent approximately 13.8-acre Outer Faber Marsh (*i.e.*, the triangle-shaped marsh between Main Faber Marsh and San Francisco Bay) that would be indirectly affected by altered hydrology and predator management. The action area also includes the adjacent 91-acre Refuge-managed Laumeister Marsh where predator management would be implemented for the benefit of the salt marsh harvest mouse and California clapper rail.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analyses in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the salt marsh harvest mouse's and California clapper rail's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the salt marsh harvest mouse and California clapper rail in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the salt marsh harvest mouse and California clapper rail; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the salt marsh harvest mouse and California clapper rail; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the salt marsh harvest mouse and California clapper rail.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the salt marsh harvest mouse's and California clapper rail's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the salt marsh harvest mouse and California clapper rail and the role of the action area in the survival and recovery of salt marsh harvest mouse and California clapper rail as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

Salt Marsh Harvest Mouse

There are two subspecies of the salt marsh harvest mouse: the northern subspecies (*R. r. halicoetes*) and the southern subspecies (*R. r. raviventris*). Both subspecies are listed as endangered. The status of the salt marsh harvest mouse and information about its biology, ecology, distribution, and current threats is available in the *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Recovery Plan) (http://ecos.fws.gov/docs/recovery_plan/TMRP_Final.pdf; Service 2013a). Critical habitat has not been designated for this species. No change in the species' listing status was

recommended in the February 2010 5-year review (Service 2010). Threats evaluated during that review and discussed in the Recovery Plan have continued to act on the species since the February 2010 5-year review and the August 27, 2013 Recovery Plan were finalized, with loss of habitat being the most significant effect. While there have been continued losses of salt marsh harvest mouse habitat throughout the various recovery units, including the Central/South San Francisco Bay Recovery Unit where the proposed project is located, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

California Clapper Rail

The status of the California clapper rail and information about its biology, ecology, distribution, and current threats is available in the Recovery Plan (http://ecos.fws.gov/docs/recovery_plan/TMRP_Final.pdf; Service 2013a). Critical habitat has not been designated for this species. Threats evaluated in the Recovery Plan have continued to act on the species since the August 27, 2013 Recovery Plan was finalized, with loss of habitat and predation being the most significant effects. While there have been continued losses of California clapper rail habitat throughout the various recovery units, including the Central/South San Francisco Bay Recovery Unit where the proposed project is located, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

Environmental Baseline

<u>San Francisquito Creek</u>

San Francisquito Creek is a perennial stream that drains a 45-square-mile basin. There are about 7,450 linear feet of San Francisquito Creek within the action area for the proposed project between San Francisco Bay and the East Bayshore Road/Highway 101 Bridge. The 2,850-foot-long lower reach of San Francisquito Creek (San Francisco Bay to Friendship Bridge) is located between the tidal marshes of Main Faber Marsh and Outer Faber Marsh to the north (right bank) and the Palo Alto Municipal Golf Course to the south (left bank) (Figure 1). The lower reach of San Francisquito Creek contains tidal marsh dominated by tule, marsh gumplant, alkali heath, and saltgrass and provides suitable breeding, foraging, and dispersal habitat for salt marsh harvest mice and California clapper rails. The middle and upper reaches of San Francisquito Creek (upstream of Friendship Bridge) within the action area are less tidally influenced and transition from brackish to freshwater riparian habitat; the middle and upper reaches are less suitable for salt marsh harvest mouse and California clapper rail foraging and dispersal. The quality of the tidal and brackish marsh within the middle and upper reaches of the creek is degraded due to the relatively sparse vegetative cover, frequent inundation during winter storms, the marsh is highly fragmented and located within a highly urbanized environment, and the presence of ruderal and invasive plant species (*e.g.*, perennial pepperweed) and avian and mammal predators (*e.g.*, raptors, feral cats, skunks, red foxes, opossums, crows, and western scrub-jays).

<u>Main Faber Marsh</u>

Main Faber Marsh is a very high quality approximately 81.5-acre restored tidal marsh managed by the Refuge that supports one of the highest density populations of the California clapper rail range-

wide (Liu *et al.* 2012; L. Liu, Point Blue Conservation Science, pers. comm. 2014) and a population of the salt marsh harvest mouse. Main Faber Marsh is located immediately north of the lower reach of San Francisquito Creek, east of a residential neighborhood of the City of East Palo Alto, south of the Refuge-managed native tidal marsh of Laumeister Marsh, and west of Outer Faber Marsh and San Francisco Bay. The tidal marsh of Main Faber Marsh is dominated by pickleweed, cordgrass, and salt grass.

Levees and berms surrounding the majority of Main Faber Marsh reduce the frequency of fluvial and tidal flooding of the tidal marsh which benefits the salt marsh harvest mouse and California clapper rail. Salt marsh harvest mice and California clapper rails are more vulnerable to predation during flooding events when suitable unsubmerged cover is limited (Albertson 1995, Overton *et al.* 2014, Service 2013a). Salt marsh harvest mouse nests may be inundated during flooding events resulting in the loss of all mice within the nest (R. Perrera, Huffman-Broadway Group, Inc., pers. comm. 2012). Therefore, the levees and berms around Main Faber Marsh provide some benefit to the salt marsh harvest mouse and California clapper rail by reducing the frequency of flooding of the tidal marsh. However, the levees and berms also provide pathways for mammal predators into the marsh which increases the risk of predation on salt marsh harvest mice and California clapper rails in Main Faber Marsh.

Vegetation within the transition zone habitat along the levees and berms of Main Faber Marsh also provides important upland refugia cover for salt marsh harvest mice and California clapper rails during extreme high tide and flooding events by providing shelter for the mice and the rails from avian and mammalian predators. However, the quality of the vegetation along the levees and berms around Main Faber Marsh is degraded due to the presence of invasive plant species like perennial pepperweed and mustard that provide poor quality high-tide refugia cover because these plants are leafless in the winter when the salt marsh harvest mouse and California clapper rail are in most need of suitable high-tide refugia cover during the more frequent storm and extreme high tide events. The existing berms provide poor quality high tide refuge habitat for salt marsh harvest mouse and California clapper rail due to a lack of suitable canopy structure because the existing vegetation is dominated by low-growing perennials, frequent bare patches, and monotypic patches of annual plants (*e.g.*, black mustard) (H.T. Harvey & Associates 2015a). Pickleweed cover on berm side slopes provides good cover for the salt marsh harvest mouse, but does not provide sufficient escape cover from predators for California clapper rail during extreme high-tides (H.T. Harvey & Associates 2015a). H.T. Harvey & Associates (2015a) reports that refuge habitat for the California clapper rail could be substantially improved on berm side-slopes at Main Faber Marsh if native shrub patches were planted.

Without suitable high-tide refugia cover, the salt marsh harvest mouse and California clapper rail are vulnerable to predation during extreme high tide and flooding events when suitable unsubmerged cover is limited. The tops of the north and east berms of Main Faber Marsh are largely dominated by low growing non-native plants such as slenderleaf iceplant, ripgut brome, and highway iceplant, monotypic stands of annual black mustard, and small isolated patches of perennial pepperweed (H.T. Harvey & Associates 2015a). Low-growing native plants such as alkali heath and saltgrass also occur at relatively low abundance compared to non-native species (H.T. Harvey & Associates 2015a). Along the tops of the southern berm and the western end of the northern berm of Main Faber Marsh (where soils are non-saline), annual non-native plants such as wild oats, black mustard, and ripgut brome are dominant (H.T. Harvey & Associates 2015a). Berm side-slopes are primarily

covered with native perennial pickleweed with scattered patches of marsh gumplant and other high marsh vegetation.

A levee on the western side of Main Faber Marsh contains a pedestrian trail (the San Francisco Bay Trail) which separates the tidal marsh of Main Faber Marsh from the residential neighborhood of the City of East Palo Alto to the west. The City of East Palo Alto is currently enhancing transition zone habitat for the salt marsh harvest mouse and California clapper rail along about 2,100 linear feet (0.58 acre) of the outboard (Main Faber Marsh) side of this levee between Runnymede Street and San Francisquito Creek (WRA Environmental Consultants 2013). The transition zone habitat enhancement being conducted by the City of East Palo Alto is compensation for the effects of the temporary disturbance of about 3.6 acres of salt marsh harvest mouse and California clapper rail habitat along the inboard (City of East Palo Alto) side of this levee in the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project (Service file number 81420-2011-F-0103-2, Service 2013b).

A berm along the southern edge of Main Faber Marsh separates the tidal marsh of Main Faber Marsh from the San Francisquito Creek channel. The quality of transition zone habitat along the southern berm of Main Faber Marsh is also low due to dominance of invasive mustard. An approximately 400-foot-long low spot in this berm downstream of the Friendship Bridge allows the five-year flood event to overtop the berm and flood Main Faber Marsh (20 percent chance of happening once in any given year) during average tidal conditions. The potential for flood flows spilling from San Francisquito Creek into Main Faber Marsh are currently limited by flow constrictions upstream (such as the Pope-Chaucer Bridge, Highway 101, and the channel near Highway 101) that reduce the amount of flows able to reach the lower reach of San Francisquito Creek and spill over into Main Faber Marsh. However, in 2015, Caltrans initiated construction of the enlargement of the U.S. Highway 101/East Bayshore Road Bridge (Caltrans facility) over San Francisquito Creek to increase the channel capacity to 9,400 cubic feet per second (cfs), the 100-year flood event for San Francisquito Creek. Once the enlargement of the Caltrans facility is completed, the maximum fluvial flood flow that could reach the lower reach of San Francisquito Creek adjacent to Main Faber Marsh will increase to 7,400 cfs. A 7,400 cfs fluvial flood flow in the lower reach of San Francisquito Creek would result in about 1,025 cfs of flow spilling into Main Faber Marsh during the 100-year flood event under average high tide conditions (an increase of 715 cfs over the 310 cfs of flow spilling into Main Faber Marsh during the 100-year flood flow under existing conditions) (M. Jones, ICF International, *in litt.* 2014). Flow constrictions further upstream (*e.g.*, Middlefield Road Bridge) will still limit the ability of the San Francisquito Creek channel to pass the 9,400 cfs 100-year flood event. The flow constriction at the Middlefield Road Bridge only allows 6,700 cfs to pass through the San Francisquito Creek channel. Pump stations downstream of Middlefield Road Bridge contribute an additional 700 cfs of flood flows to the San Francisquito Creek channel resulting in a total maximum flood flow of 7,400 cfs that could pass through the lower reach of San Francisquito Creek and the spilling of 1,025 cfs of flows into Main Faber Marsh once construction of the Caltrans facility is completed. Thus, once construction of the Caltrans facility is completed, the volume and frequency of flood flows entering Main Faber Marsh will increase resulting in an increased risk of predation on California clapper rails and salt marsh harvest mice and the flooding of salt marsh harvest mouse nests.

Outer Faber Marsh

Outer Faber Marsh is an approximately 13.8-acre triangle-shaped, low-elevation tidal marsh area located between Main Faber Marsh to the west, San Francisco Bay to the east, and immediately north of the mouth of San Francisquito Creek. Outer Faber Marsh is at a lower elevation than Main Faber Marsh and is dominated primarily by Pacific cordgrass with perennial pickleweed primarily located adjacent to the eastern and southern perimeter berms and along some channel edges (H.T. Harvey & Associates 2015a). Marsh gumplant grows in small patches along some of the tidal channels in Outer Faber Marsh. Overall, the marsh lacks sufficient high-tide refuge cover for the California clapper rail (H.T. Harvey & Associates 2015a). Additionally, the majority of the marsh also lacks high quality refuge cover for the salt marsh harvest mouse due to the relatively low elevations of the marsh plain (H.T. Harvey & Associates 2015a).

The levees and berms around Outer Faber Marsh are dominated by invasive plant species (about 58 percent cover) comprised mostly of invasive mustard and ice plant; however, the southern levee (Bay levee) contains more suitable native transition zone habitat (*e.g.*, marsh gumplant) than the western levee. The marsh is surrounded by PG&E towers and boardwalks and levees that increase predation risk on salt marsh harvest mice and California clapper rails in Outer Faber Marsh; the boardwalks and levees provide access for mammal predators while the PG&E towers provide perch and nest sites for raptors they may prey upon salt marsh harvest mice and California clapper rails in Outer Faber Marsh and the adjacent Main Faber Marsh. Due to the marsh's exposed location along San Francisco Bay and its lower elevation, Outer Faber Marsh is subject to more frequent tidal flooding and wave fetch than the more protected tidal marsh of Main Faber Marsh to the west. A north-south levee separates Outer Faber Marsh from Main Faber Marsh, while an east-west levee (the Bay levee) separates Outer Faber Marsh from the lower reach of San Francisquito Creek. Outer Faber Marsh provides lower quality breeding, foraging and dispersal habitat for salt marsh harvest mice and California clapper rails due to its exposure to more frequent tidal flooding and wave fetch from the Bay. Vegetation along the Bay levee and the berm separating Outer Faber Marsh from Main Faber Marsh provide transition zone habitat for salt marsh harvest mice and California clapper rails which shelter the mice and the rails from predation during extreme high tide and flooding events when the marsh plain is flooded; however, the quality of the transition zone habitat is low due to the dominance of invasive plant species which are leafless in the winter when the salt marsh harvest mouse and California clapper rail are in most need of suitable cover during the more frequent extreme high tide and winter storm events.

Laumeister Marsh

The Refuge-managed Laumeister Marsh is an approximately 91-acre high quality native tidal marsh located immediately north of Main Faber Marsh. Laumeister Marsh is bounded by the San Francisco Bay Trail levee and a residential neighborhood of the City of East Palo Alto to the west and the Cooley Landing public park to the north. The City of East Palo Alto is currently making improvements to Cooley Landing Park to increase public access and recreational opportunities (Cooley Landing Project). The Service issued a biological opinion for the indirect effects of increased public access at Cooley Landing Park on salt marsh harvest mice and California clapper rails in Laumeister Marsh (Service file number 81420-2011-F-0552-1; Service 2011). The City of East Palo Alto will minimize the indirect effects of increased public access at Cooley Landing Park by implementing a five-year adaptive mammal predator management plan beginning in October 2014 (Huffman-Broadway Group, Inc. 2011).

Diked Marsh Habitat at Palo Alto Municipal Golf Course

There about 2.7 acres of diked marsh habitat within the action area at the Palo Alto Municipal Golf Course adjacent to San Francisquito Creek. The diked marsh habitat within the action area is dominated by pickleweed and Mediterranean barley. The diked marsh habitat and adjacent ruderal grasslands at the Palo Alto Municipal Golf Course provide lower quality breeding, dispersal, and foraging habitat for salt marsh harvest mice. The managed turf of the golf course is not suitable habitat for the salt marsh harvest mouse because the turf grass is actively managed and maintained at a low height unsuitable for providing cover for the salt marsh harvest mouse. The diked marsh habitat within the action area is not suitable habitat for the California clapper rail because it is not tidally influenced.

Ruderal Annual Grassland

There are about 17.5 acres of ruderal annual grassland habitat within the action area along the middle reach of the San Francisquito Creek corridor. The ruderal annual grassland within the action area is dominated by wild oat and ripgut brome. The ruderal annual grassland habitat within the action area that is contiguous with and within 328 feet of suitable tidal salt or brackish marsh habitat along San Francisquito Creek provides suitable foraging and dispersal habitat for the salt marsh harvest mouse (Service 2010). The quality of the ruderal grassland within the action area is degraded by the presence of heavily used trails, abundance of predators in a highly urbanized environment, and frequent mowing.

Salt Marsh Harvest Mouse

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the salt marsh harvest mouse (Service 2013a). The Central/South San Francisco Bay Recovery Unit is within the range of the southern subspecies of the salt marsh harvest mouse (*R. r. raviventris*) (Service 2013a). The population status of the southern subspecies is more precarious than that of the northern subspecies (*R. r. halicoetes*). Few major, resilient, or secure populations of the southern subspecies of the salt marsh harvest mouse persist within the Central/ South San Francisco Bay Recovery Unit. The current populations within this recovery unit are very small and isolated compared with the historical pattern of distribution and abundance of the subspecies. All major population centers of the southern subspecies are remote from one another based on dispersal distances known for the species. Predation by mammalian and avian predators and spread of invasive plant species (*e.g.*, perennial pepperweed) are major threats to salt marsh harvest mice in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2010, Service 2013a).

Levees adjacent to tidal marsh habitat and PG&E's numerous boardwalks provide access for mammalian predators that may prey on salt marsh harvest mice and California clapper rails in the adjacent marsh. PG&E's numerous transmission towers and transmission lines within tidal marsh habitat in the South Bay provide artificial perches and nesting platforms for raptors (*e.g.*, red-tailed hawks, crows, ravens, northern harriers, peregrine falcons, kestrels, white-tailed kites, gulls, great blue herons, barn owls, short-eared owls, great horned owls) that may prey on salt marsh harvest mice and California clapper rails in the adjacent marshes (Albertson 1995; Olofson Environmental,

Inc. 2011a; J. Albertson, Refuge, pers. comm. 2014). Raptors that nest and perch on PG&E's transmission towers and transmission lines in tidal marsh in the South Bay have been observed hunting in tidal marsh habitat known to be occupied by breeding salt marsh harvest mice and California clapper rails (Albertson 1995; Olofson Environmental, Inc. 2011a; J. Albertson, Refuge, pers. comm. 2014). Predation rates increase during extreme high tide events when cover is limited.

The Refuge annually funds the U.S. Department of Agriculture Wildlife Services to control mammalian predators that threaten the salt marsh harvest mouse and California clapper rail on Refuge lands in the South Bay. The priority areas for predator management at the Refuge are Ideal Marsh, Dumbarton Marsh, Mowry Marsh, Main Faber Marsh, and Laumeister Marsh (Refuge 2013). The Refuge, however, lacks the funding to adequately control all mammalian predators that threaten the salt marsh harvest mouse and California clapper rail on Refuge lands in the South Bay (J. Albertson, Refuge, pers. comm. 2014). In 2012, Cargill, Inc. (Cargill) restarted the annual funding of the U.S. Department of Agriculture Wildlife Services for mammalian predator management for the benefit of the salt marsh harvest mouse and California clapper rail for a 10-year period along Cargill's 44 miles of salt pond levees that are adjacent to tidal marsh habitat in the Newark, Mowry, and Redwood City salt pond complexes in the South Bay at the Refuge in Alameda and San Mateo counties. The annual funding of mammalian predator management by Cargill is a condition of the Service's biological opinion on the issuance of a 10-year Corps regional general permit for Cargill's salt pond levee operation and maintenance work in the South Bay (Service file number 81420-2010-F-0519; Service 2012a). The areas where Cargill will be funding mammalian predator management are outside of the action area for the proposed project. The City of East Palo Alto is contributing funding for a five-year mammalian predator management program at Cooley Landing beginning in 2015 adjacent to Laumeister Marsh about 0.5 mile north of Main Faber Marsh (Huffman-Broadway Group, Inc. 2011). The annual funding of mammalian predator management by the City of East Palo Alto is a condition of the Service's biological opinion on the Cooley Landing Project to minimize the effects of increased public use at Cooley Landing (81420-2011-F-0552-1; Service 2011).

The Refuge finalized an avian predator management plan in 2012 for the benefit of the salt marsh harvest mouse, California clapper rail, western snowy plover, and other listed species on its Refuge lands in the South Bay (Refuge 2012). PG&E is currently working with the Refuge to assist in the implementation of the avian predator management plan by responding to the Refuge's requests to remove raptor nests from PG&E transmission towers within habitat for the salt marsh harvest mouse, California clapper rail, western snowy plover, and California least tern. PG&E's assistance with the avian predator management program is a requirement of the Refuge's Special Use Permit, which was renewed in 2013 (E. Mruz, Refuge, pers. comm. 2012; Service file number 81420-2011-F-0592-2; Service 2012b). At the request of the Refuge, PG&E removed 8-10 raptor nests (mostly raven nests and two red-tailed hawk nests) from listed species habitat in 2013 (C. Strong, Refuge, pers. comm. 2014; K. Sawyer, Refuge, *in litt.* 2013). However, the majority of the raptor nest removal conducted by PG&E in 2013 was for the benefit of the western snowy plover rather than the salt marsh harvest mouse and California clapper rail. PG&E removed a red-tailed hawk nest from a PG&E tower near the San Mateo Bridge toll plaza in Alameda County within salt marsh harvest mouse habitat west of Eden Landing Pond 10 in April 2013 (K. Sawyer, Refuge, *in litt.* 2013). No raptor nests were removed from California clapper rail habitat in 2013 (K. Sawyer, Refuge, *in litt.* 2013). Raptor nests (primarily ravens and red-tailed hawks) were removed from PG&E towers at 14 locations within or near tidal marsh habitat for the salt marsh harvest mouse and California clapper rail in the South Bay in 2014 outside of the action area (C. Strong, Refuge,

pers. comm.). PG&E removed several ravens' nests at the request of the Refuge from transmission towers near the action area near Faber Marsh in 2015 (R. Tertes, Refuge, 2015). However, the Refuge lacks the resources to adequately monitor all of PG&E's transmission towers for raptor nests (J. Albertson, Refuge, pers. comm. 2014). Therefore, raptor predation facilitated by PG&E transmission towers within tidal marsh habitat continues to be a major threat to salt marsh harvest mice and California clapper rails in the South Bay.

The Refuge finalized a weed management plan in 2013 to control invasive plant species (*e.g.*, perennial pepperweed) that threaten the tidal marsh and upland refugia habitat for the salt marsh harvest mouse and California clapper rail on Refuge lands in the South Bay (Marriott *et al.* 2013). The Refuge, however, lacks the resources to adequately implement its weed management plan (R. Tertes, Refuge, pers. comm. 2013). Cargill will implement the Refuge's weed management plan on the 12,100 acres of Cargill's property within the Newark, Mowry, and Redwood City salt pond complexes as a condition of the Service's biological opinion on the issuance of a 10-year Corps regional general permit for Cargill's salt pond levee operation and maintenance work in the South Bay (Service file number 81420-2010-F-0519; Service 2012a); the weed management that will be conducted by Cargill is outside of the action area for SFCJPA's proposed project.

Habitats within the Action Area

The expansive tidal marshes within the action area within Main Faber Marsh and the adjacent Laumeister Marsh provide high quality breeding, foraging, and dispersal habitat for salt marsh harvest mice. Outer Faber Marsh provides lower quality breeding habitat for the salt marsh harvest mouse since the tidal marsh is at a lower elevation and more exposed to tidal flooding and wave fetch due to its exposed location along San Francisco Bay. Potential breeding habitat for the salt marsh harvest mouse in Outer Faber Marsh is limited to the mid-elevation pickleweed marsh near the southern and western berms. Salt marsh harvest mice may also breed, forage, and disperse through the diked marsh habitat at the Palo Alto Municipal Golf Course near San Francisquito Creek. Salt marsh harvest mice are unlikely to utilize the managed turf of the adjacent golf course because it is actively managed, and the vegetation is maintained at a low height and thus does not provide suitable cover for the mouse.

The fringe of tidal marsh along the lower reach of San Francisquito Creek (downstream of Friendship Bridge) (Figure 1) provides moderate quality breeding, foraging, and dispersal habitat for salt marsh harvest mice; the suitability of this marsh for the salt marsh harvest mouse is reduced by frequent inundation of the marsh during winter storms. The fringe of tidal and brackish marsh along the middle reach of San Francisquito Creek (between Friendship Bridge and Daphne Way/Geng Road) (Figure 1) provides low quality breeding, foraging, and dispersal habitat for the salt marsh harvest mouse due to the marsh's sparse vegetative cover, frequent inundation during winter storms, the fragmented nature of the habitat, the presence of invasive plant species (*e.g.*, perennial pepperweed) and avian and mammal predators and frequent disturbance by trail users. The ruderal annual grassland habitat that is contiguous with and within 328 feet of the tidal and brackish marsh of the middle reach of San Francisquito Creek provides low quality foraging and dispersal habitat for the salt marsh harvest mouse. The marsh along the upper reach of San Francisquito Creek (Daphne Way/Geng Road to Highway 101) (Figure 1) is unsuitable for the salt marsh harvest mouse because it is less tidally influenced, has sparse vegetative cover, is frequently inundated during winter storms, highly fragmented, and located within a highly urbanized environment degraded by the presence of invasive plant species and avian and mammal predators.

Transition zone habitat along the levees and berms of Main Faber Marsh, Laumeister Marsh, San Francisquito Creek, and Outer Faber Marsh provide upland refugia cover for the salt marsh harvest mouse during extreme high tide and flooding events when the marsh plain is inundated. However, the quality of the transition zone habitat within the action area is low due to a lack of suitable canopy structure because the existing vegetation is dominated by invasive plant species, low-growing perennials, frequent bare patches, and monotypic patches of annual plants (*e.g.*, black mustard) (H.T. Harvey & Associates 2015a). Without suitable upland refugia cover, the salt marsh harvest mouse is more vulnerable to predation during extreme high tide and flooding events. Recent studies of the movement of the northern subspecies of salt marsh harvest mouse during extreme high tide events in tidal marsh in Suisun Bay found that the majority of the salt marsh harvest mice stayed in the marsh and climbed tall emergent vegetation to escape flood waters instead of moving horizontally into upland habitats along levees (Smith *et al.* 2014). Thus Smith *et al.* (2014) stressed the importance of tall emergent vegetation within the marsh to provide high tide refugia cover. However, the authors added that upland habitats along levees may be more important as high tide refugia cover to the southern subspecies of salt marsh harvest mouse in the South Bay due to the shorter heights of the marsh vegetation and the narrower widths of the marshes.

Occurrences near the Action Area

There are no known recent surveys of salt marsh harvest mouse that have been conducted within the action area. However, there are several reports of salt marsh harvest mice occurring near the action area. The San Francisco Estuary Institute (http://www.sfei.org/content/salt-marsh-harvest-mouse-database-and-maps) and California Natural Diversity Database (CNDDB; CDFW 2015) report the following salt marsh harvest mouse survey data within 0.5 mile of the action area for the proposed project:

1. Two hundred forty salt marsh harvest mice captured in tidal marsh habitat of the Palo Alto Baylands about 0.25 mile southeast of the action area during 2,050 trapping nights in 1972 (capture efficiency (CE) = 9.56) (site number 240; Wondolleck, unpubl. data, 1972);

2. Five salt marsh harvest mice captured in tidal marsh habitat of the Palo Alto Baylands about 0.25 mile southeast of the action area during 480 trapping nights in 1993 (CE = 1.04) (site number 502; Steinberg, unpubl. data, 1993);

3. One salt marsh harvest mouse captured in tidal marsh habitat of the Palo Alto Baylands about 0.25 mile southeast of the action area during 200 trapping nights in 1980 (CE = 0.5) (site number 91; Service, unpubl. data, 1980);

4. One salt marsh harvest mouse captured in tidal marsh habitat at the northern edge of the Laumeister Tract of the Refuge about 0.5 mile north of the action area during 800 trapping nights in 1990 (CE = 0.13) (site number 232; H.T. Harvey and Associates, unpubl. data, 1990); and

5. Twelve adult salt marsh harvest mice found in the Laumeister Tract of the Refuge south of Bay Road about 0.5 mile north of the action area in January 1991 (CNDDB occurrence number 131, CDFW 2015).

There is no recent survey data available for salt marsh harvest mice near the action area since 1993. However, a biological monitor for the City of East Palo Alto's Cooley Landing Project (Service file number 81420-2011-F-0552-1; Service 2011) reported the observation of a potential salt marsh harvest mouse nest during vegetation removal activities at Cooley Landing along the northern edge of Laumeister Marsh in November 2011. The biological monitor, however, could not find the nest during surveys of the area weeks later likely due to the nest being flooded during an extreme high tide event that month (R. Perrera, Huffman-Broadway Group, Inc., pers. comm. 2012). Mice were also observed recently during vegetation removal within diked brackish marsh habitat immediately west of Main Faber Marsh in October 2014 for the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project (Service file number 81420-2011-F-0103-2); however, the biological monitor was not able to determine whether the mice were salt marsh harvest mice (K. Allan, WRA Environmental Consulting, pers. comm. 2014).

Based on the known occurrence of the salt marsh harvest mouse near the action area and the availability of suitable habitat, the Service believes the salt marsh harvest mouse is likely to be present within all suitable tidal marsh, brackish marsh, diked marsh, and adjacent upland habitats (within 328 feet of suitable marsh habitat) throughout the action area within Main Faber Marsh, Outer Faber Marsh, Laumeister Marsh, along the lower and middle reaches of San Francisquito Creek, and the diked marsh habitat at the Palo Alto Municipal Golf Course near San Francisquito Creek.

California Clapper Rail

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the California clapper rail (Service 2013a). The Central/South San Francisco Bay Recovery Unit supports the majority of California clapper rail populations. Populations in this unit are widely separated from northern ones, but there may be occasional dispersal between these areas. Predation by mammalian and avian predators is one of the primary threats to California clapper rails in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2013a, Overton *et al.* 2014).

Levees adjacent to tidal marsh habitat and PG&E's numerous boardwalks provide access for mammalian predators that may prey on California clapper rails in the adjacent marsh. PG&E's numerous transmission towers and transmission lines within tidal marsh habitat in the South Bay provide artificial perches and nesting platforms for raptors (*e.g.*, red-tailed hawks, crows, ravens, northern harriers, peregrine falcons, kestrels, white-tailed kites, gulls, great blue herons, barn owls, short-eared owls, great horned owls) that may prey on California clapper rails in the adjacent marshes (Albertson 1995; Olofson Environmental, Inc. 2011; Overton *et al.* 2014; J. Albertson, Refuge, pers. comm. 2012). Raptors that nest and perch on PG&E's transmission towers and transmission lines in tidal marsh in the South Bay have been observed hunting in tidal marsh habitat known to be occupied by breeding California clapper rails (Albertson 1995; Olofson Environmental, Inc. 2011; J. Albertson, Refuge, pers. comm. 2012). Predation rates increase during extreme high tide events when cover is limited.

Overton *et al.* (2014) tracked 108 radio-marked California clapper rails at four marshes within the Central/South San Francisco Bay Recovery Unit (*i.e.*, Colma Marsh, Arrowhead Marsh, Laumeister

Marsh, and Cogswell Marsh) and estimated survival rates over 166 weeks between 2007 and 2009. Overton *et al.* (2014) found that most of the California clapper rails (53 percent) died due to predation with raptors depredating 30 individual California clapper rails (28 percent) and mammals depredating 27 individual California clapper rails (25 percent). Seasonal risk of mortality was more than twice as great in the winter than in other seasons (Overton *et al.* 2014). The mortality rate of California clapper rails increased during periods of greater tidal inundation in all four marshes studied, but the impact of tide level was greatest in the winter when senesced vegetation reduced available refuge cover (Overton *et al.* 2014). The annual survival rate for California clapper rails at Laumeister Marsh was 0.227 (Overton *et al.* 2014). Preliminary data from the U.S. Geological Survey shows that predation by avian predators followed by feral cats are the primary causes of mortality of the California clapper rail within Main Faber Marsh (C. Overton, U.S. Geological Survey, pers. comm. 2015).

The Refuge's goal for predator management at the Refuge is to increase California clapper rail population densities to 2.96 rails per acre (Refuge 2013). However, the Refuge lacks the resources to adequately control all mammalian and avian predators that threaten the California clapper rail (J. Albertson, Refuge, pers. comm. 2014). See the discussion above for the salt marsh harvest mouse regarding the implementation of mammalian and avian predator control and a weed management plan at the Refuge and within the Central/South San Francisco Bay Recovery Unit. No raptor nests were removed from PG&E towers within California clapper rail habitat in 2013 (K. Sawyer, Refuge, *in litt.* 2013). Raptor nests (primarily ravens and red-tailed hawks) were removed from PG&E towers at 14 locations in the South Bay within or near tidal marsh habitat for the California clapper rail in 2014 (C. Strong, Refuge, pers. comm.); however, no raptor nest removal occurred within the action area in 2014. PG&E removed several ravens' nests at the request of the Refuge from transmission towers near the action area near Faber Marsh in 2015 (R. Tertes, Refuge, 2015). The Refuge lacks the resources to adequately monitor all of PG&E's transmission towers for raptor nests (J. Albertson, Refuge, pers. comm. 2014). Therefore, raptor predation facilitated by PG&E transmission towers within tidal marsh habitat continues to be a major threat to California clapper rails in the South Bay.

Occurrences within the Action Area

The Refuge-managed 81.5-acre Main Faber Marsh and adjacent Laumeister Marsh contain very high quality expansive tidal marsh habitat for the California clapper rail and support one of the largest populations of the California clapper rail range-wide. Main Faber Marsh and the adjacent Laumeister Marsh accounted for about 3.8 percent of the estimated total range-wide population of the California clapper rail in 2009-2011 (Liu *et al.* 2012; L. Liu, Point Blue Conservation Science, pers. comm. 2014). Main Faber Marsh also has one of the highest population densities of the California clapper rail range-wide (Liu *et al.* 2012; L. Liu, Point Blue Conservation Science, pers. comm. 2014). There were a total of about 91 California clapper rails detected in Main Faber Marsh and Laumeister Marsh in 2012 and 94 in 2011 during the highest minimum count (Point Blue Conservation Science 2014). However, the total number of California clapper rail detections within Main Faber Marsh and Laumeister Marsh significantly declined in 2013 with only 50 California clapper rails detected during the highest minimum count (Point Blue Conservation Science 2014). Main Faber Marsh had the most significant decline in California clapper rail detections with between 57 and 62 California clapper rails detected in 2010, between 64 and 85 California clapper rails detected in 2011, and only 25 California clapper rails detected in 2013 (PRBO Conservation Science 2012, Point Blue Conservation Science 2014). The number of California clapper rail detections

within the adjacent Laumeister Marsh was 30 in 2011, 22 in 2012, and 25 in 2013 (PRBO Conservation Science 2012, Point Blue Conservation Science 2014).

Two California clapper rails were detected during protocol-level surveys in Outer Faber Marsh in 2011, two in 2013, and three in 2013 (Point Blue Conservation Science, *in litt.* 2014). Outer Faber Marsh provides lower quality habitat for the California clapper rail than Main Faber Marsh because the marsh is more sparsely vegetated, at a lower and more exposed location along San Francisco Bay, and subject to more frequent inundation from daily tides and wave fetch from the Bay. Although a few California clapper rails have been observed during protocol-level surveys within Outer Faber Marsh, it is not known if the rails successfully breed within Outer Faber Marsh.

Protocol-level surveys conducted along San Francisquito Creek detected two California clapper rails along the lower reach of the creek in 2011 and one in 2013 (PRBO Conservation Science 2012; Point Blue Conservation Science, *in litt.* 2014). California clapper rails likely forage and disperse along lower San Francisquito Creek, but it is not known if they successfully breed in the fringe of tidal marsh along lower San Francisquito Creek.

It is not known with certainty why the number of California clapper rails in Main Faber Marsh declined in 2013, but the Service believes it may be due to high levels of predation (Overton *et al.* 2014; J. McBroom, Olofson Environmental, pers. comm. 2014; J. Albertson, Refuge, pers. comm. 2014; E. Mruz, Refuge, pers. comm. 2014). The Refuge through the U.S. Department of Agriculture Wildlife Services has implemented minimal amounts of mammalian predator management within Main Faber Marsh and Laumeister Marsh in recent years due to limited funding (E. Mruz, Refuge, pers. comm. 2014; J. Albertson, Refuge, pers. comm. 2014). Studies in 2007 through 2009 showed high rates of predation in the adjacent Laumeister Marsh by both avian and mammal predators with 53 percent of California clapper rails depredated during the 166-week study period (Overton *et al.* 2014). Studies of predation in Laumeister Marsh in the 1990s showed that Norway rats depredated about half of the California clapper rail nests (Albertson 1995). The Refuge believes that Norway rats are likely still a significant source of predation within Main Faber Marsh and Laumeister Marsh because the U.S. Department of Agriculture Wildlife Services is unable to control the rat populations coming from the nearby residential communities in the City of East Palo Alto (J. Albertson, Refuge, pers. comm. 2014). The City of East Palo Alto is required under the biological opinion for the Cooley Landing Project to fund five years of mammalian predator management within Laumeister Marsh (Service file number 81420-2011-F-0552-1, Service 2011); the five-year predator management program at Laumeister Marsh was initiated in October 2014 (B. Popper, U.S. Department of Agriculture Wildlife Services, pers. comm. 2015).

Raptor predation is also likely a significant source of mortality of California clapper rails within the Main Faber Marsh, Laumeister Marsh, and Outer Faber Marsh (C. Overton, U.S. Geological Survey, pers. comm. 2015). Northern harriers and red-tailed hawks have been observed nesting in Main Faber Marsh and Laumeister Marsh and are likely to prey on California clapper rails within the action area (J. Albertson, Refuge, pers. comm. 2014). Raptor predation within Main Faber Marsh, Laumeister Marsh, and Outer Faber Marsh is facilitated by PG&E transmission towers and transmission lines within the marshes that provide artificial perch and nest sites for raptors. Avian predator management had not been implemented within the action area until 2015 when several ravens' nests were removed from transmissions towers by PG&E at the request of the Refuge (R. Tertes, Refuge, pers. comm. 2015). As stated previously, recent studies of the sources of mortality of California clapper rails within Laumeister Marsh and other marshes of the Central/South San

Francisco Bay Recovery Unit found that 53 percent of California clapper rails died due to predation with raptors depredating 28 percent and mammals depredating 25 percent of California clapper rails (Overton *et al.* 2014). Thus predation by mammal and avian predators are likely significant contributors to the recent decline in the number of California clapper rails within Main Faber Marsh.

Based on the known occurrence of the California clapper rail within the action area in Main Faber Marsh, Laumeister Marsh, Outer Faber Marsh, and lower San Francisquito Creek and the availability of suitable habitat, the Service considers the California clapper rail to have a high potential to occur within all suitable tidal marsh habitat and adjacent transition zone habitat within the action area in Main Faber Marsh, Laumeister Marsh, Outer Faber Marsh, and the lower reach San Francisquito Creek (downstream of Friendship Bridge). Individual California clapper rails may infrequently forage and disperse within the middle reach of San Francisquito Creek immediately upstream of Friendship Bridge; however, no California clapper rails have been observed upstream of Friendship Bridge during protocol-level surveys. California clapper rails are unlikely to occur within the upper reach of San Francisquito Creek (upstream of Dahpne Way/Geng Road) because this portion of the creek is less tidally influenced, sparsely vegetated, the marsh is highly fragmented, and located within a highly urbanized environment with an abundance of mammal and avian predators. California clapper rails are unlikely to occur within the diked marsh habitat at the Palo Alto Golf Course because this marsh is not tidally influenced.

Effects of the Proposed Project

Salt Marsh Harvest Mouse and California Clapper Rail

Habitat Disturbance

Table 3 below summarizes for each habitat type the acres and linear extent of suitable habitat for the salt marsh harvest mouse and California clapper rail that will be temporarily disturbed or permanently lost due to construction of the proposed project. Table 4 below summarizes the changes in the areal extent of each habitat type for the salt marsh harvest mouse and California clapper rail within the action area post-construction of the proposed project. Table 5 below summarizes the amount of tidal marsh habitat that will be temporarily disturbed during the installation of the five high-tide refuge islands in Outer Faber Marsh.

Salt Marsh Harvest Mouse

The proposed project will result in the temporary disturbance of a total of about 3.83 acres of tidal marsh habitat, 1.89 acres of diked marsh habitat, 13.05 acres of ruderal grassland habitat, and 8.12 acres of upland refugia/transition zone habitat for the salt marsh harvest mouse (Table 3). The proposed project will result in the permanent loss of a total of about 0.82 acre of tidal marsh habitat, 0.79 acre of diked marsh habitat, 7.77 acres of ruderal grassland habitat, and 0.27 acre of upland refugia/transition zone habitat for the salt marsh harvest mouse (Table 3). The proposed project will result in a net gain of about 6.90 acres of suitable tidal marsh habitat for the salt marsh harvest mouse within the widened San Francisquito Creek floodplain channel (Table 3). The proposed project will result in a net loss of about 1.61 acres of lower quality diked marsh habitat adjacent to the golf course (Table 3). The proposed project will result in a net loss of about 6.12 acres of upland foraging/dispersal habitat for the salt marsh harvest mouse primarily due to ongoing mowing

Table 3. Habitat loss and disturbance.

Habitat Type	Temporary Disturbance		Permanent Loss	
	Acres	Linear Feet[1]	Acres	Linear Feet[1]
Salt Marsh Harvest Mouse Only				
Tidal Marsh	2.07	n/a	0.46	n/a
Diked Marsh	1.89	n/a	0.79	n/a
Ruderal Grassland				
Construction	13.05	n/a	1.28	n/a
Ongoing O&M (levee mowing)[2]	0.00	n/a	6.49	n/a
Salt Marsh Harvest Mouse Only Subtotal	**17.01**	n/a	**9.02**	n/a
Salt Marsh Harvest Mouse and California Clapper Rail				
Tidal Salt Marsh				
Main Faber Marsh Southern Levee	0.32	475	0.30	598
Bay Levee	0.40	636	0.00	0
Bay Levee access	0.00	0	0.00	0
Outer Faber High-Tide Refugia Islands[3]	0.19	n/a	0.00	n/a
All other construction (creek channel)	0.85	n/a	0.06	n/a
Tidal Salt Marsh Subtotal	1.76	n/a	0.36	n/a
Upland Refugia/Transition Zone				
Main Faber Marsh Southern Levee[4]	1.03	1,018	0.27	488
Transition Zone Habitat Enhancement[4]	5.66	5,120	0.00	n/a
Bay Levee	0.93	651	0.00	0
Bay Levee access[4]	0.44	1,150	0.00	0
All other construction (creek channel)	0.06	n/a	0.00	n/a
Upland Refugia/Transition Zone Subtotal	8.12	n/a	0.27	n/a
Salt Marsh Harvest Mouse and California Clapper Rail Subtotal	**9.88**	n/a	**0.63**	n/a
GRAND TOTAL	**26.89**	n/a	**9.65**	n/a

[1] Linear footage of disturbance is only reported for effects incurred from construction of the Main Faber Marsh levee, Bay levee lowering, access, and levee habitat enhancement along the Main Faber Marsh and Outer Faber Marsh levees (n/a = not applicable).

[2] Ongoing O&M effects from annual mowing of grassland habitat along the levees is counted as a permanent effect. However, salt marsh harvest mouse forage and dispersal habitat will be present, especially seasonally between mowing events, when vegetation is taller.

[3] High-tide refuge islands will likely establish as jurisdictional wetlands (*i.e.*, tidal marsh) with wetland plant palette and saturated subsoils. The 0.19 acre of marsh disturbance will be temporary.

[4] A total of about 5,120 linear feet of habitat will be disturbed during transition zone enhancement along the northern, eastern, and southern Main Faber Marsh levees including 1,540 linear feet of the southern levee which partially overlaps with the 1,018 linear feet of disturbance from construction along the southern levee. However, the 5.66-acre estimate for transition zone enhancement does not include the impacts from construction activities along the southern levee.

Table 4. Post-construction changes in the areal extent of suitable habitat within the action area.

Habitat Type	Post-Construction Surface Area (acres)	Net Gain or Loss (acres)	Habitat Enhanced[2] (acres)
California Clapper Rail and Salt Marsh Harvest Mouse			
Tidal Marsh[1]	3.07	+1.09	n/a
Upland Refugia/Transition Zone[2]	7.83	+1.64	5.66[2]
Salt Marsh Harvest Mouse Only			
Tidal Marsh[1]	8.34	+5.81	n/a
Diked Marsh	1.06	-1.61	n/a
Upland Foraging/Dispersal[3] (Ruderal Grassland)	14.70	-6.12[3]	n/a

[1] Tidal marsh along the lower reach of San Francisquito Creek downstream of Friendship Bridge is counted as suitable habitat for both California clapper rail and salt marsh harvest mouse. Tidal marsh along the middle reach of San Francisquito Creek between Friendship Bridge and the ends of Geng Road and Daphne Way is counted as suitable habitat only for salt marsh harvest mouse (although there is the potential for California clapper rails to infrequently forage and disperse upstream of Friendship Bridge). Tidal marsh along the upper reach of San Francisquito Creek upstream of the ends of Geng Road and Daphne Way are not counted as suitable habitat for the California clapper rail or salt marsh harvest mouse.

[2] The enhancement of 5.66 acres of upland refugia/transition zone habitat along the southern, northern, and eastern levees of Main Faber Marsh and the western levee of Outer Faber Marsh through invasive plant control and planting suitable native transition zone plant species (n/a = not applicable).

[3] The ongoing disturbance of 6.49 acres of grassland habitat from annual levee mowing is counted as a net loss of habitat; however, the grassland will be available as salt marsh harvest mouse foraging and dispersal habitat in between mowing events, especially during the wet season. Some potential upland foraging/dispersal habitat would be created on the new levee on the Palo Alto side due to the increase in surface area of the levee on the Palo Alto side post-construction.

Table 5. Total maximum amount of tidal marsh habitat temporarily disturbed during installation of five high tide refuge islands in Outer Faber Marsh (copied from Table 5 in H.T. Harvey & Associates (2015a)).

Cause of Disturbance	**Total Maximum Disturbance for Five Refuge Islands (square feet (acres))**	**Expected Duration of Recovery**
Place plywood pathway and transport crew and materials through marsh habitat to access refuge islands construction locations	5,000 square feet (0.11 acre)	Marsh vegetation will fully recover within a few days-weeks after plywood is removed
Place plywood in approximately a 10-foot radius surrounding refuge islands to protect the construction area	2,000 square feet (0.05 acre)	Marsh vegetation will fully recover within a few weeks after plywood is removed
Refuge island construction (sod removed and then placed on island)	1,250 square feet (0.03 acre)	Marsh vegetation will fully recover 6 months - 1 year after refuge island construction
TOTAL	**8,250 square feet (0.19 acre)**	

of 6.49 acres of grassland on the levee side slopes along the San Francisquito Creek channel for O&M; the Service considers the annual mowing (up to three times per year during the summer and fall) of the grassland habitat to 3 or 4 inches high along the levee side slopes for O&M a net loss of habitat although the grassland would provide foraging and dispersal cover for the salt marsh harvest mouse in between mowing events particularly during the wet season (Table 3). The proposed project will result in a net gain of about 1.64 acres of upland refugia/transition zone habitat primarily along the widened San Francisquito Creek channel. An additional 5.66 acres of low quality upland refugia/transition zone habitat for the salt marsh harvest mouse will be enhanced along a total of about 5,120 linear feet of the southern, northern, and eastern Main Faber Marsh perimeter levees and Outer Faber Marsh western perimeter levee through control of invasive plant species (*e.g.*, mustard, ice plant, and perennial pepperweed) and planting suitable native transition zone plant species (*e.g.*, marsh gumplant) (Figure 4 and Table 4). The proposed project will also create upland refugia/transition zone habitat for the salt marsh harvest mouse within Outer Faber Marsh through the installation of five 10-foot-wide by 30-foot-long high-tide refuge islands at the elevation of MHHW (Figures 3, 4, and 5).

Tidal salt marsh habitat will be disturbed during stabilizing and filling in low spots in the Main Faber Marsh levee, degrading the Bay levee, excavating and widening the lower and middle reaches of the San Francisquito Creek channel, constructing the floodwalls along the middle reach of San Francisquito Creek, and creation of the five high-tide refuge islands in Outer Faber Marsh (Tables 3 and 5). The stabilizing and filling in low spots in the Main Faber Marsh levee will temporarily disturb about 0.32 acre and permanently remove about 0.30 acre of high quality tidal marsh habitat the salt marsh harvest mouse utilizes for breeding, foraging, sheltering, and dispersal (Table 5).

However, the quality of the tidal marsh habitat that will be temporarily disturbed (2.92 acres) or permanently removed (0.52 acre) along the lower and middle reaches of San Francisquito Creek is low due to frequent inundation during high tides and winter storms, presence of invasive plant species and predators, and habitat fragmentation. The quality of the tidal marsh habitat that will be temporarily disturbed (0.59 acre) within Outer Faber Marsh during degrading the Bay levee and installation of the high tide refuge islands is low due to the marsh's lower elevation and exposure to frequent flooding and wave fetch from the adjacent San Francisco Bay.

The stabilizing and filling in low spots in the Main Faber Marsh levee and accessing and degrading the Bay levee will also temporarily disturb about 2.40 acres and permanently remove about 0.27 acre of low quality upland refugia/transition zone habitat the salt marsh harvest mouse primarily utilizes for sheltering during extreme high tide and flooding events when the adjacent marsh plain is flooded. The quality of the upland refugia/ transition zone habitat along the Main Faber Marsh levee and Bay levee that will be disturbed is low due to the dominance of invasive plant species like mustard and perennial pepperweed which provide poor quality high tide refugia cover because these invasive plants are leafless in the winter.

The widening of the San Francisquito Creek channel and construction of the floodwalls will temporarily disturb about 1.89 acres and permanently remove about 0.79 acre of low quality diked marsh habitat adjacent to the golf course the salt marsh harvest mouse utilizes primarily for foraging and dispersal. The annual mowing (up to three times per year) of 6.49 acres of grassland along the San Francisquito Creek levee side slopes to 3 or 4 inches high during the summer and fall will continue to remove low quality upland habitat the salt marsh harvest mouse utilizes for foraging and dispersal; however, the grassland would provide suitable foraging and dispersal habitat in between mowing events particularly during the wet season.

SFCJPA and SCVWD will minimize the potential for the contamination of suitable tidal marsh habitat during construction of the proposed project by implementing a SWPPP, water quality protection BMPs, and a hazardous spill prevention plan.

The proposed project will compensate for the disturbance of salt marsh harvest mouse habitat by creating an additional approximately 6.90 acres of suitable tidal marsh habitat and 1.64 acres of suitable upland refugia/transition zone habitat for the salt marsh harvest mouse within the widened San Francisquito Creek channel resulting in a total of about 11.41 acres of suitable restored tidal marsh habitat and 7.83 acres of suitable upland refugia/transition zone habitat within the widened creek channel (Table 4). The created and restored tidal marsh and transition zone habitat will be restored under a Service-approved revegetation and monitoring plan with success criteria and invasive plant species control to ensure the tidal marsh and transition zone habitat revegetate with suitable native tidal marsh and transition zone plant species. The created and restored tidal marsh habitat within the widened San Francisquito Creek channel will provide higher quality breeding, foraging, and dispersal habitat for the salt marsh harvest mouse than the narrow and fragmented tidal marsh habitat that currently occurs along the creek channel; however, salt marsh harvest mouse within the tidal marsh along the creek channel would continue to be subject to frequent inundation during high tide and winter storm events. The proposed project will minimize the effects of the net loss of 6.12 acres of upland foraging/dispersal habitat and 1.61 acres of diked marsh habitat for the salt marsh harvest mouse by enhancing a total of approximately 5.66 acres (5,120 linear feet) of upland refugia/transition zone habitat for the salt marsh harvest mouse along the southern, northern, and eastern perimeter levees of Main Faber Marsh and the western levee of Outer Faber

Marsh (Figure 6) under a Service-approved restoration plan. Salt marsh harvest mice within the adjacent Laumeister Marsh will also benefit from the upland refugia/transition zone habitat along the levee that divides northern Main Faber Marsh and southern Laumeister Marsh. All temporarily disturbed habitats within the action area will be restored under a five-year Service-approved revegetation and monitoring plan with invasive plant species control and success criteria.

California Clapper Rail

The proposed project will result in the temporary disturbance of a total of about 1.76 acres of tidal marsh habitat and 8.12 acres of upland refugia/transition zone habitat for the California clapper rail (Table 3). The proposed project will result in the permanent loss of a total of about 0.36 acre of tidal marsh habitat and 0.27 acre of upland refugia/transition zone habitat for the California clapper rail (Table 3). The proposed project will result in a net gain of about 1.09 acres of suitable tidal marsh habitat for the California clapper rail within the widened San Francisquito Creek floodplain channel immediately downstream of Friendship Bridge (Table 4). The proposed project will also result in a net gain of about 1.64 acres of upland refugia/transition zone habitat for the California clapper rail primarily along the widened San Francisquito Creek channel downstream of Friendship Bridge (Table 4). Although upland refugia cover will be removed from Outer Faber Marsh during the Bay levee degrade, the creation of five high-tide refuge islands within Outer Faber Marsh will minimize the effects of the loss of upland refugia in Outer Faber Marsh (Figures 3, 4, and 5).

Tidal salt marsh habitat will be disturbed during stabilizing and filling in low spots in the Main Faber Marsh levee, accessing and degrading the Bay levee, excavating and widening the lower reach of the San Francisquito Creek channel, and installation of the five high-tide refuge islands in Outer Faber Marsh. The stabilizing and filling in low spots in the Main Faber Marsh levee will temporarily disturb about 0.32 acre and permanently remove about 0.30 acre of high quality tidal marsh habitat the California clapper rail utilizes for breeding, foraging, sheltering, and dispersal. However, the quality of the tidal marsh habitat that will be temporarily disturbed (0.85 acres) or permanently removed (0.06 acre) along the lower reach of San Francisquito Creek and the Bay levee (0.40 acre temporarily disturbed) is low due to frequent inundation during high tides and winter storms, presence of invasive plant species and predators, and habitat fragmentation. The excavation of sediment from the lower and middle reaches of the San Francisquito Creek channel will temporarily remove benthic invertebrate prey species for the California clapper rail. However, the benthic invertebrate prey community is likely to recover within a few months to a few years of excavation. Additionally, the widening of the San Francisquito Creek channel will result in an increase in the availability of foraging habitat for the California clapper rail.

The stabilizing and filling in low spots in the Main Faber Marsh levee will also temporarily disturb about 1.03 acres (1,018 linear feet) and permanently remove about 0.27 acre (488 linear feet) of low quality upland refugia/transition zone habitat the California clapper rail primarily utilizes for sheltering during extreme high tide and flooding events when the adjacent marsh plain is flooded. The quality of the upland refugia/ transition zone habitat along the Main Faber Marsh levee that will be disturbed is low due to the dominance of invasive plant species like mustard and perennial pepperweed which provide poor quality high tide refugia cover because these invasive plants are leafless in the winter.

SFCJPA and SCVWD will minimize the potential for the contamination of suitable tidal marsh habitat during construction of the proposed project by implementing a SWPPP, water quality protection BMPs, and a hazardous spill prevention plan.

The proposed project will compensate for the disturbance of California clapper rail habitat by creating an additional approximately 1.09 acres of suitable tidal marsh habitat and 1.64 acres of suitable upland refugia/transition zone habitat for the California clapper rail within the widened San Francisquito Creek channel resulting in a total of about 3.07 acres of suitable restored tidal marsh habitat and 7.83 acres of suitable upland refugia/transition zone habitat within the widened creek channel downstream of Friendship Bridge (Table 4). The created and restored tidal marsh and upland refugia/transition zone habitat will be restored under a Service-approved revegetation and monitoring plan with success criteria and invasive plant species control to ensure the tidal marsh and transition zone habitat revegetate with suitable native tidal marsh and transition zone plant species. The created tidal marsh and upland refugia/transition zone habitat within the widened San Francisquito Creek channel will provide higher quality breeding, foraging, sheltering, and dispersal habitat for the California clapper rail than the fragmented tidal marsh and transition zone habitat that currently occurs along the creek channel; however, California clapper rails within the tidal marsh along the creek channel would continue to be subject to frequent inundation during high tide and winter storm events. The proposed project will minimize the effects of the temporary disturbance of 2.40 acres and permanent loss of 0.27 acre of upland refugia/transition zone habitat for the California clapper rail in Main Faber Marsh and Outer Faber Marsh by enhancing a total of approximately 5.66 acres (5,120 linear feet) of upland refugia/transition zone habitat for the California clapper rail along the southern, northern, and eastern levees of Main Faber Marsh and the western levee of Outer Faber Marsh (Figure 6) under a Service-approved restoration plan. California clapper rails within the adjacent Laumeister Marsh will also benefit from the upland refugia/transition zone habitat along the levee that divides northern Main Faber Marsh and southern Laumeister Marsh. All temporarily disturbed habitats within the action area will be restored under a five-year Service-approved revegetation and monitoring plan with invasive plant species control and success criteria.

Direct Effects to Individuals

Any salt marsh harvest mice occurring within the proposed project area during excavation and levee construction activities could be injured or killed by being crushed by the use heavy equipment within suitable wetland and grassland habitat. Any salt marsh harvest mice occurring within the grassland habitat on the levee side slopes during annual levee mowing (up to three times per year) along the San Francisquito Creek channel could be injured or killed by the mower. Individual salt marsh harvest mice and California clapper rails may be displaced by noise and vibrations associated with construction activities and the operation of heavy equipment within and adjacent to suitable marsh habitat. Displaced salt marsh harvest mice and California clapper rails may have to compete for resources in occupied habitat, and may be more vulnerable to predators. Disturbance to female salt marsh harvest mice may cause abandonment or failure of the current litter. Thus, displaced salt marsh harvest mice may suffer from increased predation, competition, mortality, and reduced reproductive success. SFCJPA and SCVWD will avoid construction activities within 700 feet of California clapper rails during the rail's breeding season; therefore, no breeding California clapper rails will be disturbed during the construction of the proposed project. All work will stop if a salt marsh harvest mouse or its nest is observed within the work area.

The level of disturbance of individual salt marsh harvest mice and California clapper rails may vary depending on the type of equipment being used; different pieces of equipment have different noise levels and, thus, cause more or less disturbance. Noise and vibrations may result in displacement of salt marsh harvest mice and California clapper rails from protective cover and their territories. These disturbances are likely to disrupt normal behavior patterns of breeding, foraging, sheltering, and dispersal. The level of disturbance of salt marsh harvest mice and California clapper rails would be exacerbated if construction activities near tidal areas occurred during an extreme high tide event when the mice and rails escape the flooded marsh to seek high tide refugia cover that is not submerged; this is when the salt marsh harvest mouse and California clapper rail are most vulnerable to predation.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and reduce the level of harassment by removing vegetation within a 4-foot buffer around work areas using only non-mechanized hand tools and installing salt marsh harvest mouse-proof exclusion fencing around work areas prior to the initiation of work within suitable habitat. The hand removal of vegetation and installation of salt marsh harvest mouse-proof exclusion fencing will be supervised by a Service-approved biological monitor. A Service-approved biological monitor will be onsite during all construction activities within or adjacent to potential habitat for the salt marsh harvest mouse and California clapper rail. Prior to construction activities, environmentally sensitive areas will be flagged or fenced in order to clearly delineate the extent of the construction. A worker awareness program will be presented to all construction personnel before they start work on the proposed project; the program will summarize relevant laws and regulations that protect biological resources, discuss sensitive habitats and listed species with the potential to occur in the work zone, explain the role and authority of the biological monitors, and review applicable avoidance measures to protect listed species and habitats.

SFCJPA and SCVWD will minimize the level of harassment of salt marsh harvest mice and California clapper rails during extreme high tide events by avoiding work within 50 feet of suitable tidal marsh habitat within two hours before and after an extreme high tide event (6.5 feet or higher measured at the Golden Gate Bridge and adjusted to the timing of local high tides). All work will occur during the daylight hours to avoid disturbance of salt marsh harvest mice and California clapper rails at night. All foods and food-related trash items will be enclosed in sealed trash containers and removed from the site at the end of each workday to prevent attracting predators to the work site.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and harassment of California clapper rails during annual mowing of the levee slopes by: having a qualified biologist survey the area to be mowed; avoiding mowing suitable wetland, marsh, and transition zone habitat; avoiding mowing during extreme high tide events when salt marsh harvest mice and California clapper rails are most likely to approach the upland areas along the levee slopes; avoiding mowing at night; and stopping mowing if any salt marsh harvest mice or California clapper rails are observed within 50 feet.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and California clapper rails during rodent control within the action area by prohibiting the use of rodenticides and fumigants within suitable habitat for the salt marsh harvest mouse and California clapper rail. In areas where rodenticides are used, carcass retrieval surveys will be conducted daily for acute toxins and weekly for anticoagulants to minimize secondary poisoning impacts during the

use period. Methods of rodent control within salt marsh harvest mouse or California clapper rail habitat will be limited to live trapping. All live traps will have openings measuring no smaller than 2 inches by 1 inch to allow any salt marsh harvest mouse that inadvertently enters the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.

SFCJPA and SCVWD will minimize the potential for injury and mortality of salt marsh harvest mice and California clapper rails and reduce the level of harassment during installation of the high tide refuge islands in Outer Faber Marsh by avoiding work during the California clapper rail's breeding season; accessing the refuge island sites on foot or boat; a biological monitor will work with the contractor(s) to reduce and minimize the impacts on wetlands from construction access; protective materials such as plywood sheets over geotextile fabric (or equivalent) will be temporarily installed (for a maximum of 2-3 days) to cover all vegetated marsh areas that will be regularly accessed during island construction; using wheelbarrows to transport necessary materials over protective sheets; using skilled personnel and qualified biologists trained in working in sensitive wetland habitats; and utilizing hand tools and manual labor to construct the islands.

Invasive Plant Species

The proposed project has the potential to degrade salt marsh harvest mouse and California clapper rail habitat through the introduction of invasive weeds during proposed project construction. Invasive weeds, such as perennial pepperweed, could spread into marsh habitats when seeds are attached to vehicles, equipment, and clothing. The spread of perennial pepperweed and other invasive plants can displace native marsh vegetation and lower habitat quality for salt marsh harvest mice and California clapper rails by reducing the amount of plants they use for refugia, foraging, and nesting, such as marsh gumplant and pickleweed. Perennial pepperweed provides poor upland refugia cover because the plant is leafless in the winter when the salt marsh harvest mouse and California clapper rail are in most need of suitable upland refugia cover during the more frequent winter extreme high tides and storm events. Without suitable upland refugia cover, the salt marsh harvest mouse and California clapper rail are more vulnerable to predation during extreme high tide events. To minimize the potential for the spread of invasive plants during proposed project implementation, SFCJPA will clean all construction equipment of soil, seed, and plant parts prior to arriving onsite; utilize fill material that is free of vegetation and plant material; utilize certified weed-free erosion control materials; implement a Service-approved revegetation and monitoring plan to ensure all temporarily disturbed areas revegetate with suitable native plant species; and control invasive plant species.

Installation of Rock-Slope Protection

The installation of 3.71 acres of rock-slope protection within the San Francisquito Creek channel could provide denning areas for predators of the salt marsh harvest mouse and the California clapper rail (*e.g.*, foxes, rats, raccoons) if installed in a manner that left voids in between the rocks. This would increase the risk of predation by mammal predators on the salt marsh harvest mouse and the California clapper rail within the action area. SFCJPA will fund the implementation of a five-year mammal predator control program within the action area which will reduce the potential for predation on salt marsh harvest mice and the California clapper rails during the five-year predator control period; however, predation by mammal predators is likely to increase within the action area once the five-year predator management program is terminated.

Altered Hydrology

Main Faber Marsh

Fluvial flood flows above the five-year event (20 percent chance of happening once in any given year) currently spill over from San Francisquito Creek into Main Faber Marsh under average tidal conditions due to an approximately 400-foot-long low spot in the Main Faber Marsh levee downstream of the Friendship Bridge. Once construction of the proposed project is completed, this frequency will decrease to roughly the 25-year event (4 percent chance of happening once in any given year) due to the SFCJPA filling in the low spot in the Main Faber Marsh levee. Hydraulic modeling for the proposed project indicates that there would not be discharge to the Main Faber Marsh from San Francisquito Creek post-project during a two-year, three-year, five-year or 10-year fluvial flood flow event occurring during MHHW. If occurring during a king tide of 10.5 feet, a 10-year flow event would result in a discharge of approximately 100 cfs into Main Faber Marsh, which is a reduction from the volume that would be discharged if these two conditions happened at the same time with the current channel and levee dimensions.

Since salt marsh harvest mice and California clapper rails are most vulnerable to predation during flooding events when cover is limited (Albertson 1995, Service 2013a, Overton *et al.* 2014), any reductions in the frequency of flooding of Main Faber Marsh would likely benefit the mouse and rail by reducing the risk of predation. SFCJPA will further reduce the risk of predation on salt marsh harvest mice and California clapper rails within Main Faber Marsh by contributing funding to a Service- and Refuge-approved five-year predator management program; enhancing transition zone habitat for salt marsh harvest mice and California clapper rails along the southern, eastern, and northern levees of Main Faber Marsh under a Service-approved plan; and installing fencing at the entrance to the southern levee of Main Faber Marsh to deter people and mammal predators from accessing the southern levee. The salt marsh harvest mouse would also benefit from reductions in the frequency of flooding of salt marsh harvest mouse nests within Main Faber Marsh. Salt marsh harvest mice and California clapper rails within the adjacent Laumeister Marsh would also benefit from transition zone habitat enhancement along the northern Main Faber Marsh/southern Laumeister Marsh berm and the implementation of the five-year predator management program.

However, it is not known to what extent reductions in fluvial flooding may alter habitat quality within Main Faber Marsh. Fluvial floods may contribute sediment to Main Faber Marsh which is important for tidal marsh accretion and the ability of the marsh plain to keep up with sea level rise. Thus any decrease in the input of sediment from fluvial flood flows into Main Faber Marsh could decrease the rates of tidal marsh accretion and the ability of the tidal marsh to keep up with sea level rise.

High velocity fluvial flood flows may also scour marsh vegetation and thus reduce the availability of cover for the salt marsh harvest mouse and California clapper rail. Under existing conditions, fluvial flood flows spilling over a low spot in the Main Faber Marsh levee where San Francisquito Creek makes a sharp right turn creates a "fire hose" effect with a zone of concentrated high velocity flows spilling into the tidal marsh of the Main Faber Marsh (A. Riley, SFRWQCB, pers. comm. 2014). The proposed increase in channel capacity within the San Francisquito Creek channel could exacerbate the "fire hose" effect into Main Faber Marsh during flood events (A. Riley, SFRWQCB, pers. comm. 2014). SFCJPA will minimize the "fire hose" effect by filling in the low spot in the Main Faber Marsh levee downstream of the Friendship Bridge.

Fluvial flood flows may also alter vegetation communities within the tidal marsh of the Main Faber Marsh through the introduction of freshwater flows. For example, freshwater discharges from the San Jose/Santa Clara Water Pollution Control Plant since 1970 are thought to have contributed to a net conversion from tidal to brackish marsh and a reduction in habitat quality and population densities of the California clapper rail at the southern end of San Francisco Bay around Coyote Creek (H.T. Harvey and Associates 1989, Service 2013a). However, between 2006 and 2008, a decrease in freshwater outflow from the San Jose/Santa Clara Water Pollution Control Plant has resulted in a shift from brackish marsh to tidal marsh, in turn resulting in a net formation of 77 acres of tidal marsh at the southern end of San Francisco Bay since 1989 (H.T. Harvey Associates 2008, Service 2013a). Thus it is possible that decreases in freshwater flows into Main Faber Marsh could improve habitat quality for the California clapper rail. However, the tidal marsh of the Main Faber Marsh already supports one of the highest densities of California clapper rails range-wide; therefore, it is unlikely that further decreases in freshwater flows would significantly improve habitat quality for California clapper rails except for decreasing the risk of predation as described above.

Freshwater flows increase the biodiversity of the plant community within brackish marsh habitat around San Francisco, San Pablo, and Suisun bays. Thus it is possible that any reductions in freshwater flows may also decrease the biodiversity of plant species within Main Faber Marsh which could alter habitat quality for the salt marsh harvest mouse and California clapper rail. However, since the California clapper rail prefers more saline tidal marshes and the salt marsh harvest mouse occurs in both brackish and saline marsh habitats, it is unlikely that any decreases in freshwater flows into Main Faber Marsh would decrease habitat quality for the salt marsh harvest mouse and California clapper rail.

Outer Faber Marsh

The degrading of the Bay levee will result in an increase in the frequency of fluvial flooding of Outer Faber Marsh thus having the opposite effect described above for Main Faber Marsh. Increases in the frequency of flooding of Outer Faber Marsh may make the marsh less suitable for salt marsh harvest mice and California clapper rails. SFCJPA estimates that degrading the Bay levee will result in three to four additional flood events entering Outer Faber Marsh during large storm events over the 50-year life span of the proposed project.

Additionally, the removal of upland refugia/transition zone habitat along the Bay levee will make salt marsh harvest mice and California clapper rails within Outer Faber Marsh more vulnerable to predation during the more frequent flood events. Recent surveys of Outer Faber Marsh show only two or three California clapper rails occur within Outer Faber Marsh; therefore, the Service anticipates that no more than two or three California clapper rails will be harassed during each of the three to four additional flooding events in Outer Faber Marsh during the 50-year life span of the proposed project. Altered hydrology within Outer Faber Marsh may adversely affect breeding, foraging, and dispersing salt marsh harvest mice or result in the flooding of salt marsh harvest mouse nests; however, the number of breeding salt marsh harvest mice and their nests occurring within Outer Faber Marsh is likely to be low due to the marginal quality of the marsh for breeding salt marsh harvest mice. Degrading the Bay levee could result in an increase in the rate of sedimentation and tidal marsh accretion within Outer Faber Marsh which in the long-term could increase elevations within the marsh making the marsh more suitable for salt marsh harvest mice and California clapper rails.

SFCJPA will minimize the effects of increased flooding and loss of upland refugia/transition zone habitat on salt marsh harvest mice and California clapper rails within Outer Faber Marsh by creating five high-tide refuge islands in Outer Faber Marsh. The high-tide refuge islands will be planted with marsh gumplant and be constructed at high enough elevation to provide cover for salt marsh harvest mice and California clapper rails during most flooding events. The high-tide refuge islands are expected to provide suitable high-tide refuge habitat for the salt marsh harvest mouse and California clapper rail in Outer Faber Marsh within 3-5 years after installation (H.T. Harvey & Associates 2015a). SFCJPA will also minimize the effects of increased flooding and loss of upland refugia/transition zone habitat on salt marsh harvest mice and California clapper rails by enhancing transition zone habitat along the western Outer Faber Marsh levee. SFCJPA will also minimize the risk of predation on salt marsh harvest mice and California clapper rails within Outer Faber Marsh during flooding events by contributing to the Refuge's predator management program within the action area for five years.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

City of Palo Alto Levee O&M Mowing

The City of Palo Alto conducts frequent mowing of the San Francisco Bay Trail levees within the action area along the lower reach of San Francisquito Creek adjacent to the Palo Alto Municipal Golf Course and Palo Alto Airport and along the western side of Main Faber Marsh (K. Murray, SFCJPA, *in litt.* 2015c, 2015d). Levee mowing may result in the harassment of salt marsh harvest mice and California clapper rails and the potential for injury and mortality of salt marsh harvest mice. The level of harassment of salt marsh harvest mice and California clapper rails and potential for injury and mortality of salt marsh harvest mice increases if the mowing is conducted during an extreme high tide or flooding event when the adjacent marsh plain is inundated because this is when the mouse and the rail are most likely to approach the levee to seek cover along the levee that is not submerged. The frequent mowing of the levees also increases the risk of predation on salt marsh harvest mice and California clapper rails within the action area by removing high tide refugia cover the mice and the rails utilize as shelter from predators when the adjacent marsh plain is flooded. Levee mowing during extreme high tide and flooding events may also increase the risk of predation on salt marsh harvest mice and California clapper rails within the action area by flushing the mice and rails from suitable cover or preventing the mice and rails from seeking available unsubmerged cover along the levees. Levee mowing may also introduce and spread invasive plant species which displace higher quality transition zone habitat plant species like marsh gumplant that provide suitable year-round cover for salt marsh harvest mice and California clapper rails during extreme high tide events. The displacement of suitable higher quality transition zone habitat plant species like marsh gumplant that provide year-round suitable cover increases the risk of predation on salt marsh harvest mice and California clapper rails especially during winter extreme high-tide and flooding events when suitable cover is limited.

California clapper rails are sensitive to noise disturbance during the breeding season. For example, Albertson (1995) documented a California clapper rail abandoning its territory in Laumeister Marsh

shortly after a repair crew worked on a nearby transmission tower. The California clapper rail did not establish a stable territory within the duration of the breeding season. As a result of this territorial abandonment, the opportunity for successful reproduction during the breeding season was eliminated. Thus noise from levee mowing adjacent to California clapper rail breeding habitat in Main Faber Marsh and along lower San Francisquito Creek during the rail's breeding season may result in the flushing of California clapper rails from their nests and the loss of breeding activity. The flushing of California clapper rails from their nests increases the risk of predation on the adult California clapper rail and its nest. However, it is possible that some California clapper rails may acclimate to noise from frequent levee mowing.

The City of Palo Alto mows about 0.32 acre of salt marsh harvest mouse grassland foraging/ dispersal habitat to control ruderal grasses in an approximately 3-foot wide strip along the top of the levee along the left bank of the lower reach of San Francisquito Creek downstream of Friendship Bridge adjacent to the Palo Alto Municipal Golf Course and the Palo Alto Airport two or three times per year. The City of Palo Alto also mows annually about 0.29 acre of transition zone habitat for the salt marsh harvest mouse and California clapper rail and about 0.32 acre of grassland foraging/dispersal habitat for the salt marsh harvest mouse within an approximately 9-foot-wide by 2,830-foot-long strip along the western Main Faber Marsh levee. The strip of transition zone habitat mowed by the City of Palo Alto along the western Main Faber Marsh levee includes about 50 percent of the City of East Palo Alto's 0.58-acre transition zone habitat enhancement area which is required habitat compensation for the effects of the Runnymede Storm Drainage Improvements Phase II and O'Connor Pump Station Outfall Structure Repair Project on the salt marsh harvest mouse and California clapper rail (Service file number 81420-2011-F-0103-2, Service 2013b). The City of Palo Alto avoids the mowing of the City of East Palo Alto's transition zone shrub mitigation plantings (*e.g.*, marsh gumplant and salt marsh baccharis) during levee mowing within the 0.58-acre habitat compensation area along the western Main Faber Marsh levee; however, the mowing of the grassland vegetation in between the shrubs within the habitat compensation area reduces the ability of the habitat compensation area to provide suitable cover for salt marsh harvest mice during extreme high tide and flooding events and during seasonal foraging and dispersal.

Conclusion

After reviewing the current status of the salt marsh harvest mouse and California clapper rail, the environmental baseline for the action area, the effects of the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, and the cumulative effects, it is the Service's biological opinion that the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, as proposed, is not likely to jeopardize the continued existence of the salt marsh harvest mouse and California clapper rail. The Service reached this conclusion because the project-related effects to these species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of these species based on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual salt marsh harvest mice and California clapper rails; (2) the avoidance of construction activities within 700 feet of California clapper rail activity centers during the rail's breeding season; (3) the small amount of habitat within Main Faber Marsh that will be directly disturbed; (4) the reduction in the frequency of flood flows entering Main Faber Marsh due to filling in low spots in the levee along San Francisquito Creek will reduce the risk of predation on salt marsh harvest mice and California clapper rails and the potential for flooding of salt marsh harvest mouse

nests in Main Faber Marsh; (5) the creation of an additional approximately 6.90 acres of suitable tidal marsh habitat for the salt marsh harvest mouse and an additional approximately 1.09 acres of suitable tidal marsh habitat for the California clapper rail within the widened San Francisquito Creek channel; (6) the creation of an additional approximately 1.64 acres of suitable upland refugia/ transition zone habitat for the salt marsh harvest mouse and California clapper rail along the widened San Francisquito Creek channel; and (7) the reduction in predation levels on the salt marsh harvest mouse and California clapper rail within Main Faber Marsh and Outer Faber Marsh due to SFCJPA's contribution to the Refuge's predator management program for at least five years, the enhancement of 5.66 acres of transition zone habitat along the Main Faber Marsh and Outer Faber Marsh perimeter levees, and the installation of fencing to deter people and mammal predators from accessing the southern Main Faber Marsh levee.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or SFCJPA must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

Salt Marsh Harvest Mouse

The Service anticipates incidental take of individual salt marsh harvest mice will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of salt marsh harvest mice that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

1. The harassment and non-lethal harm of all salt marsh harvest mice within the 3.64 acres of suitable tidal marsh habitat, 1.89 acres of suitable diked marsh habitat, 13.05 acres of suitable ruderal grassland foraging/dispersal habitat, and 2.46 acres of suitable upland refugia/ transition zone habitat temporarily disturbed during construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

2. The harassment and harm of all salt marsh harvest mice within the 0.82 acre of suitable tidal marsh habitat, 0.79 acre of suitable diked marsh habitat, 1.28 acres of suitable ruderal grassland habitat, and 0.27 acre of suitable upland refugia/transition zone habitat permanently lost during construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

3. The harassment of all salt marsh harvest mice within the 5.66 acres of low quality transition zone habitat temporarily disturbed along a total of 5,120 linear feet of the southern, eastern, and northern Main Faber Marsh perimeter levees and the western Outer Faber Marsh perimeter levee during transition zone habitat enhancement.

4. The harassment of all salt marsh harvest mice within the 0.19 acre of suitable tidal marsh habitat temporarily disturbed during installation of five high tide refuge islands in Outer Faber Marsh.

5. The ongoing harassment and non-lethal harm of all salt marsh harvest mice within 6.49 acres of ruderal grassland foraging/dispersal habitat disturbed up to three times per year during annual levee mowing along the San Francisquito Creek levee slopes.

6. The harassment of all salt marsh harvest mice within the 13.8 acres of suitable tidal marsh and transition zone habitat in Outer Faber Marsh during four additional flooding events during the 50-year life span of the proposed project.

7. The injury or mortality of two adult salt marsh harvest mice and four juvenile salt marsh harvest mice.

<u>California Clapper Rail</u>

The Service anticipates incidental take of individual California clapper rails will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of California clapper rails that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

1. The harassment and non-lethal harm of all California clapper rails within the 1.57 acres of suitable tidal marsh habitat and 2.46 acres of suitable upland refugia/transition zone habitat temporarily disturbed during the construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

2. The harassment and non-lethal harm of all California clapper rails within the 0.36 acre of suitable tidal marsh habitat and 0.27 acre of suitable upland refugia/transition zone habitat permanently lost during the construction of the proposed project (*i.e.*, construction of the San Francisquito Creek levees and widened channel, filling in low spots in the Main Faber Marsh levee, and accessing and degrading the Bay levee).

3. The harassment of all California clapper rails within the 0.19 acre of tidal marsh disturbed during installation of up to five high-tide refuge islands within Outer Faber Marsh.

4. The harassment of all California clapper rails within the 5.66 acres of low quality transition zone habitat temporarily disturbed along 5,120 linear feet of the southern, eastern, and northern Main Faber Marsh levees and western Outer Faber Marsh levee during transition zone habitat enhancement.

5. The harassment of all California clapper rails within the 13.8 acres of suitable tidal marsh and transition zone habitat in Outer Faber Marsh during four additional flooding events during the 50-year life span of the proposed project.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the salt marsh harvest mouse and California clapper rail.

Reasonable and Prudent Measures

All necessary and appropriate measures to avoid or minimize effects on the salt marsh harvest mouse and California clapper rail resulting from implementation of the proposed project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the salt marsh harvest mouse and California clapper rail:

1. All conservation measures, as described in the biological assessment and restated here in the Description of the Proposed Project section of this biological opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The Corps shall include full implementation and adherence to the conservation measures as a condition of any permit or contract issued for the proposed project.

2. The Corps shall ensure that no rodenticides are used within 328 feet of suitable habitat for the salt marsh harvest mouse and California clapper rail.

3. The Corps shall ensure that any mammals trapped during rodent control that are potential predators of the California clapper rail or salt marsh harvest mouse (*e.g.*, Norway rats, feral cats, skunks, red foxes, raccoons, opossums) are dispatched and removed from the site.

4. The Corps shall ensure that SFCJPA has a plan for marsh ecotone/transition zone habitat enhancement along the Main Faber Marsh and Outer Faber Marsh levees and avian and mammal predator monitoring and management within the action area reviewed and approved by the Service prior to the initiation of construction of the proposed project. The marsh ecotone/transition zone habitat enhancement and the funding for predator management shall be initiated within one year of the initiation of construction of the proposed project.

5. The Corps shall ensure that SFCJPA has a plan for the installation of the permanent high-tide refuge islands in Outer Faber Marsh reviewed and approved by the Service within six months of the initiation of construction of the proposed project. The permanent high-tide refuge islands shall be installed within two years of the initiation of construction of the proposed project.

6. The Corps shall ensure that SFCJPA installs the rock-slope protection in a manner that minimizes voids in between the rocks that could provide denning areas for predators of the salt marsh harvest mouse and California clapper rail.

Monitoring

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

a. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Corps shall provide bimonthly updates to the Service with a precise accounting of the total acreage of habitat impacted. Updates shall also include any information about changes in project implementation that result in habitat disturbance not described in the Description of the Proposed Project and not analyzed in this Biological Opinion.

b. For those components of the action that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death is anticipated, the Corps shall immediately contact the Service's Sacramento Fish and Wildlife Office (SFWO) at (916) 414-6623 to report the encounter. If encounter occurs after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the Corps shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

c. The Corps shall ensure that SFCJPA or SCVWD provide annual reports to the Service during the five-year post-construction monitoring period on the status of revegetation and invasive plant species control of the temporarily disturbed areas, tidal marsh creation/

restoration within the widened San Francisquito Creek floodplain, transition zone habitat enhancement along the Main Faber Marsh and Outer Faber Marsh perimeter levees, and revegetation of the permanent high-tide refuge islands in Outer Faber Marsh.

d. The Corps shall ensure that SFCJPA or the U.S. Department of Agriculture Wildlife Services provides annual reports to the Service on the implementation of the avian and mammalian predator monitoring and management program within the action area. The annual reports should include the number of each species of avian and mammal predator observed, the number of each species of predator removed, and the frequency of monitoring for predators.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Coast/Bay Division Chief of the Endangered Species Program at the SFWO at (916) 414-6623.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Develop, fund, and annually implement a predator management program for controlling avian and mammal predators that threaten the salt marsh harvest mouse and California clapper rail, western snowy plover, and California least tern. Fund the monitoring of PG&E transmission towers for avian predators within suitable habitat for the salt marsh harvest mouse and California clapper rail and report any raptor nests to PG&E and the Refuge for removal. Work with PG&E to install raptor perch deterrents on their transmission towers within suitable habitat for the salt marsh harvest mouse and California clapper rail.

2. Control rat populations within the City of East Palo Alto near the Faber and Laumeister marshes.

3. Decommission trails or require that dogs be kept on a leash near breeding habitat for the California clapper rail. Avoid constructing trails near suitable habitat for the California clapper rail and salt marsh harvest mouse. Enforce dog leash laws along the San Francisco Bay Trail.

4. Remove raptor perches near suitable habitat for the salt marsh harvest mouse and California clapper rail.

5. Prohibit the feeding of wildlife near suitable habitat for the salt marsh harvest mouse and California clapper rail.

6. Control invasive perennial pepperweed within suitable upland transition zone and tidal marsh habitat for the salt marsh harvest mouse and California clapper rail and implement measures to minimize the introduction and spread of perennial pepperweed and other invasive plant species.

7. Restore tidal marsh habitat and marsh ecotone/transition zone habitat for the California clapper rail and salt marsh harvest mouse in priority areas identified in the Recovery Plan.

8. Report sightings of any listed or sensitive animal species to the CNDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project, from San Francisco Bay to Highway 101, in the City of East Palo Alto, San Mateo County, and the City of Palo Alto, Santa Clara County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have any questions regarding this biological opinion on the proposed San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project please contact Joseph Terry, Senior Biologist, or Ryan Olah, Coast/Bay Division Chief, at the letterhead address, electronic mail (Joseph_Terry@fws.gov; Ryan_Olah@fws.gov), or at telephone (916) 943-6721.

Sincerely,

Jennifer M. Norris (FOR)
Field Supervisor

cc:
Anne Morkill, San Francisco Bay National Wildlife Refuge Complex, Fremont, California
Kim Squires, Bay/Delta Fish and Wildlife Office, Sacramento, California
Tami Schane, California Department of Fish and Wildlife, Napa, California
Susan Glendening, San Francisco Bay Regional Water Quality Control Board, Oakland, California
Len Materman, San Francisquito Creek Joint Powers Authority, Menlo Park, California
Amanda Morrison, National Oceanic and Atmospheric Administration/National Marine Fisheries Service, Santa Rosa, California
Brenda Goeden, San Francisco Bay Conservation and Development Commission, San Francisco, California

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Overton, Cory. Wildlife Biologist, U.S. Geological Survey, Dixon, California.

Perrera, Robert. Biological Monitor, Huffman-Broadway Group, Inc., San Rafael, California.

Popper, Brian J. Wildlife Biologist, U.S. Department of Agriculture Wildlife Services, San Luis District, Fremont, California.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue Room 325
Santa Rosa, California 95404

DEC 3 0 2015

Refer to NMFS No: SWR-2013-9572

Lieutenant Colonel John C. Morrow
U.S. Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project near the cities of East Palo Alto and Palo Alto in San Mateo and Santa Clara counties, California (Corps file #2013-00030S).

Dear Colonel Morrow:

Thank you for your letter of April 26, 2013, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the U.S. Army Corps of Engineers' (Corps) proposed authorization for the San Francisquito Creek Joint Powers Authority to undertake the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project in San Mateo and Santa Clara counties, California, under Section 404 of the Clean Water Act of 1973, as amended (33 USC Section 1344 *et seq.*).

The enclosed biological opinion is based on our review of the proposed project and describes NMFS' analysis of potential effects on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and threatened southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) and their critical habitat in accordance with section 7 of the ESA. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of threatened CCC steelhead or southern DPS green sturgeon, nor is it likely to adversely modify their critical habitat. However, NMFS anticipates take of CCC steelhead will occur during project construction as juvenile steelhead are likely to be present during dewatering of the work site for construction. An incidental take statement which applies to this project with non-discretionary terms and conditions is included with the enclosed biological opinion.

This document also includes the results of our analysis of the action's likely effects on Essential Fish Habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Based on our review, NMFS concludes the proposed project

would adversely affect EFH for species managed within the Pacific Coast Groundfish and Coastal Pelagic Species Fishery Management Plans. NMFS has included a conservation recommendation that can be taken by the action agency to avoid, minimize, or otherwise offset potential adverse effects on EFH. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving EFH Conservation Recommendations.

Please contact Amanda Morrison, North-Central Coast Office in Santa Rosa, California at (707) 575-6083 or Amanda.Morrison@noaa.gov if you have any questions concerning this biological opinion or EFH response, or if you require additional information.

Sincerely,

for

William W. Stelle, Jr.
Regional Administrator

Enclosure

cc: Gregory Brown, Corps Regulatory, San Francisco
Joseph Terry, US Fish and Wildlife Service, Sacramento
Tami Schane, California Department of Fish and Wildlife, Yountville
Susan Glendening, San Francisco Regional Water Quality Control Board, Oakland
Len Materman, San Francisquito Creek Joint Powers Authority, Menlo Park
Copy to ARN File # 151422SWR2013SR00116
Copy to Chron File

Endangered Species Act Section 7(a)(2) Biological Opinion
and Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project
San Mateo and Santa Clara Counties, California
(Corps File No. 2013-00030S)

NMFS Consultation Number: SWR-2013-9572

Action Agency: Army Corps of Engineers, San Francisco District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Central California Coast steelhead (*O. mykiss*)	Threatened	Yes	No	No
North American Green Sturgeon (*Acipenser medirostris*)	Threatened	Yes	No	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Groundfish	Yes	Yes
Pacific Coast Salmon	No	No
Coastal Pelagic	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: for

William W. Stelle, Jr.
Regional Administrator

Date: December 30, 2015

LIST OF ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BCDC	Bay Conservation and Development Commission
BMP	Best Management Practices
BOR	Federal Bureau of Reclamation
CDFW	California Department of Fish and Wildlife
Caltrans	California Department of Transportation
CCC	Central California Coast steelhead
Corps	U.S. Army Corps of Engineers
cy	cubic yards
cfs	cubic feet per second
DWR	California Department of Water Resources
DPS	distinct population segment
EFH	essential fish habitat
FMP	Fishery Management Plan
ft/s	foot per second
GCID	Glenn-Colusa Irrigation District
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MHHW	mean higher high water
MLLW	mean lower low water
MTL	mean tide level
mg/l	milligrams per liter
mm	millimeter
MMP	Mitigation and Monitoring Plan
NMFS	National Marine Fisheries Service
NTU	nephelometric turbidity units
O&M	Operations and Maintenance
PG&E	Pacific Gas and Electric
Refuge	U.S. Fish and Wildlife Don Edwards San Francisco Bay National Wildlife Refuge
RBDD	Red Bluff Diversion Dam
RSP	rock-slope protection
SFRWQCB	San Francisco Regional Water Quality Control Board
SFCJPA	San Francisquito Creek Joint Powers Authority
SCVWD	Santa Clara Valley Water District
SMP	Stream Maintenance Program
S-CCC	South-Central California Coast steelhead
SWRCB	State Water Resources Control Board
SHEP	Steelhead Habitat Enhancement Program
USFWS	U.S. Fish and Wildlife Service

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS' Public Consultation Tracking System (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). A complete record of this consultation is on file at the NMFS North-Central Coast Office in Santa Rosa, California.

1.2 Consultation History

November 8, 2011: NMFS attended a site visit along with staff from San Francisquito Creek Joint Powers Authority (SFCJPA), Santa Clara Valley Water District (SCVWD), and the U.S. Army Corps of Engineers (Corps).

April 26, 2013: NMFS received from the Corps the project's Biological Assessment (BA) (ICF International 2012) and the request for consultation on the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project (Project). In the initiation letter, the Corps determined the project may affect, but is not likely to adversely affect, threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and threatened southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) and their critical habitat. Additionally, the Corps determined that the project would not have substantial adverse effects on EFH for various federally managed fish species within the Pacific Coast Groundfish, Pacific Coast Salmon, and Coastal Pelagic Species Fishery Management Plans (FMP).

May 13, 2013: NMFS sent an electronic message to the Corps commenting on the BA and requesting additional information on the proposed project. The message mentioned that the description of the project contained in the

BA did not contain sufficient detail for NMFS to assess the potential impacts of the project, and requested additional clarification on the project description (*i.e.*, dewatering activities and using heavy equipment in the channel).

February – July 2014: NMFS attended multiple interagency meetings regarding the project with staff from the U.S. Fish and Wildlife Service's (USFWS) Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), the Corps, SCVWD, SFCJPA, California Department of Fish and Wildlife (CDFW), San Francisco Regional Water Quality Control Board (SFRWQCB), NMFS, and the Bay Conservation and Development Commission (BCDC) to discuss the various alternative configurations for the proposed project including filling in low spots in the Main Faber Marsh levee, degrading the Bay levee adjacent to Outer Faber Marsh near the mouth of San Francisquito Creek, and further setting back the levee into the Palo Alto Municipal Golf Course.

August 28, 2014: NMFS received from the Corps and SFCJPA the amended BA for the Project.

October 15, 2014: NMFS attended a site visit along with staff from SFCJPA, SCVWD, CDFW, and Corps. During the site visit NMFS was informed several additional documents regarding the project were available. These documents consisted of the Draft Mitigation and Monitoring Plan (MMP) (SFCJPA 2015c), Draft Operations and Maintenance (O&M) Plan (SFCJPA 2015a), and Temporary Water Diversion Plan (SFCJPA 2015b). NMFS received these documents from the SFCJPA on October 17, 2014.

November 3, 2014: NMFS sent a letter to the Corps and SFCJPA commenting on the August 2014 amended BA, the Draft MMP, and the Draft O&M Plan and requested additional information on channel capacity, sedimentation, and flooding, and fish passage and habitat. In this letter, NMFS also informed the Corps and SFCJPA that this information was necessary to complete the NMFS assessment of potential project impacts and conclude consultation.

April 24, 2015: NMFS attended a meeting with the Corps, SFRWQCB, SCVWD, and SFCJPA to discuss NMFS's comments and questions raised in the November 3, 2014, letter. The SFCJPA agreed to investigate the feasibility of, and provide to NMFS a conceptual proposal for incorporation of several project features (*i.e.*, velocity refuges and passive tidal marsh revegetation) to improve conditions for fish. The SFCJPA further agreed to provide: 1) updated planting plans and landscape sheets; 2) a table of wetlands impacts and mitigation calculations; 3) an updated MMP; 4) written responses to the points

	raised in the NMFS letter of November 3, 2014; and 5) HEC-RAS model results for existing conditions and proposed conditions. In addition, NMFS informed the Corps that the project may adversely affect ESA-listed species, critical habitat, and EFH and that a formal consultation will likely be necessary.
May – July 2015:	NMFS received via electronic mail from SFCJPA the responses to NMFS's comments and questions raised in the November 3, 2014, letter and the additional information the SFCJPA agreed to provide at the April 24, 2015, meeting.
July - October 2015:	NMFS participated in biweekly conference calls with SFCJPA, the Corps, USFWS, the Refuge, and SCVWD to discuss the information needed to complete the NMFS assessment.
July 30, 2015:	During a biweekly conference call with the SFCJPA, Corps, USFWS, and SCVWD, NMFS requested the SFCJPA and SCVWD schedule a future, focused meeting among themselves, USFWS (Regulatory and Refuge), Corps, and NMFS to discuss a scenario in which certain elevations of marsh plain would be allowed to passively revegetate.
August 19, 2015	NMFS provided via electronic mail to SFCJPA and the Corps comments on the additional information provided by the SFCJPA between May and July 2015 (*e.g.*, additional hydraulic and hydrologic information).
August 26, 2015:	NMFS participated in a conference call with SFCJPA and SCVWD to provide clarification on the additional hydrologic and hydraulic information NMFS requested on August 19, 2015.
September 3-24, 2015:	NMFS received via electronic mail from SFCJPA updated versions of the Draft O&M Plan (SFCJPA 2015); Temporary Water Diversion Plan; Draft MMP; and hydraulic and hydrologic information.
September 24, 2015:	NMFS participated in a conference call with SFCJPA, Corps, USFWS, and SCVWD to inform the Corps and SFCJPA that NMFS believes the information provided completes the consultation request package.
October 13, 2015:	NMFS attended a meeting with SFCJPA, SCVWD, Corps, USFWS Regulatory, Refuge, and SFRWQCB to discuss the tidal marsh design elevations and revegetation activities. During the meeting NMFS requested that the SFCJPA modify the proposed tidal marsh elevations to increase tidal salt marsh complexity and enhance ESA-listed fish habitat. The SFCJPA and SCVWD agreed to consider modifications and follow-up with NMFS within two weeks.

October 20, 2015:	Via electronic mail to the SFCJPA, SCVWD, and Corps, NMFS requested additional hydrologic information (*e.g.*, HEC-RAS model results for the 1 percent, 5 percent, and 50 percent [March-June] exceedance flows).
November 5, 2015:	During the biweekly project update call, NMFS informed the SFCJPA and Corps that SFRWQCB Estuarine Geomorphologist, Christina Toms, spoke with NMFS on October 26, 2015, regarding modifications to the Project's marshplain designs. NMFS explained the SFRWQCB believed that a passive approach to creating channel complexity in the tidal salt marsh would not be successful in the action area due to intense fluvial influences and that alternative methods would need to be taken to enhance ESA-listed fish habitat, specifically adult fish passage conditions. NMFS informed the SFCJPA that they will provide a memo summarizing their analysis of the Project's impacts on fish habitat and recommendations on the types of habitat enhancements that would be needed to enhance fish habitat within two weeks. NMFS also confirmed that they could rush completion of the Opinion, with a goal of completing it by December 15, 2015.
November 23, 2015:	NMFS provided the Corps, SFCJPA, and other resource agency representatives a technical memo prepared by fish passage engineer, Dave White, which summarized the fish passage issues associated with high channel velocities under some streamflow conditions in the project reach, and suggested design elements to provide velocity refuge in the project reach.
November 30, 2015:	In response to recommendations provided in the NMFS November 23, 2015, fish passage review memorandum, the SFCJPA submitted to NMFS and the Corps a preliminary proposal for the location, number and type of steelhead migration features to be incorporated in to project.
December 1, 2015:	A telephone conference call with representatives of NMFS, SFCJPA, USFWS and SCVWD was held to discuss SFCJPA's proposed steelhead fish passage features. NMFS informed the group that the proposal will likely address the most significant high velocity areas by creating resting sites behind boulders and rootwads. The SFCJPA agreed to incorporate these features into the project and continue to work with NMFS to develop the specific designs for each feature.
December 2, 2015:	The SFCJPA provided a revised proposal for steelhead fish passage features based on the December 1, 2015, conference call with NMFS.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The Corps proposes to issue a permit under Section 404 of the Clean Water Act of 1973 (33 U.S.C. Section 1344) to the SFCJPA to construct a 1.5 mile flood protection and habitat restoration project along San Francisquito Creek from San Francisco Bay to East Bayshore Road, near the cities of East Palo Alto and Palo Alto in San Mateo and Santa Clara counties, California (Figures 1-5). The SFCJPA is a regional government agency whose members include the Cities of Palo Alto, Menlo Park, and East Palo Alto, the San Mateo County Flood Control District, and the SCVWD. The purpose of the proposed activity is to improve flood protection (up to a 100-year flood flow event coupled with the influence of tides and projected sea level rise), restore and enhance habitat functions, and improve recreational opportunities within the project area. Major project elements include: levee setback and improvements, construction of floodwalls, extension of a pedestrian bridge, excavation of sediment deposits within the channel to maximize flood conveyance, relocation and removal of utilities, and revegetation of tidal marsh habitats. Construction of the project elements would likely take two years to complete. The project is scheduled to begin in 2016 and to be completed by 2018.

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interdependent or interrelated actions associated with the proposed action.

1.3.1. Construct Floodwalls and Rebuild, Relocate, and Degrade Levees

Approximately 5,650 linear feet of floodwalls will be constructed along the channel at the top of levees to increase flow capacity and maintain consistency with the California Department of Transportation's (Caltrans) enlargement of the U.S. 101/East Bayshore Road Bridge over the San Francisquito Creek. On the East Palo Alto side (north bank), concrete floodwalls up to 4 feet above top of bank (up to 13 feet from channel bottom) will be constructed along approximately 500 linear feet near Friendship Bridge (pedestrian bridge crossing the creek) (STA 28+00 to STA 33+00) (Figure 4) and along 2,300 linear feet of channel between Daphne Way (STA 52+50) and U.S. Highway 101/East Bayshore Road (STA 75+50) (Figure 5). On the Palo Alto side (south bank), sheetpile floodwalls up to 4 feet above top of bank (up to 13 feet from channel bottom) will be constructed along approximately 2,850 linear feet from Geng Road (STA 47+50) to Highway 101/East Bayshore Road Bridge (STA 76+00) (Figures 4 and 5).

Downstream of the floodwalls, the SFCJPA will rebuild the East Palo Alto Levee (northern levee) in its current location and relocate the Palo Alto Levee/Palo Alto Municipal Golf Course Levee (southern levee). Approximately 3,400 linear feet of the existing levee on the north side of the channel would be rebuilt to a greater strength and/or height from just downstream of Friendship Bridge (STA 21+00) (Figure 3) to Daphne Way (STA 55+00) to increase channel capacity (100-year water surface elevation). Approximately 55,000 cubic yards (cy) of fill will be used to reinforce and increase the height of the northern levee. Approximately 2,727 linear feet of the southern levee will be relocated and/or reinforced between the area just downstream

of Friendship Bridge (STA 22+73) and the area just downstream of Geng Road (STA 50+00). A portion of the levee will be relocated up to 200 feet east into the Palo Alto Municipal Golf Course and raised to increase channel capacity. This set back of the southern levee will create space for a floodplain terrace. Approximately 84,700 cy of fill will be used for the southern levee relocation. The elevation increase of both the northern and southern levees varies by up to 4 feet based on existing conditions and the necessary modifications at each station.

The SFCJPA will build about 10,176 linear feet of maintenance roads on the newly raised and relocated levees. The maintenance roads will also serve as pedestrian/bicycle trails. The roads will be up to 16 feet wide and paved with crushed granite, except for a 2,658 section on the south bank (STA 27+50 through 54+08), that will be paved with asphalt as part of the Bay Trail.

The SFCJPA will raise and grade a portion of the currently unmaintained levee between the creek and the Faber Tract (Faber Tract Levee) closer to its original design elevation to stabilize the levee and preserve existing frequency, volume, and velocities of fluvial discharge to the Faber Tract to optimize conditions for USFWS protected species that inhabit the Faber Tract marsh. Fill will be added to reinforce and raise the Faber Tract Levee up to 2 feet along 550 linear feet (STA 21+00 to STA 26+50) to reduce concerns regarding levee erosion and the potential for mass wasting leading to levee failure. In addition, the SFCJPA will incorporate a 6H:1V levee side slope on the side sloping into the Faber Tract. The 6H:1V levee side slope will help protect the levee toe from potential erosion due to flow overtopping along a 400-foot distance as the levee transitions upstream to a higher elevation closer to the Friendship Bridge. Approximately 12,000 cy of clean imported fill will be used to reinforce and redesign the Faber Tract levee.

The SFCJPA will degrade a 600 linear foot section of the northern levee east of the Faber Tract (referred to as the Bay Levee) to restore the tidal-fluvial interface in the marsh area east of the Faber Tract and to reduce water surface elevations in the creek between Friendship Bridge and the Bay. About 2,820 cy of sediment/soil will be removed along 600 linear feet (0.73 acres) of the Bay Levee (STA 3+50 to 9+50) (Figure 3) downstream of the Faber Tract in a marsh area that is already subject to daily tides from the Bay.

1.3.2. Excavate Sediment and Install Rock Slope Protection

About 175,890 cy of sediment will be removed from along 5,775 linear feet of the creek channel and associated channel expansion area to increase creek capacity and to maximize conveyance. In-channel sediment will not be reused because it is unlikely to provide suitable material for levee embankment use.

The JPA will install approximately 4,000 linear feet (3.71 acres) of rock-slope protection (RSP) at various locations along the length of the channel side of the Project to protect the levees against erosion and to stabilize the floodwalls. The RSP on the levees will be installed from the toe of the levee up the bank approximately 10 to 15 feet.

1.3.3. Construct Friendship Bridge Boardwalk Extension

The existing Friendship Bridge will be retained and a 202 linear foot boardwalk will be constructed from the retained eastern footing of the bridge and across the newly-expanded marshplain to connect with the realigned southern levee. The boardwalk will be the same width as the Friendship Bridge (140 feet long and 10 feet wide), constructed of timber deck and concrete piles, and require twenty 18-inch diameter concrete piles. The elevation of the low mark of the boardwalk will be set above the highest anticipated flood elevation, with the lowest point of the bridge a minimum of 5 feet above the marshplain terrace beneath it.

1.3.4. Relocate or Remove Utilities

The SFCJPA will remove, abandon, or replace several utility components for electricity, gas, and sanitary sewer, and stormwater runoff present within the Project right-of-way. SFCJPA will remove various storm drain pipelines existing within the golf course and at the top of the current levees that will be under the future southern levee and widened creek channel post project. This work will be concurrent with the levee and channel work. The SFCJPA will realign a sanitary sewer line that currently crosses the creek near the Friendship Bridge (STA 32+00 at the south bank to 34+50 at the north bank). As proposed, this task will involve open trenching with a minimum depth below ground surface of 3.5 feet for the new line. The sanitary sewer line would be encased in armored steel where it crosses the creek. This work would be concurrent with the levee construction work so will not have separate impacts to waters of the San Francisquito Creek. The SFCJPA will remove about 390 linear feet of existing sanitary sewer line.

The SFCJPA will coordinate with Pacific Gas and Electric (PG&E) to perform electricity and gas transmission system work before creek channel and levee construction work begins. PG&E's work is considered part of the Project and will be covered under the Corps' 404 permit for the Project. PG&E will realign the existing electricity transmission system that currently crosses over the creek from STA 52+00 (south bank) to R-line STA 48+00 (north bank). The new line will be shifted 250 feet south and cross over the creek at STA 51+00 (south bank) to STA 52+00 on the north bank. A transmission pole will be removed from both banks; replacing two existing poles, one on each bank; and adding two new poles on the north bank for the new line. In addition, PG&E will remove wires from six towers that run north to south along the far north bank right-of-way between STA 30+00 to STA 56+00. Of these six towers, one will be raised by 15 feet. The realigned section will connect to the southern-most pole in this series. Any replacement poles will be made of light-duty steel.

PG&E will replace the foundation of an existing electric transmission tower located in the floodplain of the future channel alignment footprint at STA 48+00, approximately 2,000 feet upstream of the Friendship Bridge. PG&E will demolish the existing foundation, build a temporary shoo-fly support, and build a permanent concrete foundation at the existing foundation site. The electricity tower on the old foundation will be lifted and placed onto the permanent concrete foundation with an area of 625 square feet. An access ramp will be built on the inboard side of the levee for this tower.

PG&E will abandon in place 3,000 linear feet of the gas transmission line located in the Project right-of-way, of which about 1,350 linear feet is in the new channel realignment footprint. THE SFCJPA will remove the abandoned gas transmission lines. PG&E estimates that the old line is 4.7 feet below grade beneath the creek channel. The SFCJPA will confirm the elevation during excavation activities.

The new gas line will be aligned south to north in the golf course, then will cross east to west through the Project right-of-way upstream of the Friendship Bridge from STA 32+00 (south bank) to STA 34+00 (north bank), and will extend west to a connection in East Palo Alto. The pipeline tunnel under the Creek will be bored by horizontal direction drilling at 25 feet below ground. The other portions of the pipeline will be installed by cut and fill at a minimum of 4 feet below ground surface.

PG&E will place three trench spoils piles equidistant from south to north along the south bank. Each pile is planned to be 100 feet by 100 feet. On the north bank, PG&E will place another 100 foot by 100 foot spoils pile next to the borehole site. The suitability of the spoils for reuse to cover the new pipeline will be determined after they are appropriately assessed during the utility activities, and any unused spoils will be hauled from the site and appropriately disposed of at an approved upland facility.

1.3.5. Revegetation

The action area encompasses 4.34 acres of diked marsh wetlands, 0.33 acres of freshwater marsh wetlands, 112.26 acres of tidal salt marsh wetlands, 1.13 acres of freshwater pond, 22.39 acres of tidal channel and bay waters, and 0.37 acres of tidal pans. The project construction is anticipated to impact a total of 3.13 acres of diked marsh, 4.51 acres of tidal salt marsh habitat, and 2.43 acres of tidal channel and bay waters. The diked marsh community is found on the landward side of the levees along San Francisquito Creek and within the Golf Course; and the tidal salt marsh vegetation is found throughout the Faber Tract and along both sides of San Francisquito Creek. The Project will result in the removal of between 162 and 256 trees. Of the potential of 256 trees to be removed, 220 of these are on the south side of the creek and the remaining 36 are on the north side.

After levee construction is complete, the tidal marsh area would be terraced and revegetated with high-marsh plants appropriate to the elevation relative to tidal levels in accordance with the MMP for the Project (SCVWD 2014). The high-marsh (above mean higher high water) will be planted with include alkali weed (*Cressa truxillensis*), saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), marsh jaumea (*Jaumea carnosa*), and perennial pickleweed (*Salicornia pacifica* [*S. virginica*]). The high-marsh transition planting area will be planted with fat hen (*Atriplex patula*), alkali weed, saltgrass, alkali heath, gumweed (*Grindelia* spp.), marsh jaumea, and western marsh rosemary (*Limonium californicum*). Native marsh plants will be used to revegetate the terraced land. Plants appropriate to the high marsh will be planted near the stream channel. Plants native to marsh transition areas would be planted in areas more distant from the creek channel and in the upper half of the Project area as elevation gains. Approximately 19,600 high marsh and high marsh transition wetland plants and cuttings are planned for installation. Plants will be sourced from the San Francisquito Creek watershed and Baylands areas.

A temporary irrigation system will be installed for use during the planting and three-year establishment phase, in order to provide a back-up water supply to the newly-installed vegetation in the event of a period of drought during the winter or spring rainy season, and for irrigation as needed during the summer. Irrigation frequency is expected to be reduced as the site develops during the establishment phase. The supplemental irrigation ensures an adequate supply of moisture to the young plants until they are fully established in the site's soils.

Annual monitoring will be conducted over a 5-year period. Performance goals related to revegetation efforts will aid in determining if the site is progressing incrementally toward meeting the year-5 success criteria (SFCJPA 2015c). Year 5 monitoring will determine if the success criteria have been achieved. Monitoring will be overseen or conducted by a qualified biologist with experience in vegetation monitoring. Final success will not be considered to have been achieved until temporary irrigation has been off for at least two years. The specific performance goals and criteria that will be used to determine if all revegetation was successful will be described in a Final MMP.

1.3.6. Dewatering of the Project Area

The project area is located in a reach of San Francisquito Creek that is influenced by tides and freshwater flow from the San Francisquito Creek watershed. Therefore, both a stream flow and tidal diversion will be necessary to dewater the project area for construction purposes. Water diversion will be implemented to maintain the work site as water-free as possible for the duration of in-channel work. The full width of the channel from tops of bank will be dewatered. Water incursion is expected from Bay tides, natural and urban runoff flows from upstream, outfalls downstream from the U.S. 101/East Bayshore Road Bridge, and discharges from the O'Connor Pump Station in East Palo Alto and the Palo Alto Pump Station.

Water diversion will include cofferdams upstream (to intercept stream flows) and downstream (to block tidal Bay waters) of the work site. Stream flows upstream of the site will be pumped through pipes that bypass the work site. Discharges from the two municipal pump stations located adjacent to the creek will be pumped from the clear wells into the diversion pipes as well. In addition, water that is diverted from the channel during dewatering will be retained, tested, and treated, as necessary, in order to meet all water quality effluent limitations as specified in the SFRWQCB, San Francisco Bay Region, Basin Plan (Basin Plan). Diversion pipe flow velocity dissipaters will be installed downstream of the cofferdam on existing banks. Pumps will be used to dewater the work site. Pumps will be required to: 1) reroute water from the stream, which accumulates above the upstream cofferdam; 2) dewater the construction area above the downstream cofferdam or where ponded; and 3) to reroute outflow at each of the two municipal pump stations (see below).

The cofferdams will be installed for the in-channel construction period between June 15th and October 15th at various locations, depending on the construction element, during the two construction seasons (see Table 1). Utilities and levee construction and dewatering will be completed in one season, and floodwall construction the following season.

Table 1. Cofferdam locations (approximate).

Construction Element	Downstream Location/Cofferdam Height	Upstream Location/Cofferdam height
Utilities Downstream Levee Construction	STA 13+00/12 ft	58+00/8ft
Upstream Floodwall Construction	49+00/10 ft	Within 50 ft upstream of U.S. 101 West Bayshore Road Bridge/ 8 ft

Groundwater depths are anticipated to be in the range of 1 to 3 feet below existing channel invert, so dewatering sumps may be required for excavation and will be utilized as necessary.

Dewatering for the utility crossings, levee work, and floodwall construction will be performed with the installation of a 36-inch diameter bypass pipe from above the upstream cofferdam to below the downstream cofferdam to allow anticipated construction season streamflows to avoid contacting the work area. The downstream cofferdams will be installed first and during the lowest tide during normal construction hours. The upstream cofferdams will be installed during the minimum streamflow expected during normal working hours. Diversion pipes and pumps will be in place and operational before cofferdams are installed. Cofferdams will remain in place and functional throughout the in-stream construction periods. Cofferdams will be removed at annual cessation of in-channel work, and channel and bank will be restored to pre-construction condition.

Dewatering for the Bay Levee deconstruction will be achieved by a floating silt curtain on both sides of the Bay Levee (STA 4+50 to 10+00) to prevent sediment from entering the adjacent marshland, creek, and San Francisco Bay. The silt curtains will be resistant to wind and high water velocity.

Cofferdams will be constructed of steel sheet pile embedded no less than 15 feet below the channel invert, gravel bags, and plastic sheeting. The piles will be installed with a backhoe or hammer attached to a backhoe. Gravel bags will be stacked against the sheet piles to the desired height. Gravel material will be between 0.4 and 0.8 inch in diameter, and will be clean and free from clay balls, organic matter, and other deleterious materials. The gravel bags will be placed on top of the plastic sheeting, which will be laid upon the channel invert or bank to prevent leakage. The gravel bags will be arranged so that each layer of gravel bag placed will be staggered in pyramid-like fashion. After the final height has been reached, the original plastic sheeting will be placed on top of the sandbags. To hold the plastic sheeting in place, gravel bags will be placed above the top plastic sheeting.

Water collected from the dewatered reach between cofferdams will be discharged through municipal storm drains to the City of East Palo Alto's pump station adjacent to the channel (O'Conner Street Pump Station). Additional water from urban sources will also be routed to this pump station, which normally outflows to the work area. To prevent flows from the East Palo Alto and Palo Alto pump stations from entering the work area, outflows will be pumped from the wet wells directly to the channel downstream of the downstream cofferdam or join the pump station outflow pipe to the stream diversion pipe.

The SFCJPA will ensure SFRWQCB and State Water Resources Control Board (SWRCB) water quality standards for receiving waters will be met during creek dewatering discharges, dewatering of excavations, and diverting creek and stormwater flows. Specifically, the instantaneous discharge pH will be in the range of 6.5 to 8.5 and shall not vary from ambient pH by more than 0.5 pH units; the discharge dissolved oxygen concentration will be no less than 5.0 milligrams per liter (mg/L) as an hourly average for discharging into tidal water and 7.0 mg/L (hourly average) for discharging into non-tidal receiving waters; dissolved sulfide will not be greater than 0.1 mg/L; the receiving water turbidity measured as nephelometric turbidity units (NTU) will not be greater than 10 percent of natural conditions in areas where natural turbidity is greater than 50 NTU (daily average); and the receiving waters will not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

The SFCJPA will identify an acceptable location or locations at which to measure background turbidity. Receiving water and discharge turbidity will be monitored at least one time every 8 hours on days when discharges from excavations or any other dewatering processes may occur.

1.3.7. Fish Collection and Relocation

Because the project will require water diversion and dewatering of work sites, fish within the project area will be collected and relocated in order to minimize their risk of being harmed or killed. The fish collection and relocation activities will be conducted by a NMFS/CDFW-approved biologist. Methods used to capture and relocate fish in the project area may include dip net and seine. Due to the high conductivity of brackish waters, electrofishing will not be used. The SFCJPA will submit a fish relocation plan to NMFS and CDFW for review no less than 90 days prior to beginning these activities for each phase of construction.

1.3.8. Operation and Maintenance

The SFCJPA has entered into a Construction Management Agreement with the SCVWD to designate the SCVWD as the lead agency responsible for project construction and post-project revegetation monitoring and management. The SFCJPA has also delegated responsibility for routine operation and maintenance of the Project, outside the scope of construction-related maintenance and monitoring activities, to the City of East Palo Alto and the SCVWD. Routine operations and maintenance include providing the proper care to levee embankments, floodwalls, channels, interior drainage system, and pump stations required for the efficient operation of the Project. The only operation and maintenance activity proposed by the SFCJPA as part of the Project is levee maintenance, vegetation management, and removal of trash and debris. The primary routine maintenance activities will consist of mowing levees to facilitate inspections, removal of trash and debris from the channel and channel benches, and control of burrowing rodents. Mowing will occur on the sides of the levee, which, on the inboard side of the levee, extend to the tidal marsh. Maintenance activities will be performed in accordance with the Best Management Practices Handbook (Attachment F to the SCVWD 2014-2023 SMP).

Additional future maintenance within the completed flood channel could include sediment removal, vegetation removal, levee repair, floodwall maintenance, removal of woody debris from the channel, repair of rock slope protection, maintenance of access roads, and repair and maintenance of outfalls and culverts. These activities, within specified limits and mitigation measures, are conducted as part of the SCVWD's Stream Maintenance Program (SMP). NMFS and the Corps completed formal section 7 consultation in 2014 on a 10-year (2014-2023) SMP conducted by SCVWD within stream channels of Santa Clara County, including San Francisquito Creek. A biological opinion was issued to the Corps on April 29, 2014 (See Section 2.3.3.2 for more detail). At this time, no maintenance activities outside the actions described above and outside the purview of SCVWD's SMP are anticipated.

1.3.9. Proposed Best Management Practices and Fish Protection Measures

Based on a fish passage analysis performed by NMFS, the SFCJPA proposes to install six structures in the flood control channel that are designed to provide velocity refuge for upstream migrating adult steelhead. Five of the structures will be constructed with rock and rootwads as a "constructed log jam". The sixth structure will be a rock spur structure extending from the lower tip of the Friendship Bridge Island into the low flow channel. All six structures will be placed in or adjacent to the low flow channel at approximately 300 feet intervals in the middle reach of the project. These structures will be designed to create velocity breaks and fish resting areas during high flow events and low tide conditions.

During project construction, operation and maintenance activities, the project will implement BMPs to avoid and/or minimize potential impacts to special-status species and their designated critical habitat. All activities will be performed in accordance with Best Management Practices Handbook (Attachment F to the SCVWD 2014-2023 SMP). The BMP handbook is a comprehensive document that includes minimization measures related to hazards and hazardous materials, hydrology and water quality, bank protection, stormwater management, discharge activities, grading and excavation, sediment removal and storage, vegetation management and removal, and other topics.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

San Francisquito Creek Watershed drains approximately 47.5-square miles on the eastern side of the Santa Cruz Mountains. Major tributaries include Bear Creek, Corte Madera Creek, and Los Trancos Creek, which converge to form San Francisquito Creek. The project area has a Mediterranean climate, typical of the California's central coast, with cool, wet winters and a long, mild dry season. Rainfall in the winter averages approximately 35 inches per year, falling mainly between the months of October and March. Portions of the upper San Francisquito Creek watershed are perennial and support spawning and rearing habitat for CCC steelhead. Sections of the mainstem of San Francisquito Creek dry by late spring or early summer in most years (Launer and Spain 1998; Metzger 2002; Stokes 2006).

The action area consists of the lower 1.5 miles of San Francisquito Creek in an existing flood control channel and adjacent marsh areas. The action area encompasses 4.34 acres of diked marsh wetlands, 0.33 acres of freshwater marsh wetlands, 112.26 acres of tidal salt marsh wetlands, 1.13 acres of freshwater pond, 22.39 acres of tidal channel and bay waters, and 0.37 acres of tidal pans. The diked marsh community is found on the landward side of the levees along San Francisquito Creek and within the Golf Course; and the tidal salt marsh vegetation is found throughout the Faber Tract and along both sides of San Francisquito Creek. From upstream to downstream, the constructed channel flows southwest to northeast through the cities of East Palo Alto and Palo Alto. The proposed project is located between where U.S. Highway 101 crosses San Francisquito Creek at the border of southern San Mateo and northern Santa Clara counties and the confluence of San Francisquito Creek with San Francisco Bay. This 7700 linear foot reach of San Francisquito Creek is located in a moderately urbanized, low gradient area, historically occupied by extensive tidal marshes at the edge of San Francisco Bay. The project location experiences daily tidal fluctuations.

2. ENDANGERED SPECIES ACT CONSULTATION: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[1]

[1] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

For critical habitat, NMFS determines the range-wide status of critical habitat by examining the condition of its physical or biological features (also called "primary constituent elements" or PCEs) - which were identified when critical habitat was designated. Species and critical habitat status are discussed in section 2.2 of this biological opinion.

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources referenced in the Consultation History section. Information was also provided in electronic mail messages and telephone conversations between April 2013 and November 2015. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses

(Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

the current function of the essential physical and biological features that help to form that conservation value.

2.2.1. Species Description, Life History, and Status- CCC Steelhead

In this opinion, NMFS assesses four population viability parameters to help analyze the status of CCC steelhead and the population's ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al.* 2000). NMFS has used the best available scientific and commercial information to determine the general condition of the population and factors responsible for the current status of the DPS.

The population viability parameters are used as surrogates for numbers, reproduction, and distribution; the criteria to be analyzed pursuant to the regulatory definition of jeopardy (50 CFR §402.02). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained. This results in reduced population resilience to environmental variation at local or landscape-level scales.

2.2.1.1. CCC Steelhead General Life History

Steelhead are anadromous forms of *O. mykiss*, spending some time in both fresh- and saltwater. The older juvenile and adult life stages reside in the ocean, until the adults ascend freshwater streams to spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al.* 1996). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults.

General reviews for steelhead in California document much variation in life history (Barnhart 1986; Busby *et al.* 1996; Shapovalov and Taft 1954). Although variation occurs, in coastal California steelhead usually live in freshwater for 1 to 2 years before emigrating to the ocean. Juvenile steelhead emigration from San Francisco Bay natal streams occurs episodically during winter and spring months, and generally occurs during high flow events. Barnhart (1986) reports that peak smolt migration occurs in March and April, and steelhead smolts in California typically range in size from 140 to 210 millimeter (mm) (fork length). Steelhead of this size can withstand higher salinities than smaller fish, and are more likely to occur for longer periods in tidally influenced estuaries, such as San Francisco Bay. Steelhead smolts in most river systems must pass through estuaries prior to seawater entry. Once they leave their natal streams, steelhead will spend 1 to 3 years in the ocean before returning to spawn.

Based on the timing of adult migration from the ocean to freshwater, CCC steelhead are classified as winter-run steelhead. Adult CCC steelhead typically enter freshwater between December and April, peaking in January and February (Fukushima and Lesh 1998). Steelhead

females build redds to bury eggs for a several month-long incubation period. Redds are generally located in areas where the hydraulic conditions are such that fine sediments, for the most part, are sorted out and streamflow is constant. This is because, during the incubation period, the intragravel environment must permit a constant flow of water to deliver dissolved oxygen and to remove metabolic wastes. Other intragravel parameters such as the gravel permeability, water temperature, substrate composition, and organic material in the substrate effect the survival of eggs to fry emergence (Chapman 1988; Everest *et al.* 1987; Shapovalov and Taft 1954). Adult steelhead may spawn 1 to 4 times over their life span.

Steelhead fry rear in freshwater edgewater habitats and move gradually into pools and riffles as they grow larger. Cover, water temperature, sediment, and food items are important habitat components for juvenile steelhead. Cover in the form of woody debris, rocks, overhanging banks, and other in-water structures provide velocity refuge and a means of avoiding predation (Bjornn *et al.* 1991; Shirvell 1990). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986; Bjornn and Reiser 1991b; Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 20 degrees (°) Celsius (C) (Hokanson *et al.* 1977; Myrick and Cech 2005; Wurtsbaugh and Davis 1977). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby *et al.* 1996).

Turbidity (*i.e.*, water clarity) also can influence the behavior, distribution, and growth of steelhead (Cordone and Kelley 1961; Newcombe and Jensen 1996; Newcombe and MacDonald 1991; Redding *et al.* 1987; Sigler *et al.* 1984). The impacts of turbidity on juvenile salmonids are largely linked to factors such as background turbidity levels and the duration of turbid conditions. Bisson and Bilby (1982) found that juvenile coho salmon that were acclimated to clear water did not exhibit significant sediment avoidance until the turbidity reached 70 NTUs. Sigler *et al.* (1984) observed avoidance of turbid water by juvenile steelhead and coho when exposed to turbidities as low as 38 NTUs and 22 NTUs, respectively, for a period of 15-17 days. Sigler *et al.* (1984) also observed that fish kept in these turbid conditions had lower growth rates than fish kept in clear water for the same amount of time.

2.2.1.2. Status of CCC Steelhead DPS and Critical Habitat

Historically, approximately 70 populations[2] of steelhead existed in the CCC steelhead DPS (Spence *et al.* 2008; Spence *et al.* 2012). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt *et al.* 2005). The remaining populations were

[2] Population as defined by Bjorkstedt *et al.* 2005 and McElhaney *et al.* 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (Bjorkstedt *et al.* 2005; McElhany *et al.* 2000).

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River - the largest population within the DPS (Busby *et al.* 1996). Near the end of the 20th century the population of wild CCC steelhead in the Russian River was estimated to be between 1,700-7,000 fish (Busby *et al.* 1996; Good *et al.* 2005) . Recent estimates for the Russian River population are unavailable since monitoring data is limited. Abundance estimates for smaller coastal streams in the DPS indicate low population levels that are slowly declining, with recent estimates (2011/2012) for several streams (Redwood [Marin County], Waddell, San Vicente, Soquel, and Aptos creeks) of individual run sizes of 50 fish or less (Nature Conservancy 2013). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al.* 2005). Similar losses in genetic diversity in the Napa River may have resulted from out-of-basin and out-of-DPS releases of steelhead in the Napa River basin in the 1970s and 80s. These transfers included fish from the South Fork Eel River, San Lorenzo River, Mad River, Russian River, and the Sacramento River. In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: (Busby *et al.* 1996; Good *et al.* 2005; Spence *et al.* 2008; Williams *et al.* 2011).

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. In 2005, a status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al.* 2005). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[3] (Spence *et al.* 2008). Monitoring data from the last ten years of adult CCC steelhead returns in Lagunitas and Scott creeks show steep declines in adults in 2008/2009. In 2011/2012 population levels began to increase, but still remained lower than levels observed over the past ten years (Nature Conservancy 2013). The most recent status update found that the status of the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since Good *et al.* (2005), does not

[3] Viable populations have a high probability of long-term persistence (> 100 years).

appear to suggest a change in extinction risk. On December 7, 2011, NMFS chose to maintain the threatened status of the CCC steelhead (76 FR 76386).

Critical habitat was designated for CCC steelhead on September 2, 2005 (70 FR 52488) and includes PCEs essential for the conservation of CCC steelhead. These PCEs include estuarine areas free of obstruction and excessive predation with the following essential features: (1) water quality, water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and (3) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (70 FR 52488).

The condition of CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[4]: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation. Impacts of concern include alteration of streambank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased streambank erosion, loss of shade (higher water temperatures) and loss of nutrient inputs (70 FR 52488 ; Busby *et al.* 1996). Water development has drastically altered natural hydrologic cycles in many of the streams in the DPS. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Overall, current condition of CCC steelhead critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

2.2.2. Species Description, Life History, and Status- Southern DPS Green Sturgeon

2.2.2.1. Green Sturgeon General Life History

Green sturgeon is an anadromous, long-lived, and bottom-oriented fish species in the family Acipenseridae. Sturgeon have skeletons composed mostly of cartilage and lack scales, instead possessing five rows of characteristic bony plates on their body called "scutes." On the underside of their flattened snouts are sensory barbels and a siphon-shaped, protrusible, toothless mouth. Large adults may exceed 2 meters in length and 100 kilograms in weight (Moyle 1976). Based on genetic analyses and spawning site fidelity, NMFS determined that North American green sturgeon are comprised of at least two DPSs: a northern DPS consisting of populations originating from coastal watersheds northward of and including the Eel River ("northern DPS

[4] Other factors, such as over fishing and artificial propagation have also contributed to the current population status of steelhead. All these human induced factors have exacerbated the adverse effects of natural factors such as drought and poor ocean conditions.

green sturgeon"), with spawning confirmed in the Klamath and Rogue river systems; and a southern DPS consisting of populations originating from coastal watersheds south of the Eel River ("southern DPS green sturgeon"), with spawning confirmed in the Sacramento River system (Adams *et al.* 2002).

Green sturgeon is the most marine-oriented species of sturgeon (Moyle 2002). Along the West Coast of North America, they range in nearshore waters from Mexico to the Bering Sea (Adams *et al.* 2002), with a general tendency to head north after their out-migration from freshwater ((Lindley *et al.* 2011). While in the ocean, archival tagging indicates that green sturgeon occur in waters between 0 and 200 meters depth, but spend most of their time in waters between 20–80 meters and temperatures of 9.5–16.0°C (Huff *et al.* 2011; Nelson *et al.* 2010). Subadult and adult green sturgeon move between coastal waters and estuaries (Lindley *et al.* 2011; Lindley *et al.* 2008), but relatively little is known about how green sturgeon use these habitats. Lindley *et al.* (2011) reported multiple rivers and estuaries are visited by aggregations of green sturgeon in summer months, and larger estuaries (*e.g.*, San Francisco Bay) appear to be particularly important habitat. During the winter months, green sturgeon generally reside in the coastal ocean. Areas north of Vancouver Island are favored overwintering areas, with Queen Charlotte Sound and Hecate Strait likely destinations based on detections of acoustically-tagged green sturgeon (Lindley *et al.* 2008; Nelson *et al.* 2010).

Based on genetic analysis, (Israel *et al.* 2009) reported that almost all green sturgeon collected in the San Francisco Bay system were southern DPS. This is corroborated by tagging and tracking studies which found that no green sturgeon tagged in the Klamath or Rogue rivers (*i.e.*, Northern DPS) have yet been detected in San Francisco Bay (Lindley *et al.* 2011). However, green sturgeon inhabiting coastal waters adjacent to San Francisco Bay include northern DPS green sturgeon.

Adult southern DPS green sturgeon spawn in the Sacramento River watershed during the spring and early summer months (Moyle *et al.* 1995). Eggs are laid in turbulent areas on the river bottom and settle into the interstitial spaces between cobble and gravel (Adams *et al.* 2007). Like salmonids, green sturgeon require cool water temperatures for egg and larval development, with an upper thermal limit for developing embryos of 17˚C (Van Eenennaam *et al.* 2005). Eggs hatch after 6–8 days, and larval feeding begins 10–15 days post-hatch. Larvae grow into juveniles typically after a minimum of 45 days (post-hatch) when fish have reached 60–80 mm total length (TL) and have migrated downstream. Juveniles spend their first few years in the Delta and San Francisco estuary before entering the marine environment as subadults. Juvenile green sturgeon salvaged at the State and Federal water export facilities in the southern Delta are generally between 200 mm and 400 mm TL (Adams *et al.* 2002), which suggests southern DPS green sturgeon spend several months to a year rearing in freshwater before entering the Delta and San Francisco estuary. Laboratory studies conducted by Allen and Cech (2007) indicated juveniles approximately 6 month old were tolerant of saltwater, but approximately 1.5-year old green sturgeon appeared more capable of successful osmoregulation in salt water.

Subadult green sturgeon spend several years at sea before reaching reproductive maturity and returning to freshwater to spawn for the first time (Nakamoto *et al.* 1995). Little data are available regarding the size and age-at-maturity for the southern DPS green sturgeon, but it is

likely similar to that of the northern DPS. Male and female green sturgeon differ in age-at-maturity. Males can mature as young as 14 years and female green sturgeon mature as early as age 16 (Van Eenennaam *et al.* 2006). Adult green sturgeon are believed to spawn every two to five years. Recent telemetry studies by Heublein *et al.* (2009) indicate adults typically enter San Francisco Bay from the ocean and begin their upstream spawning migration between late February and early May. These adults on their way to spawning areas in the upper Sacramento River typically migrate rapidly through the estuary toward their upstream spawning sites. Preliminary results from tagged adult sturgeon suggest travel time from the Golden Gate to Rio Vista in the Delta is generally 1-2 weeks. Post-spawning, tagged southern DPS green sturgeon displayed two outmigration strategies (Heublein *et al.* 2009); outmigration from Sacramento River prior to September 1 and outmigration during the onset of fall/winter stream flow increases. The transit time for post-spawning adults through the San Francisco estuary appears to be very similar to their upstream migration (*i.e.*, 1-2 weeks).

During the summer and fall, an unknown proportion of the population of non-spawning adults and subadults enter the San Francisco estuary from the ocean for periods ranging from a few days to 6 months (Lindley *et al.* 2011). Some fish are detected only near the Golden Gate, while others move as far inland as Rio Vista in the Delta. The remainder of the population appear to enter bays and estuaries farther north from Humboldt Bay, California to Grays Harbor, Washington (Lindley *et al.* 2011).

Green sturgeon feed on benthic invertebrates and fish (Adams *et al.* 2002). Radtke (1966) analyzed stomach contents of juvenile green sturgeon captured in the Sacramento-San Joaquin Delta and found the majority of their diet was benthic invertebrates, such as mysid shrimp and amphipods (Corophium spp). Dumbauld *et al. (2008)* report that immature green sturgeon found in Willapa Bay, Grays Harbor, and the Columbia River Estuary, fed on a diet consisting primarily of benthic prey and fish common to these estuaries (ghost shrimp, crab, and crangonid shrimp), with burrowing thalassinid shrimp representing a significant proportion of the sturgeon diet. Dumbauld *et al.* (2008) observed feeding pits (depressions in the substrate believed to be formed when green sturgeon feed) in soft-bottom intertidal areas where green sturgeon are believed to spend a substantial amount foraging.

2.2.2.2. Status of Southern DPS Green Sturgeon and Critical Habitat

To date, little population-level data have been collected for green sturgeon. In particular, there are no published abundance estimates for either northern DPS or southern DPS green sturgeon in any of the natal rivers based on survey data. As a result, efforts to estimate green sturgeon population size have had to rely on sub-optimal data with known potential biases. Available abundance information comes mainly from four sources: 1) incidental captures in the CDFW white sturgeon (*Acipenser transmontanus*) monitoring program; 2) fish monitoring efforts associated with two diversion facilities on the upper Sacramento River; 3) fish salvage operations at the water export facilities on the Sacramento-San Joaquin Delta; and 4) dual frequency sonar identification in spawning areas of the upper Sacramento River. These data are insufficient in a variety of ways (short time series, non-target species, etc.) and do not support more than a qualitative evaluation of changes in green sturgeon abundance.

CDFW's white sturgeon monitoring program incidentally captures southern DPS green sturgeon. Trammel nets are used to capture white sturgeon and CDFW utilizes a multiple-census or Peterson mark-recapture method to estimate the size of subadult and adult sturgeon population (https://www.dfg.ca.gov/fish/Resources/Sturgeon/). By comparing ratios of white sturgeon to green sturgeon captures, estimates of southern DPS green sturgeon abundance can be calculated. Estimated abundance of green sturgeon between 1954 and 2001 ranged from 175 fish to more than 8,000 per year and averaged 1,509 fish per year. Unfortunately, there are many biases and errors associated with these data, and CDFW does not consider these estimates reliable. For larval and juvenile green sturgeon in the upper Sacramento River, information is available from salmon monitoring efforts at the Red Bluff Diversion Dam (RBDD) and the Glenn-Colusa Irrigation District (GCID). Incidental capture of larval and juvenile green sturgeon at the RBDD and GCID have ranged between 0 and 2,068 green sturgeon per year (Adams *et al.* 2002). Genetic data collected from these larval green sturgeon suggest that the number of adult green sturgeon spawning in the upper Sacramento River remained roughly constant between 2002 and 2006 in river reaches above Red Bluff (Israel and May 2010). In 2011, rotary screw traps operating in the Upper Sacramento River at RBDD captured 3,700 larval green sturgeon which represents the highest catch on record in 16 years of sampling (Poytress *et al.* 2011).

Juvenile green sturgeon are collected at water export facilities operated by the California Department of Water Resources (DWR) and the Federal Bureau of Reclamation (BOR) in the Sacramento-San Joaquin Delta. Fish collection records have been maintained by DWR from 1968 to present and by BOR from 1980 to present. The average number of southern DPS green sturgeon taken per year at the DWR facility prior to 1986 was 732; from 1986 to 2001, the average per year was 47 (70 FR 17386). For the BOR facility, the average number prior to 1986 was 889; from 1986 to 2001 the average was 32 (70 FR 17386). Direct capture in the salvage operations at these facilities is a small component of the overall effect of water export facilities on southern DPS green sturgeon; entrained juvenile green sturgeon are exposed to potential high levels of predation by non-native predators, disruption in migratory behavior, and poor habitat quality. Delta water exports have increased substantially since the 1970s and it is likely that this has contributed to negative trends in the abundance of migratory fish that utilize the Delta, including the southern DPS green sturgeon.

During the spring and summer spawning period, researchers with University of California Davis have utilized dual-frequency identification sonar (*i.e.*, DIDSON) to enumerate adult green sturgeon in the upper Sacramento River. These surveys estimated 175 to 250 sturgeon (±50) in the mainstem Sacramento River during the 2010 and 2011 spawning seasons. However, it is important to note that this estimate may include some white sturgeon, and movements of individuals in and out of the survey area confound these estimates. Given these uncertainties, caution must be taken in using these estimates to infer the spawning run size for the Sacramento River, until further analyses are completed.

The southern DPS green sturgeon was listed as threatened on April 7, 2006 (71 FR 17757). NMFS determined that the southern DPS green sturgeon was likely to become endangered in the foreseeable future due to the substantial loss of spawning habitat, the concentration of a single spawning population in one section of the Sacramento River, and multiple other risks to the species such as stream flow management, degraded water quality, and introduced species (NMFS

2005). A recent status review update concluded that there has been no significant change in the status of Southern DPS green sturgeon since they were listed as Threatened in 2006 (NMFS 2015). This was based on an evaluation of new information generated since the 2006 which indicated that some threats, such as those posed by fisheries and impassable barriers, have been reduced. It also identified an emerging threat posed by nearshore and offshore energy development that requires continued attention into the future. Overall, the new information did not provide conclusive data indicating that habitat conditions and factors have changed in severity or degree of threat since 2006, and that additional research is needed. Since many of the threats cited in the original listing still exist, on August 11, 2015, NMFS chose to maintain the threatened status of the southern DPS green sturgeon (NMFS 2015).

Critical habitat was designated for the southern DPS of green sturgeon on October 9, 2009 (74 FR 52300). Critical habitat includes coastal marine waters within 60 fathoms depth from Monterey Bay, California to Cape Flattery, Washington, and includes the Strait of Juan de Fuca to its United States boundary. Designated critical habitat also includes the Sacramento River, lower Feather River, lower Yuba River, Sacramento-San Joaquin Delta, Suisun Bay, San Pablo Bay, and San Francisco Bay in California. PCEs of designated critical habitat in estuarine areas are food resources, water flow, water quality, mitigation corridor, depth, and sediment quality. In freshwater riverine systems, PCEs of green sturgeon critical habitat are food resources, substrate type or size, water flow, water quality, migratory corridor, depth, and sediment quality. In nearshore coastal marine areas, PCEs are migratory corridor, water quality, and food resources.

The current condition of critical habitat for the southern DPS of green sturgeon is degraded over its historical conditions. It does not provide the full extent of conservation values necessary for the recovery of the species, particularly in the upstream riverine habitat of the Sacramento River. In the Sacramento River, migration corridor and water flow PCEs have been impacted by human actions, substantially altering the historical river characteristics in which the southern DPS of green sturgeon evolved. In addition, the Delta may have a particularly strong impact on the survival and recruitment of juvenile green sturgeon due to their protracted rearing time in brackish and estuarine waters.

2.2.3. Factors Responsible for Steelhead and Sturgeon Stock Declines

NMFS cites many reasons (primarily anthropogenic) for the decline of steelhead (Busby *et al.* 1996) and southern DPS of green sturgeon (Adams *et al.* 2002; National Marine Fisheries Service (NMFS) 2005). The foremost reason for the decline in these anadromous populations is the degradation and/or destruction of freshwater and estuarine habitat. Additional factors contributing to the decline of these populations include: commercial and recreational harvest, artificial propagation, natural stochastic events, marine mammal predation, and reduced marine-derived nutrient transport.

The following section details the general factors affecting the CCC steelhead and southern green sturgeon in California. The extent to which there are species specific differences in these factors is not clear; however, the freshwater and estuarine ecosystem characteristics necessary for the

maintenance of self-sustaining populations of steelhead and green sturgeon are similar. Therefore, most of these factors below affect both steelhead and green sturgeon.

2.2.3.1. Habitat Degradation and Destruction

The best scientific information presently available demonstrates a multitude of factors, past and present, have contributed to the decline of west coast salmonids by reducing and degrading habitat by adversely affecting essential habitat features. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by urban development, agriculture, poor water quality, water resource development, dams, gravel mining, forestry (Adams *et al.* 2002; Busby *et al.* 1996; Good *et al.* 2005), and lagoon management (Bond 2006; Smith 1990).

The final rule listing Southern DPS green sturgeon indicates that the principle factor for the decline in the DPS is the reduction of spawning to a limited area in the Sacramento River (71 FR 17757). The constriction of spawning areas is caused by passage impediments associated with several dams, weirs, and diversions on the Sacramento River and its tributaries. While some of these passage impediments have been improved (*e.g.*, RBDD), significant numbers of these structures continue to impede passage of green sturgeon to spawning areas.

2.2.3.2. Commercial and Recreational Harvest

Ocean salmon fisheries off California are managed to meet the conservation objectives for certain stocks of salmon listed in the Pacific Coast Salmon FMP, including any stock that is listed as threatened or endangered under the ESA. Early records did not contain quantitative data by species until the early 1950's. In addition, the confounding effects of habitat deterioration, drought, and poor ocean conditions on salmonids make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of salmonids and green sturgeon in West Coast rivers.

Since being listed in 2006, landing and sales of green sturgeon is prohibited. A recent analysis of green sturgeon bycatch (Lee et al. 2015) estimated the number of Southern DPS green sturgeon bycatch in federally managed fisheries (*e.g.*, LE groundfish bottom trawl, IFQ groundfish bottom trawl, and at-sea hake fisheries) was 20.9 in 2011, 12.1 in 2012, and 5.5 in 2013, below NMFS's authorized take level of 28 per year (NMFS 2012).

2.2.3.3. Artificial Propagation

Releasing large numbers of hatchery fish can pose a threat to wild steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991).

2.2.3.4. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected steelhead and green sturgeon populations throughout their evolutionary histories. The effects of these events are exacerbated by anthropogenic changes to watersheds such as logging, roads, and water diversions. These anthropogenic changes have limited the ability of steelhead and green sturgeon to rebound from natural stochastic events and further depressed populations to critically low levels.

2.2.3.5. Marine Mammal Predation

The population of some marine mammal species, such as the Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*), have increased along the Pacific Coast (NMFS 1999). Although predation by these mammals is not believed to be a major factor in overall population decline, there may be substantial localized impacts on steelhead particularly during the migration season (Hanson 1993). CDFW notes predation on Southern DPS green sturgeon by California sea lions in the Sacramento River, bays, and Delta[5]. Steller and California sea lion abundance has increased in recent decades (NMFS 2013).

2.2.3.6. Invasive Species

San Francisco Bay is considered one of the most invaded estuaries in the world (Cohen and Carlton 1998). Invasive species contribute up to 99 percent of the biomass of some of the communities in the Bay (Cloern and Jassby 2012). Invasive species can disrupt ecosystems that support native populations. While there have been numerous invasions in the Bay, the best documented and studied invasive is the nonnative overbite clam (*Corbula amurensis*). It is a small clam native to rivers and estuaries of East Asia that is believed to be introduced in the ballast waters of ships entering the Bay in the late 1980s. The overbite clam can utilize a broad suite of food resources and withstand a wide range of salinities, including a tolerance of salinities less than 1 part per thousand (Nichols *et al.* 1990). Its introduction has corresponded with a decline in phytoplankton and zooplankton abundance due to grazing by the overbite clam (Kimmerer *et al.* 1994). Prior to its introduction, phytoplankton biomass in the Bay was approximately three times what it is today (Cloern 1996; Cloern and Jassby 2012), and the zooplankton community has changed from one having large abundances of mysid shrimp, rotifers, and calanoid copepods to one dominated by copepods indigenous to East Asia (Winder and Jassby 2011).

Kogut (2008) noted that overbite clams passed through the gut of white sturgeon alive. NMFS assumes that this may occur with green sturgeon too. Clams passing alive through a sturgeon's gut may lead to adverse effects on calorie and nutrient intake of sturgeon and may be a mechanism to assist in distribution of overbite clams to novel areas.

[5] California Department of Fish and Wildlife submitted comments in response to NMFS' invitation to review the green sturgeon Southern DPS draft status review in 2013.

2.2.3.7. Reduced Marine-Derived Nutrient Transport

Marine-derived nutrients from adult salmon carcasses have been shown to be vital for the growth of juvenile salmonids and the surrounding terrestrial and riverine ecosystems (Bilby *et al.* 1996; Bilby *et al.* 1998; Gresh *et al.* 2000). Declining salmon and steelhead populations have resulted in decreased marine-derived nutrient transport to many watersheds. This has contributed to the further decline of ESA-listed salmonid populations (Gresh *et al.* 2000).

2.2.3.8. Ocean Conditions

Recent evidence suggests poor ocean conditions played a significant role in the low number of returning adult fall run Chinook salmon to the Sacramento River in 2007 and 2008 (Lindley *et al.* 2009). The decline in ocean conditions likely affected ocean survival of all west coast salmonid populations (Good *et al.* 2005; Spence *et al.* 2008). Changing ocean conditions could also impact Southern DPS green sturgeon since subadults and adults use ocean habitats for migration and potentially for feeding. Based on their use of coastal bay and estuarine habitats, subadults and adults can occupy habitats with a wide range of temperature, salinity, and dissolved oxygen levels, so predicting the impact of climate change in these environments is difficult (Kelly *et al.* 2007; Lindley *et al.* 2008).

2.2.3.9. Global Climate Change

One factor affecting the rangewide status of CCC steelhead and Southern DPS green sturgeon, and aquatic habitat at large is climate change. The acceptance of global climate change as a scientifically valid and human caused phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies *et al.* 2001; Oreskes 2004; UNFCCC 2014). The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. This warming is inseparably linked to the oceans, the biosphere, and the world's water cycle. Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies *et al.* 2001). In general, as the magnitude of climate fluctuations increases, the population extinction rate also increases (Good *et al.* 2005). Global warming is likely to manifest itself differently in different regions.

Modeling of climate change impacts in California suggests average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007; Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al.* 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is

expected to decline. For the California North Coast, some models show large increases (75 to 200 percent) while other models show decreases of 15 to 30 percent (Hayhoe *et al.* 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to green sturgeon. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002). The projections described above are for the mid to late 21st Century. In shorter time frames natural climate conditions are more likely to predominate (Cox and Stephenson 2007; Smith and Murphy 2007).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02).

2.3.1. Status of Critical Habitat in Action Area

Designated critical habitat for CCC steelhead includes all aquatic habitat within the action area. Within the action area, essential features of critical habitat include estuarine areas. The critical habitat designation for CCC steelhead specifies that:

> *…estuarine areas should be free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. These features are essential to conservation because without them juveniles cannot reach the ocean in a timely manner and use the variety of habitats that allow them to avoid predators, compete successfully, and complete the behavioral and physiological changes needed for life in the ocean. Similarly, these features are essential to the conservation of adults because they provide a final source of abundant forage that will provide the energy stores needed to make the physiological transition to fresh water, migrate upstream, avoid predators, and develop to maturity upon reaching spawning areas* (70 FR 52488).

These essential features of designated critical habitat for adult and juvenile steelhead within the action area are partially degraded and limited due to channelization, high water velocities, limited water depth and natural cover, lack of emergent marsh, and reduced channel complexity (*i.e.*, floodplains and side channels).

The project's action area is located within designated critical habitat for the southern DPS of green sturgeon. PCEs essential for green sturgeon critical habitat in estuarine areas include food

resources, water flow, water quality, migratory corridor, water depth, and sediment quality. These PCEs for green sturgeon critical habitat in the action area are partially degraded. NMFS believes the overall PCE for rearing of green sturgeon is degraded due to the poor overall condition of the habitat, including a lack of emergent marsh, limited depth and cover, and reduced channel complexity. Adult southern DPS green sturgeon are only known to spawn in deep, turbulent pools in the upper Sacramento River below Keswick Dam and therefore spawning would not occur in the San Francisquito Creek watershed.

2.3.2. Status of Listed Species in the Action Area

2.3.2.1. CCC Steelhead

The San Francisquito Creek watershed CCC steelhead population represents one of only a few known remaining runs in tributary streams to South San Francisco Bay. The mainstem of San Francisquito Creek provides access between the headwaters of the watershed and San Francisco Bay and, thus, is essential for the immigration of steelhead adults and the emigration of smolts. Juvenile and adult abundance data for this watershed are very limited.

Based on the limited surveys that have been conducted, adult steelhead currently occur in San Francisquito Creek and its tributaries (Launer and Spain 1998; Leidy *et al.* 2005). Most steelhead presence data are based on observations from local residents/biologists and pertain primarily to the upper watershed. Launer and Spain (1998) conducted observations of fish and amphibian communities in San Francisquito Creek through the Stanford University (approximately 6 miles upstream of the action area) property during the summer of 1997. Based on their observations, they estimated a few thousand juvenile steelhead inhabited that segment of the creek, which represents a small fraction of the total available rearing habitat available to steelhead in the watershed. In the summer of 2004, juvenile steelhead were captured and relocated at two sites on the upper mainstem of San Francisquito Creek. Juvenile steelhead densities at the two sites were approximately 17 and 12 fish per 100 feet respectively (D.W. Alley and Associates 2004).

During the course of their downstream migration, juvenile steelhead may utilize the estuarine reaches of San Francisquito Creek and San Francisco Bay for seasonal rearing, but available information suggests that fish are actively migrating and currently they do not reside in estuarine reaches or the San Francisco Bay estuary (Chapman *et al.* 2015). Historically, the tidal marshes of San Francisco Bay provided a highly productive estuarine environment for juvenile anadromous salmonids. However, loss of habitat, changes in prey communities, and water-flow alterations and reductions have degraded habitat and likely limit the ability of the Bay and the action area to support juvenile rearing. MacFarlane and Norton (2002) found that fall-run Chinook experienced little growth, depleted condition, and no accumulation of lipid energy reserves during the relatively limited time the fish spent transiting the 40-mile length of the estuary. Sandstrom *et al.* (2013) found that CCC steelhead smolts emigrated more rapidly through the Bay than the Napa River and the ocean.

Steelhead use of the action area would be primarily as migratory habitat for adults and smolts migrating in and out of the watershed during the winter and spring months. As noted earlier,

reaches upstream of the U.S. Highway 101 Bridges go dry in most years and therefore summer rearing habitat is not available at this location (Launer and Spain 1998; Leidy *et al.* 2005; Metzger 2002). In the action area, NMFS expects juvenile and smolt steelhead presence during construction activities is unlikely due to the lack of connection with upstream freshwater rearing areas in the summer months, the timing of project construction (*i.e.,* at the end of the smolt out-migration season), and the poor quality of rearing habitat described above.

2.3.2.2. Southern DPS Green Sturgeon:

Sub-adult and non-spawning adult green sturgeon are found in San Francisco Bay during the summer months; however, acoustic tagging studies suggest the duration of residence by an individual is typically 6 weeks . There are no known records of green sturgeon utilizing San Francisquito Creek. Green sturgeon have occasionally been captured by CDFW during trawl surveys in southern San Francisco Bay, and acoustic tagging studies have reported tagged green sturgeon in the vicinity of the Dumbarton Bridge, approximately 2.5 miles north of the Project (ECORP Consulting, Inc. unpublished data 2011).

While no surveys for green sturgeon have been conducted in the action area, tidal sloughs are used as foraging habitat by green sturgeon. Green sturgeon prey on demersal fish (*e.g.*, sand lance) and benthic invertebrates similar to those that green sturgeon are known to prey upon in estuaries of Washington and Oregon . Green sturgeon are known to be generalist feeders and may feed opportunistically on a variety of benthic species encountered. For example, the invasive overbite clam has become the most common food of white sturgeon, and for the green sturgeon that have been examined to date (CDFG 2002). Based on distribution data and foraging habits of green sturgeon, NMFS assumes they are present in the action area when tidal conditions permit. Based on the poor condition of habitat in the action area for green sturgeon (*i.e.,* shallow waters, poor cover, and limited foraging habitat) NMFS expects very few green sturgeon will be present in the action area during project construction.

2.3.2.3. Factors Affecting Species Environment within San Francisquito Creek and the Action Area

Factors affecting watershed reaches upstream of the action area have impacted steelhead, and to a significantly lesser degree affected green sturgeon. Jones and Stokes (2006) conducted a limiting factors analysis for steelhead in the San Francisquito Creek. Based on their conclusion, multiple factors are impacting the survival and abundance of steelhead in San Francisquito Creek. They identified poor overwintering habitat (*i.e.,* a lack of deep, complex pools) as the primary limiting factor for juvenile survival. Although the availability of summer rearing habitat was not found to be a limiting factor, they noted that summer rearing habitat was degraded due to a lack of deep pools, low abundance of large woody debris, limited coarse substrate accumulations caused by channelization, urban development, and stream flow regulation. Steelhead outmigration success is limited by seasonal drying which may be further impacted by fish passage impediments in San Francisquito Creek. In dry to average years, low spring outmigration flows severely limits passage for out-migrating smolts. Multiple dams in the upper watershed have blocked approximately 33 percent of the historic steelhead spawning habitat in the San Francisquito Creek watershed (Spence *et al.* 2008).

The lower reaches of San Francisquito Creek are heavily channelized and bordered by levees and dikes. Some areas of stream bank are armored with concrete to prevent erosion. In the action area, San Francisquito Creek is tidally influenced. The action area consists of a flood control channel with two tight curves, two long straight sections, and one soft bend. The current channel is confined by earthen levees for most of its length except in a small 300 foot long reach in the middle of the channel where the levees have partially degraded. Channel widths from the top of the northern to southern levees ranges between 110 to 200 feet. The flood control channel has an irregular v-shaped low flow channel bordered by a gentle sloping marshplain. The Palo Alto Municipal Golf Course is located on the south side of the creek within a portion of the action area.

Historically, this reach consisted of a sinuous main channel that transitioned into a distributary tidal marshland approximately 0.5 miles from the mouth of the creek (Hermstad 2009). Historical conditions supported a highly complex habitat structure with multiple entry/exit points, depth variability, more abundant woody debris in the channel, and a more expansive floodplain. All of which contributed to higher water levels at low tide, increased depth variability, and reduced stream velocities through the multichannel marsh. Major re-routing of the lower reaches took place in the late 1920s, with levees constructed on both sides of the creek for flood control and development purposes (Hermstad 2009). Constriction of the marsh within a narrow corridor has led to the current condition of a simplified channel and homogenous marshplain, with no side channels, deep pools, or large woody debris to provide natural cover for fish. Freshwater flow through the action area during the dry season is either non-existent or consists largely of urban runoff.

2.3.3. Previous Section 7 Consultations and Section 10 Permits in the Action Area

Within the past ten years, pursuant to section 7 of the ESA, NMFS conducted section 7 consultations in the action area:

2.3.3.1. Hwy 101Bridge Replacement Project

NMFS and the Caltrans completed formal section 7 consultation on Caltrans' proposal to replace the U.S. Highway 101 Bridge over San Francisquito Creek, and a biological opinion was issued on May 29, 2011. The biological opinion analyzed the effects of construction and operation of the bridge on CCC steelhead and southern DPS green sturgeon and their critical habitat. The biological opinion concluded that the project was not likely to jeopardize steelhead or green sturgeon, or adversely modify their critical habitat.

2.3.3.2. SCVWD Stream Maintenance Permit

NMFS and the Corps completed formal section 7 consultation on SCVWD's activities to be conducted between 2014 and 2023 in Santa Clara County as part of the SCVWD's SMP. A biological opinion was issued on April 29, 2014. The biological opinion analyzed the effects of maintenance activities on CCC steelhead, South-Central California Coast (S-CCC) steelhead, southern DPS green sturgeon, and their critical habitat. The biological opinion concluded that

the project was not likely to jeopardize CCC steelhead, S-CCC steelhead, or southern DPS green sturgeon, or adversely modify their critical habitat.

2.3.3.3. Stanford University's proposed Steelhead Habitat Enhancement Program (SHEP) (NMFS PCTS #SWR-2006-00892 and WCR 2014- 875; and Corps File No. 28630S)

NMFS and the Corps completed formal section 7 consultation regarding Stanford University's proposed SHEP, and a biological opinion was issued on April 21, 2008. The formal consultation evaluated modifications to Stanford's San Francisquito Pump Station and the Los Trancos Diversion. The consultation and resulting biological opinion also evaluated the future operation of the San Francisquito Pump Station and Los Trancos Diversion under the SHEP's minimum bypass flow requirements. The biological opinion concluded the project was not likely to jeopardize the continued existence of threatened CCC steelhead or adversely modify CCC steelhead designated critical habitat.

The Corps requested reinitiation of formal consultation with NMFS in June 2014, to address a bank stabilization structure that failed at the Los Trancos Diversion facility and unsuccessful riparian mitigation plantings that needed to be replanted. The formal consultation analyzed the effects of these actions on CCC steelhead and their critical habitat, and a biological opinion was issued on August 27, 2014. The biological opinion concluded the project was not likely to jeopardize the continued existence of threatened CCC steelhead or adversely modify CCC steelhead designated critical habitat.

2.3.3.4. Stanford University's Habitat Conservation Plan (HCP)

In addition to the above interagency consultation, NMFS conducted an internal section 7 consultation on the proposed issuance of an ESA section 10(a)(1)(B) Incidental Take Permit (ITP) for Stanford's 2011 HCP. NMFS completed a biological opinion on October 19, 2012, which concluded the issuance of a 50-year ITP was not likely to jeopardize the continued existence of threatened CCC steelhead or adversely modify CCC steelhead designated critical habitat. However, NMFS did not proceed with the issuance of the ITP because Stanford requested by letter dated December 6, 2012, that NMFS suspend the processing of their application until such time as the Searsville Alternative Study is complete or advanced to a point where Stanford better understands the best future for Searsville Dam and Reservoir.

2.3.3.5. Research and Enhancement Permits

Research and enhancement projects resulting from NMFS' Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the action area. Salmonid and sturgeon monitoring approved under these programs includes juvenile and adult net surveys and tagging studies. In general, these activities are closely monitored and require measures to minimize take during the research activities. As of November 2015, no research or enhancement activities requiring Section 10(a)(1)(A) research and enhancement permits or section 4(d) limits have occurred in the action area.

2.4 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

In this biological opinion, our approach to determine the effects of the action was based on institutional knowledge and a review of the ecological literature and other relevant materials. We used this information to gauge the likely effects of the proposed project via an exposure and response framework that focuses on the stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, to which CCC steelhead and southern DPS green sturgeon are likely to be exposed. Next, we evaluate the likely response of the above listed fish to these stressors in terms of changes to survival, growth, and reproduction, and changes to the ability of PCEs or physical and biological features to support the value of critical habitat in the action area. PCEs, and physical and biological features, include sites essential to support one or more life stages of the species. These sites for migration, spawning, and rearing in turn contain physical and biological features that are essential to the conservation of the species. Where data to quantitatively determine the effects of the proposed action on listed fish and their critical habitat were limited or not available, our assessment of effects focused mostly on qualitative identification of likely stressors and responses.

2.4.1. Effects on Species

2.4.1.1. Steelhead and Green Sturgeon Passage and Rearing Conditions

NMFS fish passage facility design criteria (NMFS 2011) re intended to assist with improving conditions for salmonids that must migrate past man-made structures to complete their life cycle. The criteria were developed by integrating knowledge about fish behavior, physiology, and bio-mechanics with hydraulic, hydrology, and engineering specifications of typical fish passage designs. For a structure to meet NMFS's fish passage requirements it ultimately must provide for the safe, timely, and efficient upstream and downstream passage of anadromous salmonids at impediments created by artificial structures, natural barriers, or altered instream hydraulic conditions.

There are no specific criteria for flood control channels, per se, but design criteria for similar structures (*i.e.,* fishways) can be adapted to flood control channels. NMFS assessed fish passage within the flood control channel using the hydraulic design criteria for culverts and other road crossings. The hydraulic design method is a design process that matches the hydraulic performance of a culvert with the swimming abilities of a target species and age class of fish. It is only suitable in streams with sufficiently low gradient. This method targets distinct species of fish and therefore does not account for ecosystem requirements of non-target species. There are significant errors associated with estimation of hydrology and fish swimming speeds that are resolved by making conservative assumptions in the design process. Determination of the high and low fish passage design flows, water velocity, and water depth is required for this option.

The hydraulic design method requires hydrologic data analysis, open channel flow hydraulic calculations, and information on the swimming ability and behavior of the target group of fish. This design method is intended for the design of new, replacement culverts, and retrofitted culverts. NMFS chose to use this criterion as opposed to another method that heavily relies on geomorphic attributes (*i.e.*, the active channel method or stream simulation method) since the flood control channel exhibits a very simplified geometry and more closely resembles a very long natural bottom culvert than a natural, more complex channel.

The range of fish passage flows is frequently defined by exceedance flows obtained from a flow duration curve for the site. The San Francisquito Creek stream gage, operated by the USGS from 1950 to 2015 (65 years of record), is located near the Junipero Serra Boulevard Road crossing, roughly 6 to 7 miles upstream of the flood control channel. The historic daily average streamflow data from this gaging station was used to construct a flow duration curve for the project site representing flow conditions during the period of assumed adult steelhead migration (December through March).

Design high flow for fishways is the mean daily average streamflow that is exceeded 1 percent of the time on an annual basis, or the 5 percent exceedance flow if the flow duration is based on the period of fish migration. The fish passage design high flow is the highest streamflow for which migrants are expected to be present, migrating, and dependent on the channel or fishway for safe passage. Design low flow for fishways is the mean daily average streamflow that is exceeded 50 percent of the time on an annual basis. If the 50 percent exceedance flow is less than 3 cubic feet per second (cfs), then the low flow design should be for 3 cfs. The fish passage design low flow is the lowest streamflow for which migrants are expected to be present, migrating, and dependent on the channel or fishway for safe passage.

For San Francisquito Creek, the 5 percent exceedance during November through April is approximately 160 cfs which was selected as the high fish passage design flow for upstream steelhead passage. Since this is based on a more expansive timeframe than the peak steelhead migration window (December through March) in which the majority of high flows occur, 160 cfs is likely an underestimate of the 5 percent exceedance flow during the period of migration. For San Francisquito Creek the 95 percent exceedance flow during the period of migration is less than 1 cfs, so the alternative minimum flow of 3 cfs was selected as the low fish passage design flow for upstream steelhead passage.

A different set of criteria is commonly used by NMFS to assess juvenile salmonid passage. NMFS guidance recommends assessing high flow juvenile fish passage by calculating the average water velocity within a facility at the 10 percent annual exceedance flow (NMFS 2001) or the 50 percent exceedance flow for the time period corresponding to juvenile upstream passage (March through June) (NMFS 2011). The 50 percent exceedance flow in San Francisquito Creek during the period of juvenile passage is approximately 2.6 cfs which was selected as the high fish passage design flow for juvenile passage. NMFS guidance recommends the 95 percent annual exceedance flow or 1 cfs, whichever is greater, should be used for juveniles. The 95 percent exceedance flow during the migration period in San Francisquito Creek is less than 1 cfs, so the 95percent annual exceedance is less than that, and therefore the 1 cfs alternative was selected as the low design flow for juvenile passage.

During these design flows, NMFS fish passage guidance requires structures to maintain maximum average water velocities of less than or equal to 1 foot per second (ft/s) to enable juvenile steelhead to move throughout the structure; and between 2 and 6 ft/s to enable adult steelhead passage. The velocity threshold for adult passage is dependent upon the length of the structure in which the fish is migrating through (Table 2). Since the San Francisquito Flood Project reach is approximately 7700 linear feet, NMFS fish passage guidance prescribes a maximum allowable water velocity of 2 ft/s or less to enable adult steelhead passage.

Table 2. Maximum allowable average culvert velocity prescribed for fish passage structures using the hydraulic design criteria (NMFS 2001).

Culvert Length (ft)	Velocity (fps) - Adult Salmonids
<60	6
60-100	5
100-200	4
200-300	3
>300	2

NMFS fish passage guidance prescribed a minimum water depth at the fish passage design flows of 1.0 foot for adult steelhead and 0.5 feet for juvenile steelhead, as measured in the centerline of the channel. Table 3 summarizes NMFS fish passage criteria relevant to the project.

Table 3. Fish passage criteria and design flows for the San Francisquito Creek Flood Control Project.

Steelhead Passage Design Flows	Design Exceedance Flow for migration period, unless otherwise noted (EF)	Streamflow at Design EF(cfs)	Maximum Average Water Velocity (ft/s)	Depth Criteria (ft)
Adult High	5 percent	160	2	1
Adult Low	95 percent or 3cfs, whichever is greater.	3	2	1
Juvenile High	50 percent	5	1	0.5
Juvenile Low	95 percent on annual basis or 1cfs, whichever is greater	1	1	0.5

Steelhead passage conditions at the project specific design flows were assessed by NMFS in the flood control reach using HEC-RAS model results for flows close to the design flows listed in Table 3 which were provided by the SCVWD and SFCJPA. The HEC-RAS results predict the water surface elevations, channel depths, and water velocities at various river stations throughout the project reach for the proposed design. In some instances, cross sections of the channel were

provided to illustrate water surface elevation profiles in the reach at certain flows. NMFS requested HEC-RAS results for both the Mean Lower Low Water (MLLW) and Mean Higher High Water (MHHW) tidal stages.

During the MHHW tide stage, tidal backwater extends upstream of the project reach creating suitable passage conditions for juveniles and adults. Tidal backwater also extends upstream of the project reach at the Mean Tide Level (MTL) and all the tidal stages between the MTL and MHHW. NMFS assumes the tidal backwater effect creates suitable fish passage conditions at all tidal stages between MTL and MHHW. This constitutes about 12 hours of the daily tidal cycle.

During the lower end of the tidal cycle (between MLLW and MTL) tidal backwater extent varies between STA 2+27 and the upstream end of the project. This constitutes about 12 hours of the daily tidal cycle. Based on the HEC-RAS results, high design flow stream velocities will exceed the 2 ft/s velocity threshold at some locations during the lower tidal range (MLLW to MTL). To provide hydraulic breaks and resting areas for upstream migrating adult steelhead, the project has proposed the installation of five complex rootwad and boulder structures in the low flow channel between STA 28+97 and 46+07. An additional rock spur structure will also be installed at the downstream tip of Friendship Bridge Island. The rock spur structure will extend into the low flow channel and function as a partial weir. These features have been incorporated into the channel design to function as an analog for native historic velocity refuges and would also provide cover and other habitat benefits for adult and juvenile steelhead. These structures will be strategically placed to avoid excessively long reach(es) with relatively swift water velocities and no resting opportunities. As a result, adult steelhead are expected to ascend the flood control channel at the high design fish passage flow (5 percent exceedance flow) under all tidal conditions.

For the upstream passage of juvenile steelhead, the high design flow stream velocities are anticipated to consistently exceed the 1 ft/s velocity threshold during the low tidal range. This may result in an excessively long reach(es) with relatively swift water velocities at high stream flows and no velocity refuge. Under low flow conditions during periods of low tide, water depths in the channel are not expected to meet the 0.5 ft criterion, and very shallow water depths could impede the movement of steelhead juveniles. However, at this downstream location in San Francisquito Creek, steelhead juveniles are anticipated to be primarily smolts and actively moving downstream. Upstream movement in this reach of stream is not essential since they have reached the tidally-influenced portion of San Francisquito Creek and they are generally committed at this stage to passing into San Francisco Bay, and subsequently the Pacific Ocean. The majority of smolts will likely be moving through the action area during periods of moderate and high flows in the spring when passage conditions are anticipated to be adequate for downstream passage to San Francisco Bay. Under low flow conditions, the alluvial reaches of San Francisquito Creek upstream of the action area experience very shallow depths and smolts will unlikely be descending into the project reach under these conditions. Therefore, the hydraulic and geomorphic conditions in the action area as a result of the Project are not expected to adversely affect smolt steelhead emigrating through the action area.

For green sturgeon, NMFS did not conduct a fish passage assessment because sturgeon are not expected to ascend San Francisquito Creek. Adult and juvenile green sturgeon may enter and

depart the project reach during periods of high tide when adequate water depths allow sturgeon access into the project area. No impediments to the passage of green sturgeon in the action area are anticipated by project construction.

2.4.1.2. Dewatering and Fish Relocation

To protect water quality, and avoid direct and indirect mortality of fishes from construction activities, SFCJPA will bypass stream flow around the work area and dewater the work site in areas where in-stream work occurs. The project will require channel dewatered during up to two consecutive dry seasons. A vast majority, if not all, of the water present during the summer months would be tidal waters. The SFCJPA will submit a final dewatering and fish relocation plan to NMFS and the Corps prior to construction. This plan will provide a detailed description of the methods that will be employed, individuals conducting the work, dewatering sites, and relocation sites. All construction will occur during the summer low-flow between June 15 and October 15.

Stream flow diversions and dewatering is expected to cause temporary loss, alteration, and reduction of aquatic habitat, including critical habitat, in the action area. Dewatering activities could harm individual juvenile steelhead and green sturgeon by concentrating or stranding them in residual wetted areas (Cushman 1985) before they are relocated. Juvenile steelhead and green sturgeon could be killed or injured during dewatering activities, though direct mortality is expected to be minimal due to relocation efforts prior to installation of the bypass system. The proposed bypass system, which isolates the work areas to be dewatered; will allow stream flow in the San Francisquito Creek to continue flowing downstream.

Before the project site is dewatered, a qualified biologist will capture fish and relocate them away from the project work site to avoid direct mortality and minimize possible impacts during project dewatering and construction of the work site. Fish in the immediate project area will be captured by seine and/or dip net, and then transported and released at an appropriate location. Electrofishing will not be used to capture fish due to potentially high salinity/conductivity levels in the tidal channel. Data to precisely quantify the amount of steelhead that will be relocated prior to construction are not available. However, based on the proposed timing of project construction, NMFS can narrow the life-history-stage to juvenile steelhead because in-channel work activities will occur during the summer low-flow period after emigrating steelhead smolts have left and before adult migration has been initiated. In addition, the project reach is tidally-influenced and the presence of juvenile steelhead during the summer months in this area is expected to be low. However, the areas to be de-watered for project construction are large and the project reach includes 1.5 miles of lower San Francisquito Creek. Therefore, the steelhead that are likely to be captured during relocation activities should not exceed 20 pre-smolting juveniles, each year of construction. Based on distribution data and foraging habits of green sturgeon, their occurrence in the action area is assumed to be rare. Therefore, no individual green sturgeon are anticipated to be captured during relocation activities, each year of construction.

Fish capture and relocation activities pose a risk of injury or mortality to fish species. Fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996) has some associated

risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists, direct effects to and mortality of steelhead during capture are expected to be minimized. Data from years of similar salmonid relocation activities indicate that average mortality rate is below one percent (Jeffrey Jahn, NMFS, personal communication, November 2015). Based on this information, NMFS will use 2 percent as the maximum amount of mortality likely from fish relocation for the project, or no more than one fish, each year of construction.

Fish collection is unlikely to be 100-percent effective at removing all individuals, but experienced biologists are expected to remove approximately greater than 95 percent of the fish present. Juvenile steelhead that evade capture and remain in the project area will likely be lost to desiccation or thermal stress during dewatering activities. This will result in the mortality of one steelhead, each year of construction.

Fish encountered during dewatering will be relocated to a downstream or upstream location in similarly brackish conditions. Because the project is located adjacent to the San Francisco Bay, fish relocated downstream will have direct access to ample Bay habitats and adjacent fringe marshes. Fish relocated upstream may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with resident fish for available resources such as food and habitat. Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have more habitat and a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS cannot accurately estimate the number of fish affected by competition, but does not believe this impact will affect the survival chances of individual fish or cascade through the watershed population of these species based on the small area that will likely be affected and the small number of steelhead likely to be relocated. As a result, fish are not expected to experience crowding or any reductions in fitness from relocation.

Another manner by which juvenile steelhead and green sturgeon may be harmed or killed during dewatering activities is to be entrained into pumps or discharge lines if these methods are used. To eliminate this risk, the SFCJPA will screen all pumps according to NMFS criteria, to ensure juvenile steelhead and green sturgeon will not be harmed by the pumps during dewatering events.

Juvenile steelhead and green sturgeon foraging within the action area may be inadvertently affected by the loss of benthic aquatic macroinvertebrate production associated with construction disturbance. However, effects to aquatic macroinvertebrates resulting from dewatering will be temporary because construction activities will be limited to the summer period during two consecutive years, drift from upstream will continue through the bypass pipes, and rapid recolonization (about two to three months) of disturbed areas by macroinvertebrates is expected following construction (Cushman 1985; Harvey 1986; Thomas 1985). Furthermore, the project area is located in the tidally-influenced reach of San Francisquito Creek, so benthic aquatic organisms from San Francisco Bay are likely to rapidly recolonize the action area from sources downstream of the project area. Based on the foregoing, the temporary loss of aquatic

macroinvertebrates as a result of dewatering activities and channel disturbances is not expected to adversely affect juvenile steelhead or green sturgeon.

2.4.1.3. Construction Related Impacts on Water Quality

Water Quality. In-stream and near-stream construction activities may cause temporary increases in turbidity (reviewed in Furniss *et al.* 1991, Everest *et al.* 1991, and Spence *et al.* 1996), reductions in dissolved oxygen, changes to pH, and other alterations in water quality. NMFS anticipates only short-term changes to ambient water quality conditions will occur during proposed activities (*e.g.,* construction and removal of cofferdams and the initial re-wetting of the channel following the removal of the diversion). High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Berg and Northcote 1985; Bjornn *et al.* 1977; Cordone and Kelley 1961), reduce growth rates (Crouse *et al.* 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality (Berg and Northcote 1985; Gregory and Northcote 1993; Sigler *et al.* 1984; Waters 1995). Even small pulses of turbid water will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival.

The SFCJPA will ensure water quality during construction will meet RWQCB and SWRCB water quality standards by monitoring water quality at reference sites and works sites at regular time intervals and implementing BMPs (see Sections 1.3.6 and 1.3.9). Water quality will remain close to ambient conditions. These slight alterations to water quality may cause minor behavioral changes (Henley *et al.* 2000), but are not expected to result in injury or mortality (immediate or latent) of fish. Behavioral changes will likely materialize as fish temporarily vacating preferred habitat or temporarily reduced feeding efficiency. These temporary changes in behavior, may reduce growth rates, but are not likely to reduce the survival chances of individual juveniles. Water quality alteration is expected to be limited to the immediate area of construction activities plus varying distances up and downstream (depending on the tidal stage). Fish will be able to move from the areas where degraded water quality may occur to the ample Bay habitats and fringing tidal marshes nearby. Therefore, any short-term impacts associated with changes in water quality during implementation of this project are expected to be insignificant.

Toxic Chemicals. Equipment refueling, fluid leakage, equipment maintenance, and road surfacing activities near the stream channel pose some risk of contamination of aquatic habitat and subsequent injury or death to listed salmonids. The SFCJPA and its contractors propose to maintain any and all fuel storage and refueling site in an upland location well away from the stream channel; that vehicles and construction equipment be in good working condition, showing no signs of fuel or oil leaks, and that any and all servicing of equipment be conducted in an upland location. For instream construction activities, NMFS does not anticipate any localized or appreciable water quality degradation from toxic chemicals or adverse effects to steelhead or green sturgeon associated with the proposed project, as the stream will be dewatered, giving the SFCJPA and its contractors ample opportunity to attend to any spill prior to toxic chemicals reaching the waters of San Francisquito Creek. NMFS anticipates proposed BMPs and responses

by the SFCJPA and its contractors to any accidental spill of toxic materials should be sufficient to restrict the effects to the immediate area and not enter the waterway. Therefore, any short-term impacts associated toxic chemicals during implementation of this project are expected to be insignificant.

2.4.2. Effects on Critical Habitat

Designated critical habitat for Southern DPS green sturgeon and CCC steelhead occurs in the action area. The Project may impact designated critical habitat for these species by maintaining the existing condition of minimal natural cover, altering water quality, and temporarily reducing foraging habitat.

2.4.2.1. Natural Cover

Tidal salt marsh vegetation is found throughout the action area. Tidal salt marsh habitat is primarily supported by tidal exchange. Dominant plant species in the tidal salt marsh community include Pacific cordgrass (*Spartina foliosa*), pickleweed, perennial peppergrass (*Lepidium latifolium*), gumplant (*Grindelia stricta*), and alkali heath (*Frankenia salina*). Narrow bands of brackish tidal marsh are present along a few-hundred-foot section of San Francisquito Creek downstream of East Bayshore Road. In the brackish marsh, bulrush (*Schoenoplectus* sp.) is the dominant species rather than cordgrass and pickleweed. Ruderal vegetation intergrades with salt marsh species along the levee banks.

A total of 4.51 acres of tidal salt marsh vegetation will be impacted by construction of the Project. Impacts to tidal salt marsh are primarily from excavation of accumulated sediments on both sides of the channel and the relocation of approximately 1,100 feet of tidal channel. Excavation of sediments will result in the removal of 2.82 acres of tidal salt marsh vegetation. Additional tidal salt marsh vegetation will be removed for: creating roads for construction access (1.33 acres); filling in the low spot of the Faber Tract levee and improving the slope of the levee (0.35 acres); and degrading the Bay Levee (0.01 acres). After project construction is complete, the tidal marsh area would be terraced and revegetated with high-marsh plants appropriate to the elevation relative to tidal levels in accordance with the MMP for the Project (SFCJPA 2015c). Approximately 19,600 native wetland plants and cuttings are planned for installation. Plants will be sourced from the San Francisquito Creek watershed and Baylands areas. The SFCJPA also proposes to install 5 large debris jam structures within the channel to improve adult steelhead passage. These structures are anticipated to provide cover in the form of large woody debris and depth.

Removal of tidal salt marsh vegetation during construction could temporarily reduce the amount of cover utilized by steelhead for protection from predators. The reduction of in-channel vegetation may also temporarily reduce invertebrates in the channel by limiting their food source or substrate in which they live. Similarly, by disturbing the bed and banks of the channel, sediment removal may bury aquatic insects that steelhead and green sturgeon feed on. Overhanging and submerged vegetation provides hiding cover (protection from predators) and disturbance for adult salmonids during their migrations (Bisson *et al.* 1987; Bjornn and Reiser 1991a). Removal of this vegetation exposes them to predation and disturbance. Furthermore,

removing vegetation has the potential to reduce the amount of velocity refuges available for adults and juveniles during high stream flow events.

NMFS expects the impacts on natural cover from construction of the Project will significantly reduce the already limited amount of natural cover for steelhead or green sturgeon until re-establishment of vegetation occurs. Installation of the debris jams will improve natural cover for fish within an approximate 2000 linear foot section of the channel. NMFS expects the impacts on natural cover will adversely affect PCEs of steelhead and green sturgeon for the short-term due to the large size of the construction area. Following vegetation reestablishment, PCEs and physical and biological features of critical habitat will be restored to near their current degraded state, and is expected to improve because of the increase in natural cover that will be provided by the debris jams.

The Project proposes to construct the levees, channel, and marshplains to resemble its current condition which is degraded from its historical condition described in Section 2.3.1. Major re-routing of the lower reaches took place in the late 1920s, with levees constructed on both sides of the creek for flood control and development purposes (Hermstad 2009). Constriction of the marsh within a narrow corridor has led to the current condition of a simplified channel and homogenous marshplain, with no side channels, deep pools, or large woody debris to provide natural cover for fish. Installation of five debris jams will improve habitat complexity in the channel. Overall, NMFS believes the proposed Project will improve the current degraded condition of natural cover for steelhead and green sturgeon in the action area.

Future maintenance activities will be limited to levee maintenance, vegetation management, and removal of trash and debris. Maintenance of the levee will employ best management practices to avoid impacts to the surrounding areas and channel. Ongoing maintenance that will be covered by the Project is expected to have minimal impacts on natural cover for steelhead and green sturgeon since the Project only proposes to remove vegetation along the levees. These activities will be located away from the channel, where steelhead and green sturgeon are expected to occur the majority of the time. Therefore, ongoing maintenance in the form of mowing vegetation along the levees is not expected to affect natural cover for steelhead or green sturgeon in the action area.

2.4.2.2. Water Quality

The effects of the Project on water quality were discussed above in section 2.4.1.3 of this opinion and also apply to the critical habitat within the action area. As described above, the effects of the proposed project may result in increased levels of turbidity, reductions in dissolved oxygen, changes to pH, and other water quality alterations. NMFS does not expect the impacts on water quality will adversely affect PCEs and physical and biological features of steelhead or green sturgeon because alterations to water quality will be associated with construction activities which will be temporary. Water quality is expected to remain near ambient levels as a result of the SFCJPA implementing BMPs and monitoring water quality during construction.

2.4.2.3. Foraging

The Project proposes to remove a significant amount of sediment and vegetation during excavation of the channel. Disturbance to benthic habitat from excavation will result in the direct removal of prey resources (*e.g.*, entrained with sediment and vegetation) or the displacement of preferred forage species due to habitat disturbances. These impacts are expected to persist throughout the two-year construction timeframe and extend up to five years beyond the completion of the Project while vegetation is re-establishing.

As described in Section 2.3.2.1 of this opinion, habitat in the action area is degraded and does not contain attributes that would likely support extended foraging by steelhead or green sturgeon. NMFS does not consider the action area a primary foraging site for green sturgeon or steelhead and the impacts incurred from the Project will not likely have a substantial impact on the current value of this habitat to steelhead or green sturgeon. Sturgeon and steelhead likely already use other areas in South San Francisco Bay as preferred foraging sites, and will continue to do so when project construction is completed. Nonetheless, the Project will result in significant alterations to marsh vegetation and the channel benthos for up to two years during construction and five years during marsh vegetation re-establishment. This is expected to reduce the amount of already degraded forage opportunities for green sturgeon during this time. After construction is complete and vegetation re-establishes, forage will likely return to current levels, and may slightly improve as a result of the Project's channel widening in some locations and vegetation management and monitoring activities. Based on this information, NMFS concludes that Project is likely to reduce the quality of the PCEs and physical and biological features for green sturgeon and steelhead critical habitat within the action area over the short-term (seven years), with the potential for minor improvements to the quality of PCEs in the long-term.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR §402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

2.5.1. Searsville Dam and Reservoir

Searsville Dam and Reservoir are owned and operated by Stanford University on lower Corte Madera Creek approximately 12 mile upstream of the action area. Construction of Searsville Dam on lower Corte Madera Creek was completed in 1892 by Spring Valley Water Company, and in 1919 the reservoir and some surrounding property became part of the Stanford University. Searsville is a year-round water storage and diversion facility.

Although Searsville Dam is upstream of the action area, sediment transported over the dam is predicted to affect the channel within the action area of this Project. Searsville Reservoir is rapidly filling with sediment due to historical and current episodes of erosion. Stanford is currently reviewing their potential future management options for Searsville Dam and Reservoir,

but Stanford has not identified a future course of action. In the absence of future actions by Stanford, the natural filling of Searsville Reservoir will continue until equilibrium between sediment inflow and sediment outflow is reached (Northwest Hydraulic Consultants *et al.* 2002). 2002). Once Searsville Reservoir fills with sediment, Northwest Hydraulic Consultants, Inc. (Northwest Hydraulic Consultants *et al.* 2002) predict bedload consisting primarily of sand will be transported over the dam for the first time in more than 100 years.

The San Francisco District Corps of Engineers Water Resources Section evaluated what specific changes are expected to occur within the action area as a result of Searsville Dam filling with sediment (Corps 2011). The study used the predicted channel bed elevation changes from the (Northwest Hydraulic Consultants *et al.* 2002) study to model a "with-sediment" flow scenario in the action area. Northwest Hydraulic Consultants *et al.* (2002) predicted an average channel bed change of 1.24 feet from sediment deposition over a 70-year period. The Corps' study results predict sediment deposition in the action area may increase flood flow depths by up to 1.5 feet in some locations of the action area during the 100-year flood event (Corps 2011). Deposition of sediment at this volume will not require sediment removal since the project has been designed to accommodate flow elevation increases associated with the predicted 1.24 foot average bed elevation increase.

Periodic sediment removal at current baseline volumes is anticipated as a future maintenance need and will be conducted under the auspices of the SCVWD SMP. Information from SCVWD maintenance records shows removal of approximately 1,200 to 5,300 cubic yards of sediment from the project reach at variable intervals (1- 4 years) between 2000 and 2013. The cumulative effect of sediment originating from Searsville Reservoir could increase, from the current baseline, the frequency and volume of material periodically removed. However, per SCVWD's SMP, sediment removal in San Francisquito Creek will not exceed 300 linear feet along the channel bed and will not exceed the maintenance baseline established by the relevant Maintenance Guidelines. If additional sediment is deposited with the flood channel reach during high flow events, additional sediment removal may be required to maintain the Project's design flow conveyance capacity, yet it would not be covered under the Corps permit for this Project.

Sediment removed by excavation of the channel per the SCVWD SMP is expected to disturb benthic habitat and result in the direct removal of prey resources (*e.g.*, entrained with sediment and vegetation) or the displacement of preferred forage species due to habitat disturbances. However, excavation would occur in relatively small sections of the channel (300 linear feet or less) and be restricted to volumes similar to baseline excavation volumes. Since the project area is located in the tidally-influenced reach of San Francisquito Creek, benthic aquatic organisms from San Francisco Bay are expected to rapidly recolonize the action area from sources downstream following sediment excavation events. Juvenile steelhead and green sturgeon foraging within the action area may be inadvertently affected by the temporary loss of benthic aquatic macroinvertebrate production associated with disturbance by sediment removal activities; however the effect is not expected to be significant due to the localized and short-term nature of the impact, and that adequate foraging areas adjacent to the action area remain available and undisturbed.

2.5.2. Climate Change

The long-term effects of climate change have been presented in the Section 2.3.2.3 - Factors Affecting Species Environment within San Francisquito Creek and the Action Area of this biological opinion. These include changes in streamflow regimes, water temperatures, and rainfall patterns. Climate change poses a threat to CCC steelhead and Southern DPS green sturgeon within the action area. The current climate in the action area is generally warm, and modeled regional average air temperatures show an increase in summer (Lindley *et al.* 2007) and greater heat waves (Hayhoe *et al.* 2004). The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75 to 200 percent) in precipitation while other models show decreases of 15 to 30 percent (Hayhoe *et al.* 2004). Sea level rise of 16 inches in San Francisco Bay could extend the area of tidal-influence in lower San Francisquito Creek upstream by approximately one mile and (BCDC 2007) convert portions of high marsh habitat (elevations of 0.2 to 0.3 meters) in the lower 0.5 mile of stream to mid marsh habitat (elevations of -0.2 to 0.1 meters) (Point Reyes Bird Observatory Conservation Science 2012).

Steelhead rearing and migratory habitat are most at risk to climate change. Increasing water temperatures and changes in the amount and timing of precipitation will impact water quality, streamflow levels, and steelhead migration. Low and warm summer flow conditions will negatively affect juvenile steelhead growth and survival. The upstream migration of adult steelhead will be impeded by low stream conditions during winter months, as well as, excessively high streamflows during large winter precipitation events. Smolt outmigration may be constrained by fewer or lower spring high flow events. Climate change is also anticipated to result in further ocean acidification and changes in ocean prey availability (Feely *et al.* 2008; Portner and Knust 2007) which would also negatively impact adult steelhead in the marine environment. Overall, the range and degree of variability in ambient temperature and precipitation are likely to increase due to climate change, and these predictions further highlight the importance of providing suitable instream habitat diversity/complexity in the streams and estuaries where CCC steelhead DPS and southern DPS green sturgeon occur.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (section 2.4) to the environmental baseline (section 2.3) and the cumulative effects (section 2.5), taking into account the status of the species and critical habitat (section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

CCC steelhead and southern DPS green sturgeon have experienced serious declines in abundance, and long-term population trends suggest a negative growth rate. Human-induced factors have reduced populations and degraded habitat, which in turn has reduced the

population's resilience to natural events, such as droughts, floods, and variable ocean conditions. Global climate change presents another real threat to the long-term persistence of these populations, especially when combined with the current depressed population status and human caused impacts. Within the project's action area in the effects of channelization and urban development are evident. These activities have contributed the lack of emergent marsh and reduced channel complexity (*i.e.*, floodplain extent and side channels) in the action area. As a result, forage species that listed salmonids and green sturgeon depend on have been reduced, stream hydrology and hydraulics have been altered, and natural cover characteristic of intact complex tidal salt marshes (*e.g.*, deep pools, side channels, and woody debris) have been eliminated.

Construction of the Project will occur during two consecutive construction seasons between June 15 and October 15, when CCC steelhead juveniles may be present within the action area. Based on distribution data and foraging habits of green sturgeon, their occurrence in the action area is assumed to be rare. Therefore, no individual green sturgeon are anticipated to be encountered during dewatering and fish relocation activities. The Project has the potential to affect juvenile steelhead during construction through injury or mortality during fish capture and relocation, desiccation during dewatering, and degradation of water quality. The project has the potential to adversely impact natural cover, water quality, and forage features of CCC steelhead and southern DPS green sturgeon critical habitat.

The Project proposes to build one simplified channel, with relatively narrow floodplains. Although most of the project reach will contain minimal structural complexity, the Project has proposed to construct six structures in the channel for the purpose of creating hydraulic velocity breaks which will serve as both resting areas for upstream migrating steelhead and provide instream cover. The general lack of channel complexity will resemble the current channel configuration, which is a product of historical flood control and development activities in the action area. The Project will slightly widen the flood control channel and recreate marshplains throughout the action area. These actions are expected to provide minor improvements to the current degraded habitat condition within the action area.

The Project proposes to dewater and relocate juveniles steelhead from the action area prior to construction each season. Experienced fish biologists are expected to work effectively to collect and relocate juvenile steelhead. Based on the low mortality rates for similar dewatering and fish relocation efforts, NMFS anticipates few juvenile steelhead will be harmed or killed during implementation of this project. The maximum number of individuals likely to be encountered by the project over the two year construction window is 40 pre-smolting juvenile steelhead. Anticipated mortality from relocation activities are expected to not exceed two (2) percent of the total likely to be encountered each construction season (*i.e.*, one individual juvenile steelhead each year). Fish that elude capture and remain in the project area during construction activities will likely be lost to thermal stress or crushed by heavy equipment, but this number is not expected to exceed five (5) percent of the fish within the area dewatered each construction season (*i.e.*, one individual juvenile steelhead each year). In total, NMFS expects no more than four (4) juvenile steelhead will be harmed or killed by this project's fish relocation and dewatering. Due to the relatively large number of juveniles produced by each spawning pair, steelhead spawning in the San Francisquito Creek watershed in future years are expected to

produce enough juveniles to replace the few that may be lost at the project site due to relocation and dewatering. It is unlikely that the small potential loss of juveniles by this project will impact future adult returns.

During construction, water quality in the action area may be degraded through temporary increases in turbidity, reductions in dissolved oxygen, changes to pH, introduction of toxic chemicals, and other alterations to ambient water conditions. However, due to the implementation of BMPs these water quality alterations are not expected to occur at levels known to cause reductions in fitness to listed fish. Alterations to water quality during construction will be temporary and similar to the natural conditions typically encountered by listed fish (close to ambient conditions). Furthermore, steelhead will have been relocated from work sites and green sturgeon are not expected to be present during construction so their exposure to altered water quality conditions is unlikely. If fish do encounter water quality alterations, they will likely result in minor and temporary changes to fish behavior (*i.e.*, avoidance), and are not expected to adversely affect green sturgeon or steelhead.

The action area experienced major re-routing in the late 1920s, with levees constructed on both sides of the creek for flood control and development purposes (Hermstad 2009). Constriction of the marsh within a narrow corridor has led to the current condition of a simplified channel and homogenous marshplain, with no side channels, deep pools, or large woody debris to provide natural cover for fish. This has led to an overall degraded condition of PCEs and physical and biological features of green sturgeon and steelhead critical habitat. Construction of the Project will have short-term (two years) adverse impacts on critical habitat through the direct disturbance of benthic prey items, natural cover, water quality, and passage conditions. After project construction is complete, the tidal marsh area would be terraced and revegetated so construction impacts will dissipate within the five year vegetation reestablishment period. The SFCJPA also proposes to install five large debris jam structures within the channel to improve adult steelhead passage. These structures are anticipated to provide cover in the form of large woody debris and depth. Installation of the debris jams will improve natural cover for fish within an approximate 2000 linear foot section of the channel. Following vegetation reestablishment, PCEs and physical and biological features of critical habitat will be restored to near their current degraded state, and is expected to improve because of the increase in natural cover that will be provided by the debris jams.

For steelhead, the action area serves as an essential migration corridor to and from one of the few remaining steelhead populations in tributaries to South San Francisco Bay. Migration for steelhead through the completed Project will be adequate, and may improve over current conditions by the addition of the instream wood structures. Also, the project will not reduce the ability of green sturgeon to move into and out of lower San Francisquito Creek. The Project's impacts on forage, and cover features in the action area will result in temporary reduction in steelhead critical habitat value in the action area, yet because of its limited scope and duration, the impacts to critical habitat in the action area will not appreciably reduce the critical habitat value for CCC steelhead.

The current ecological distribution of green sturgeon in the Bay suggests that the action area is not of prime importance for this species. NMFS anticipates no direct impact to green sturgeon

during construction of this project. The Project's impacts to aquatic habitat will not result in an appreciable reduction in critical habitat value in the action area or at entire critical habitat designation scale for southern DPS green sturgeon.

The cumulative effects of the operation of Searsville Dam and Reservoir are anticipated to affect CCC steelhead and designated critical habitat in the future in a manner similar to the present day impacts on steelhead and critical habitat in the action area. Sedimentation rates in the action area are only expected to increase slightly once Searsville Reservoir fills with sediment and the annual sediment loads from the upper watershed move past the reservoir to downstream reaches. The predicted changes in bed elevations (plus 1.24 feet) and flood elevations (plus 1.5 feet) within the action area as a result of the filling of Searsville Reservoir (Corps 2011) are not expected to appreciably reduce steelhead or green sturgeon critical habitat value within the action area.

Regarding future climate change effects in the action area, California could be subject to higher average summer air temperatures and lower total precipitation levels. The Sierra Nevada snow pack may decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled. Reductions in the amount of precipitation would reduce streamflow levels in Northern and Central Coastal rivers. Estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this project, construction would be completed no later than 2020 and the above effects of climate change are unlikely to be detected within that time frame. The short-term effects of project construction will have completely elapsed prior to these climate change effects.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of threatened CCC steelhead and threatened southern DPS green sturgeon or destroy or adversely modify their designated critical habitat.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR §222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be

prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1. Amount or Extent of Take

The number of threatened CCC steelhead that may be incidentally taken during project activities is expected to be small, and limited to the juvenile (pre-smolt) life stage. Take is anticipated to occur during fish relocation and dewatering of construction reaches within the action area between June 15 and October 15 over two years of construction. The number of juvenile steelhead relocated during project construction is anticipated to be no more than 20 per year (40 for the entire two years of construction), and no more than two juvenile steelhead are expected to be injured or killed each year (4 for the entire two years of construction) during fish relocation and dewatering activities.

If more than 40 juvenile steelhead are captured, or more than 4 juvenile steelhead are injured or killed, incidental take will have been exceeded.

Based on distribution data and foraging habits of green sturgeon, their occurrence in the action area is assumed to be rare and no take of southern DPS green sturgeon is anticipated from the Project.

2.8.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Ensure construction methods, minimization measures, operations and maintenance, and monitoring are properly implemented within the action area.

2. Ensure the steelhead habitat complexity features are designed in a manner that provide adequate resting and holding areas for steelhead migrants.

3. Undertake measures to ensure that harm and mortality to steelhead resulting from fish relocation and dewatering activities is low.

4. Prepare and submit a report to document effects of construction and relocation activities and performance.

5. Monitor and evaluate the performance of the habitat elements (RPM #2), revegetation, and channel morphology components of the project.

6. Prepare and submit reports to document the performance of habitat elements (RPM #2), revegetation, and channel morphology components of the project.

2.8.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR §402.14). The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR §402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

All plans and reports mentioned below must be submitted to: NMFS North-Central Coast Office Attention: San Francisco Bay Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California 95404-6528.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. The permittees must submit the Project's Final Operations and Maintenance Manual and Mitigation and Monitoring Plan for review and approval at least 90 days prior to construction of the Project.

    b. The SFCJPA will allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the project sites during construction activities described in this biological opinion.

    c. If any ESA-listed fish are found dead or injured, the biologist shall contact NMFS biologist Amanda Morrison to review the activities resulting in take and to determine if additional protective measures are required. All ESA-listed fish mortalities shall be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length measured, and be frozen as soon as possible. Frozen samples shall be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS North-Central Coast Office without obtaining prior written approval from the North-Central Coast Office, San Francisco Bay Branch Chief. Any such transfer will be subject to such conditions as NMFS deems appropriate.

2. The following terms and conditions implement reasonable and prudent measure 2:

    a. The permittees must submit the Project's 60 percent and 90 percent design plans for steelhead habitat features (*i.e.,* debris jams and rock weir) to NMFS for review and approval at least 90 days prior to the initiation of construction of the Project.

3. The following terms and conditions implement reasonable and prudent measure 3:

a. The permittees must submit the Project's Final Dewatering and Fish Relocation Plan(s) for review and approval at least 90 days prior to construction of each phase. The Plan(s) must clearly identify the proposed cofferdam locations and fish relocation methods.

b. All screens used on equipment meant to divert flows must be screened in accordance with the NMFS Fish Screening Criteria for Anadromous Salmonids [available at: http://swr.nmfs.noaa.gov/hcd/fishscrn.pdf] and the Addendum for Juvenile Fish Screen Criteria for Pump Intakes [available at: http://swr.nmfs.noaa.gov/hcd/pumpcrit.pdf].

c. The SFCJPA shall retain a qualified biologist with expertise in the areas of anadromous fish biology, including handling, collecting, and relocating salmonids and green sturgeon; salmonid and green sturgeon habitat relationships; and biological monitoring of salmonids and green sturgeon. The Corps shall ensure that all biologists working on this project be qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed fish.

d. A qualified biologist shall monitor the construction site during placement and removal of flow diversions and cofferdams to ensure that any adverse effects to steelhead and green sturgeon are minimized. The biologist shall be on site during all dewatering events to ensure that all ESA-listed fish are captured, handled, and relocated safely. The biologist shall notify NMFS biologist Amanda Morrison at (707) 575-6083 or Amanda.Morrison@noaa.gov one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities.

e. ESA-listed fish shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream and fish shall not be removed from this water except when released. To avoid predation, the biologist shall have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured steelhead and green sturgeon must be relocated, as soon as possible, to a suitable in-stream or estuary location in which suitable habitat conditions are present and similar to capture sites to allow for adequate survival of transported fish and fish already present.

f. If any ESA-listed fish are found dead or injured, the SFCJPA must implement Term and Condition 1.c. listed above.

4. The following terms and conditions implement reasonable and prudent measure 4:

   a. The Corps and SFCJPA must provide a written report to NMFS by January 15 of each year following completion of the previous year's construction and fish relocation activities. The report must contain, at a minimum, the following information:

      (1) *Construction related activities.* The report must include the dates construction began and was completed; photographs taken before, during, and after the activity from photo reference points; a discussion of any unanticipated effects or unanticipated levels of effects on ESA-listed fish and their habitat, a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish or designated critical habitat; and, the number of ESA-listed fish killed or injured during the project action.

      (2) *Fish Relocation.* The report must include a description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; a description of water quality at release sites at the time of release, including, at a minimum, water temperature and dissolved oxygen levels; a description of the equipment and methods used to collect, hold, and transport ESA-listed fish; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

5. The following terms and conditions implement reasonable and prudent measure 5:

   a. The SFCJPA must conduct annual inspections of the Project by November of each year that evaluate the performance of fish habitat elements, vegetation re-establishment, and channel design performance as it relates to fish passage conditions, in addition to other elements inspected per the Project's Mitigation and Monitoring and Operations and Maintenance Plans.

6. The following terms and conditions implement reasonable and prudent measure 6:

   a. The Corps and SFCJPA must provide a written report to NMFS by February 1 of each year on the results of annual inspections. The report must include a discussion on the performance of fish habitat elements and channel design performance as it relates to fish passage conditions; a discussion of any unanticipated effects to fish passage or critical habitat; and a description of potential measures that will be taken to mitigate those effects.

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

NMFS has no Conservation Recommendations.

2.10 Reinitiation of Consultation

This concludes formal consultation for San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide effects, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Pacific coast salmon (PFMC 1999) contained in the fishery management plans (FMP) developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Effects of the proposed project will effect EFH for various federally managed fish species within the Pacific Coast Groundfish (PFMC 2005), Pacific Coast Salmon (PFMC 1999), and Coastal

Pelagic Species (PFMC 1998) FMPs. Furthermore, the project area is located in a Habitat Area of Particular Concern for various federally managed fish species within the Pacific Coast Groundfish FMP.

3.2 Adverse Effects on Essential Fish Habitat

Adverse effects to EFH for coastal pelagic species and Pacific groundfish will occur through (1) altered water quality, and (2) disturbance of benthic biological community, including removal of prey, and physical habitat. No adverse effects to EFH for Pacific salmon are anticipated.

3.2.1. Water Quality

As described in sections 2.4.1.3 and 2.4.2.2 of the biological opinion, in-stream and near-stream construction activities may cause temporary increases in turbidity (reviewed in Everest *et al.* 1991; Furniss *et al.* 1991; Spence *et al.* 1996), reductions in dissolved oxygen, changes to pH, and other alterations in water quality. NMFS anticipates only short-term changes to ambient water quality conditions will occur during proposed activities (*e.g.,* construction and removal of cofferdams and the initial re-wetting of the channel following the removal of the diversion). The SFCJPA will ensure water quality during construction will meet SFRWQCB and SWRCB water quality standards through monitoring and implementing BMPs (see Sections 1.3.6 and 1.3.9). Water quality will remain close to ambient conditions. Water quality alteration is expected to be limited to the immediate area of construction activities plus varying distances up and downstream (depending on the tidal stage). It is expected that fish species encountering the altered water quality conditions will react behaviorally and either move away from or avoid them. These effects are expected to be temporary and there is ample area for fish to move to near the action area.

3.2.2. Benthic disturbance

As described in Section 2.4.2.3 of the opinion, the Project proposes to remove a significant amount of sediment and vegetation during project construction. Disturbance to benthic habitat from excavation will result in the direct removal of prey resources (*e.g.*, entrained with sediment and vegetation) or the displacement of preferred forage species due to habitat disturbances. These impacts are expected to persist throughout the two-year construction timeframe and extend up to five years beyond the completion of the Project while vegetation is re-establishing.

The Project would result in benthic disturbance and potential removal of invertebrate prey within 4.5 acres of tidal salt marsh habitat from sediment removal and 2.4 acres of bay waters from channel realignment, for a total of 6.9 acres of soft substrate habitat. EFH species managed under the Coastal Pelagics and Pacific Groundfish FMPs forage on infaunal and bottom-dwelling organisms, such as polychaete worms and crustaceans. Excavation and dredging activities can adversely affect the benthic invertebrate community by directly removing or burying these organisms (Newell 2002; Van der Veer *et al.* 1985). The Project is likely to result in the temporary loss of EFH prey organisms due to construction activities.

Recolonization studies suggest that recovery (generally meaning the later phase of benthic community development after disturbance when species that inhabited the area prior to disturbance begin to re-establish) may not be quite as straightforward, and can be regulated by physical factors including particle size distribution, currents, and compaction/stabilization processes following disturbance. Rates of recovery listed in the literature range from several months to several years for estuarine muds (Currie and Parry 1996; McCauley *et al.* 1977; Tuck *et al.* 1998; Watling *et al.* 2001) to up to 2 to 3 years for sands and gravels (Gilkinson *et al.* 2005; Oliver *et al.* 1977; Reish 1961; Thrush 2002; Thrush *et al.* 1995; Watling *et al.* 2001). Thus, forage resources for fish that feed on the benthos may be substantially reduced before recovery is achieved. Based on available literature, NMFS will assume full recovery of prey resources will exceed one year following construction.

Additionally, the act of removing sediments and the associated biotic assemblages during construction of the Project creates an area of disturbance that is extremely susceptible to recolonization by invasive species, often resulting in the displacement of native species. As a result, the Project may result in the increased distribution and abundance of invasive species in the action area, which in turn would reduce the amount of native prey resources available to coastal pelagic species and groundfish in the action area.

3.3 Essential Fish Habitat Conservation Recommendation

To compensate for the temporal effects of benthic disturbance on 6.9 acres of soft bottom substrate during two years of construction and for an additional period of year or longer following construction, NMFS recommends the SFCJPA: (1) provide funding to an ongoing restoration project; (2) purchase credits from a conservation/mitigation bank; and/or (3) implement a new restoration project.

For any compensatory mitigation, the habitat replacement should be "in-kind", such that the replacement habitat value is equal to, or greater than, pre-project habitat value. Determination of habitat replacement value should be based on the contribution of that habitat to the support of species and vegetation affected by the proposed project and be determined in coordination with NMFS.

Compensatory mitigation should occur on-site at an one-to-one mitigation ratio (*e.g.*, 15 acres restored:15 acres impacted) or off-site at a three-to-one mitigation ratio (*e.g.*, 45 acres restored:15 acres impacted) and should be habitat replacement in-kind. Ratios greater than one-to-one to account for temporal losses, uncertainty of performance, and differences in functions or values in replacement habitats outside of the action area.

The amount of credits purchased from a conservation/mitigation bank should be equal to a three-to-one ratio, or greater, and should result in habitat replacement in-kind. If the credit system for a bank is not expressed and measured in the same manner as the impacts of proposed project, the SFCJPA should confer with NMFS to determine an acceptable amount of credits to be purchased. The amount of monies provided to a restoration project should be sufficient to fund one-to-one habitat restoration for projects in South San Francisco Bay, or three-to-one at off-site restoration sites.

Fully implementing this EFH conservation recommendation would avoid, minimize, or offset the adverse effects described in section 3.2, above, to approximately 6.9 acres of designated EFH for Pacific coast groundfish, and coastal pelagic species.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Corps must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR §600.920 (k)(l)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR §600.920 (l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include the SFCJPA, SCVWD, USFWS, BCDC, and the SWQCB. Individual copies of this opinion were provided to the Corps. This opinion will be

posted on the Public Consultation Tracking System web site (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

5. FIGURES

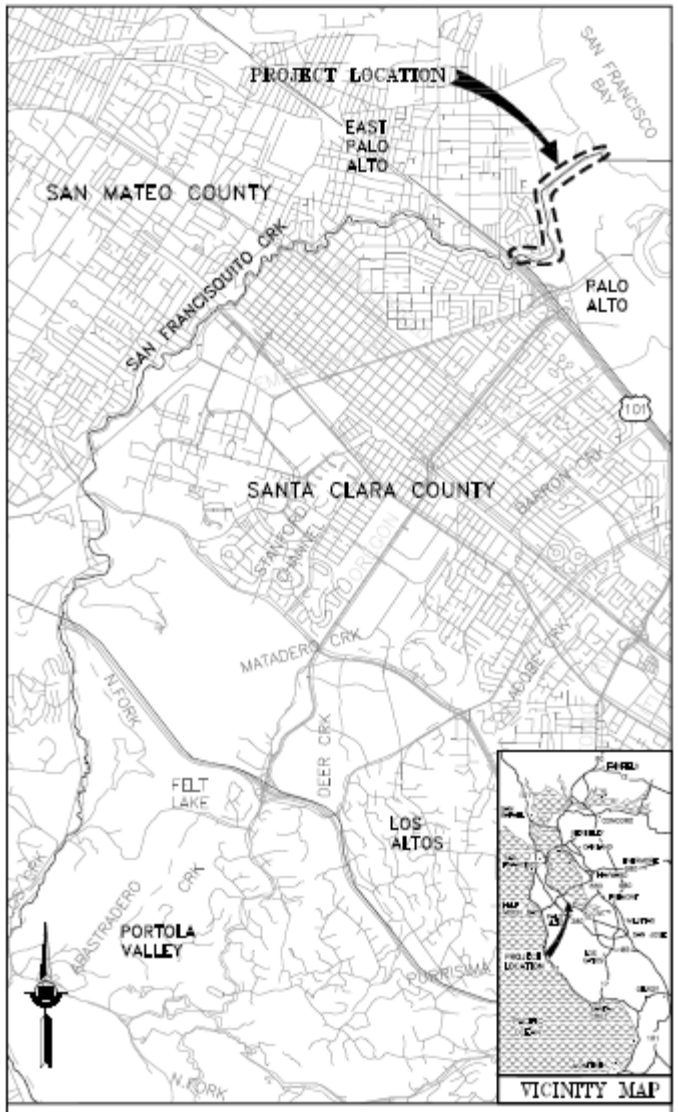

Figure 1. Map showing general location of the Project.

Figure 2. Map of entire project area.

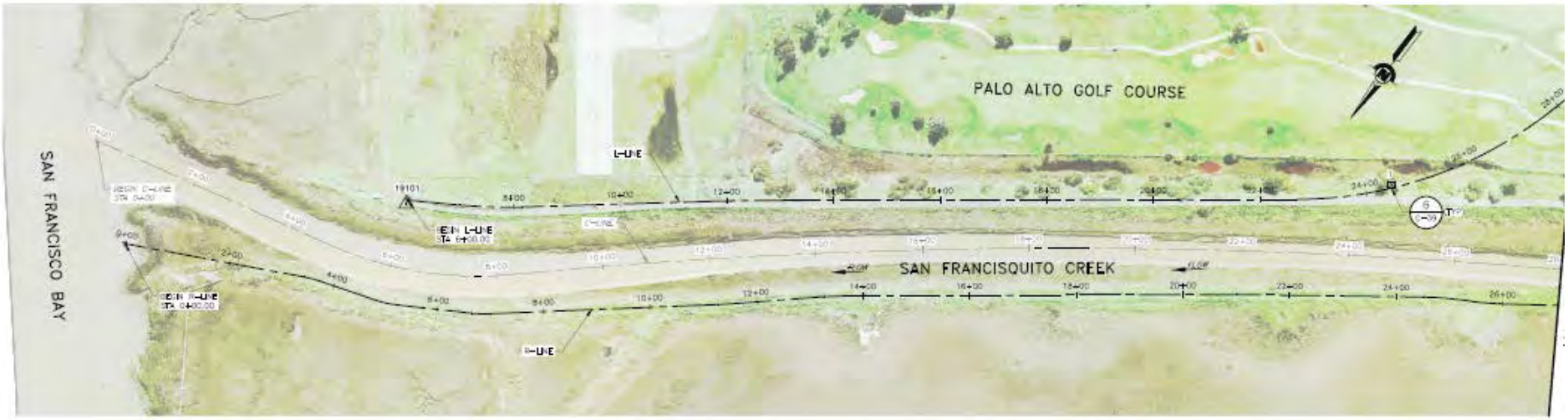

Figure 3. Map of project area from center line STA 0+00 to STA 28+00.

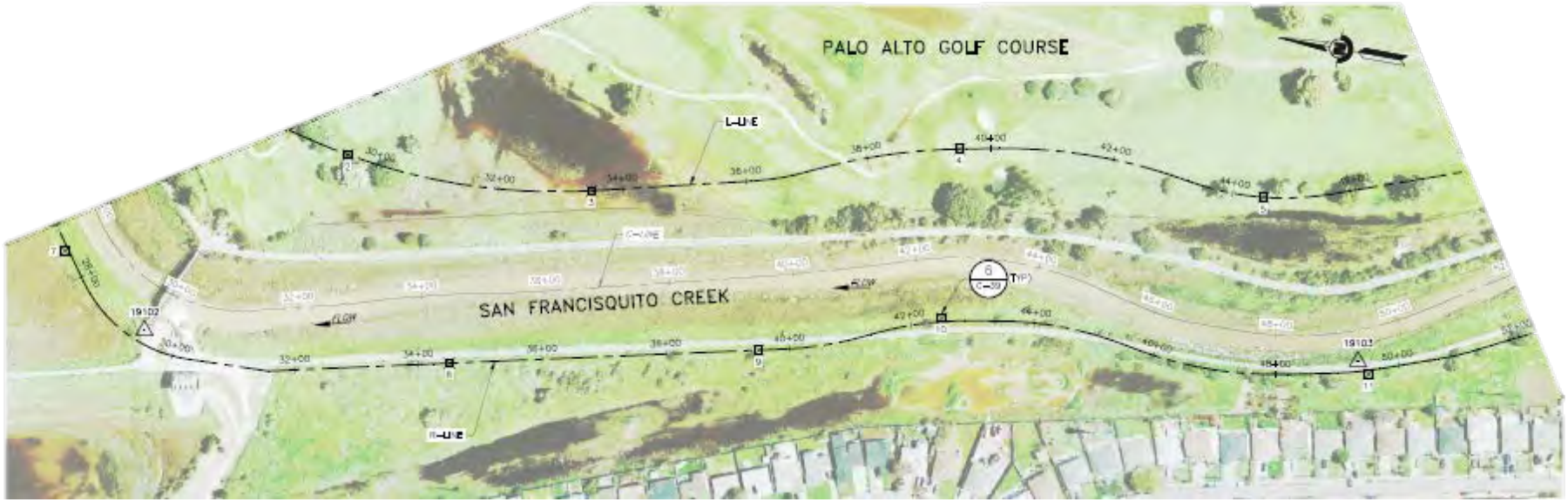

Figure 4. Map of project area from center line STA 28+00 to STA 52+00.

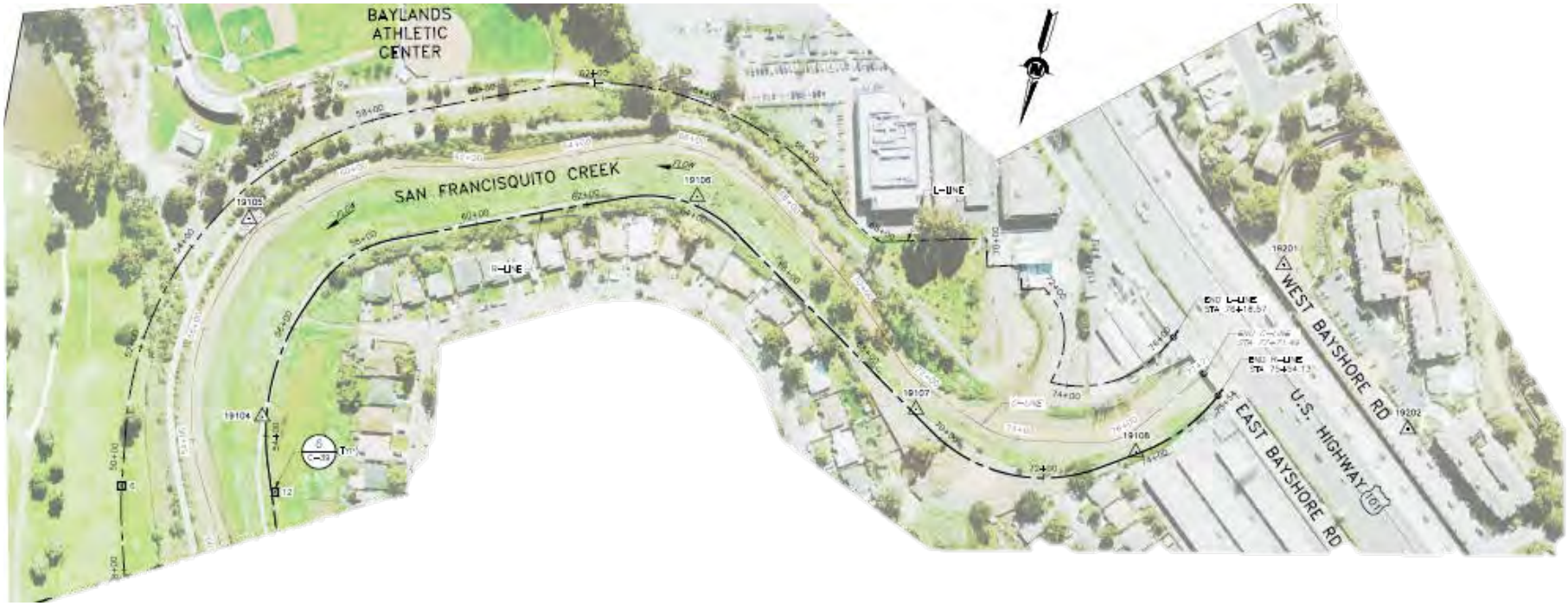

Figure 5. Map of project area from center line STA 52+00 to STA 77+71.

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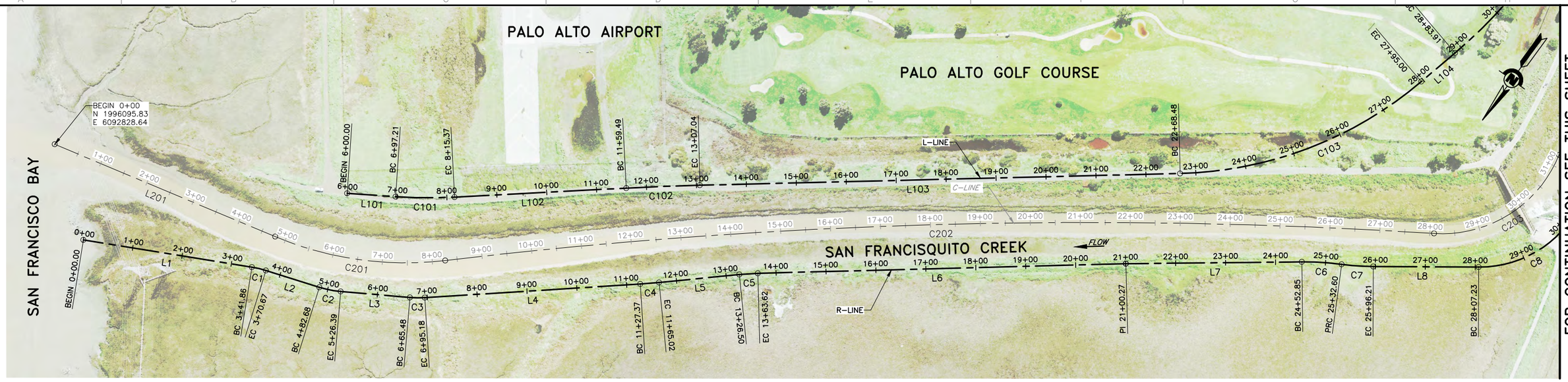
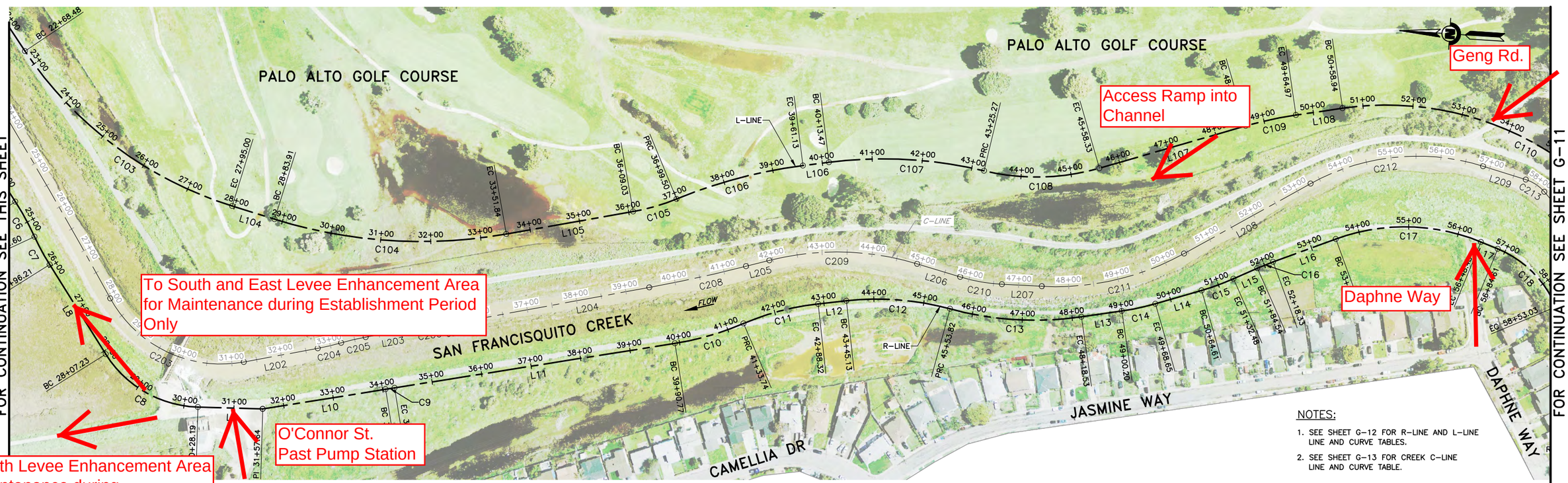


LEVEE ALIGNMENT RIGHT BANK AND LEFT BANK LINE AND CURVE PLAN

SCALE: 1"=100'



NOTES:

1. SEE SHEET G-12 FOR R-LINE AND L-LINE LINE AND CURVE TABLES.
2. SEE SHEET G-13 FOR CREEK C-LINE LINE AND CURVE TABLE.

LEVEE ALIGNMENT RIGHT BANK AND LEFT BANK LINE AND CURVE PLAN

SCALE: 1"=100'

REV	DESCRIPTION	DATE	APPR.
	DRAFT 100% JULY 2015		

DOCUMENT NUMBER: S-XXXXXXX

Figure 1a Maintenance Access Downstream

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY

ACCEPTED BY DISTRICT

PROJECT ENGINEER DATE

PROJECT NAME AND SHEET DESCRIPTION:
SAN FRANCISQUITO CREEK FLOOD REDUCTION, ECOSYSTEM RESTORATION, & RECREATION PROJECT
LEVEE ALIGNMENT RIGHT BANK AND LEFT BANK LINE AND CURVE PLAN

SCALE: 1" = 100'

VERIFY SCALES 0 1"

BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PROJECT NUMBER: 26284002

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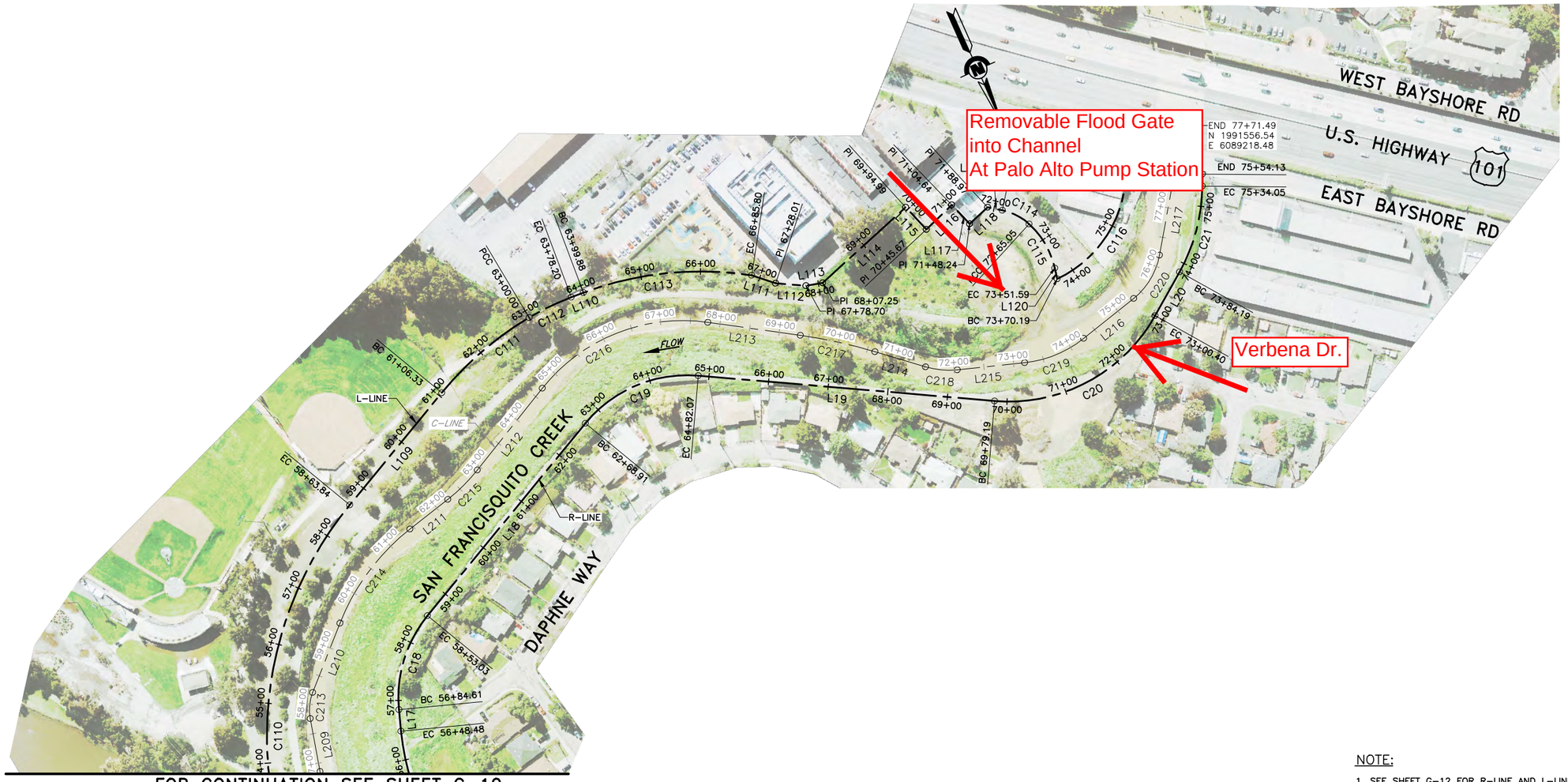

NOTE:

1. SEE SHEET G-12 FOR R-LINE AND L-LINE LINE AND CURVE TABLES.
2. SEE SHEET G-13 FOR CREEK C-LINE LINE AND CURVE TABLES.

LEVEE ALIGNMENT RIGHT BANK AND LEFT BANK LINE AND CURVE PLAN

SCALE: 1"=100'

REV	DESCRIPTION	DATE	APPR.
	DRAFT 100% JULY 2015		

Figure 1b Maintenance Access Upstream

PROJECT NAME AND SHEET DESCRIPTION:
SAN FRANCISQUITO CREEK FLOOD REDUCTION, ECOSYSTEM RESTORATION, & RECREATION PROJECT
LEVEE ALIGNMENT RIGHT BANK AND LEFT BANK LINE AND CURVE PLAN

SCALE: 1" = 100'
VERIFY SCALES: 0 — 1"
BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PROJECT NUMBER: 26284002

DOCUMENT NUMBER: SFC_LP-G-1028-XXXXXXX

USERNAME: BillShad Tue 08 Jul 2008 09:32am
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Santa Clara Valley Water District

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W E
S

0 100 200 400 600 800 Feet

Salt Marsh Harvest Mouse Foraging/Dispersal Habitat
Operation and Maintenance Impacts

July 2015