OPERATIONS & MAINTENANCE MANUAL

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

San Francisco Bay to Highway 101

August 25, 2016

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY

HDR

Santa Clara Valley Water District

CITY OF PALO ALTO CALIFORNIA

CITY OF EAST PALO ALTO INCORPORATED 1983

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.

CONTENTS

ACKNOWLEDGEMENTS ii
LIST OF COMMON ACRONYMS AND ABBREVIATIONS iii
GLOSSARY iv
1 OVERVIEW AND ACCESS 1
1.1 Purpose of Manual 1
1.1.1 Project Description 1
1.1.2 Design Data 1
1.1.2.1 Flood Depths and Velocities 2
1.1.2.2 Created Marshplain Range of Widths within Channel 2
1.2.2.3 Tidal Marsh Mitigation, Restoration, and Creation 3
1.2 Changes to the Project or the Manual 3
1.3 Project Vehicular Access 3
2 OPERATION 4
2.1 Introduction 4
2.2 Maintenance of Hydraulic Performance 5
2.2.1 Triggers for Sediment Removal or other measures to preserve conveyance capacity 5
2.2.2 Vegetation Removal Triggers for Channel 6
3. MAINTENANCE 6
3.1 Vegetation Maintenance 10
3.1.1 Mitigation Plantings during Establishment Period 11
3.1.1.1 Instream benches adjacent to levees and floodwalls to remove undesired and non-native vegetation 11
3.1.1.2 Faber Tract levees 11
3.1.2 Erosion Control Plantings 11
3.1.3 Protection for Endangered Species 11
3.1.4 Other Vegetation Removal 15
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. 15

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. .15
3.1.4.3 Removal of woody vegetation in channel 15
3.2 Flood Protection Structures 15
3.2.1 Levee Maintenance 15
3.2.1.1 Levee repairs 15
3.2.1.2 Repair of levee damage caused by flood events (erosion,scour,slumps,and sags) ..16
3.2.1.3 Animal Control Program (baiting, trapping, and barriers) 16
3.2.1.4 Repair animal damage on levee slopes and at levee toe 16
3.3 Floodwall Maintenance 17
3.3.1 Repair of floodwall coating 17
3.3.2 Repair of floodwall damage caused by flood events 17
3.4 Creek Channel Maintenance 17
3.4.1 Removal of downed trees in creek channel 17
3.4.2 Sediment removal in low flow channel 17
3.4.3 Fill and repair scour holes in channel 17
3.4.4 Control of unwanted vegetation on benches to maintain conveyance 18
3.4.5 Repair of rock slope protection 18
3.4.6 Trash and debris removal in channels and at bridge piers/columns 18
3.5 Maintenance Access Ramps and Maintenance Roads 19
3.5.1 Repair and maintenance of levee maintenance roads and access ramps 19
3.5.2 Repair and maintenance of floodwall maintenance roads and access ramps 19
3.6 Outfalls, Flap Gates, and Valves 19
3.6.1 Culvert flap gate service and repairs (during annual inspections) 20
3.6.2 Pipe culvert inspection, repairs, and sediment removal (during annual inspections) 20
3.6.3 Periodic video inspection of culvert joints and lining for buckling, spalling, corrosion, damage Interior Drainage System 20
3.6.4 Removal of sediment and woody vegetation at culverts and outfalls (during annual inspections) 20
3.6.5 Repair and maintenance of outfall slope protection (during annual inspections) 20
3.6.7 Positive closure valve (during annual inspections) 20
3.7 Speciality Maintenancel ..... **Error! Bookmark not defined.**
3.7.1 Maintenance and repair of stop log flood gate 21
3.7.2 Homeless encampment clean-up 21

3.8 Miscellaneous Maintenance Activities....21
3.8.1 Miscellaneous Repairs and Maintenance....21
3.8.2 Remove unauthorized encroachments on Project (stairs, landscaping, utilities, fences, irrigation, etc.)....21
3.8.3 Maintenance of authorized encroachments on Project (Vehicular and pedestrian trails, utilities, etc.) 22
3.9 Friendship Bridge and Boardwalk....22
3.9.1 Vehicular carrying capacity of the Boardwalk is 10,000 lb.. 22
3.9.2 Maintenance Activities at Boardwalk....22
3.9.3 Maintenance Activities at Friendship Bridge....22
3.10 Storm Water Pump Stations 22
4 INSPECTION AND REPORTS....24
4.1 Introduction 24
4.2 Inspection and Reporting Frequency....24
4.3 JPA Inspections of Project Elements....24
4.4 Check Lists and Instructions....25
4.5 JPA Project Inspections....25
4.5.1 JPA Evaluation of Project Elements 25
4.5.2 JPA Rating of Project Elements and Deficiencies....25

List of Appendices

Appendix A. Design Documentation Report
Appendix B. Project As-Built Drawings *[to be included when project complete]*
Appendix C. Levee Inspection Guidelines and Forms
Appendix D. SCVWD Stream Maintenance Program Manual, 2014-2023
Appendix E. Environmental Permits
Appendix F. Pesticide Use and Vegetation Control
Appendix G. Level of Service
Appendix H. Floodwall Coating Specifications
Appendix I. USFWS and NMFS Biological Opinions
Appendix J. Prospective Adaptive Management Scenarios

List of Figures *[To be included in final]*

Figure 1a & b. Maintenance Access
Figure 2. Levee Mowing Areas
Figure 3. San Francisquito Creek Mitigation Sites
Figure 4. Faber Tract Levee Mitigation Sites

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.

1.1.1 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.**Project Description**

The Project is located on lower San Francisquito Creek from United States Highway 101 and Bayshore Road to its mouth at South San Francisco Bay, bordering the City of East Palo Alto in San Mateo County, and City of Palo Alto in Santa Clara County. San Francisquito Creek is a tidal channel bordered by levees on both sides. The current channel capacity is 5,300 cfs. A Caltrans' Highway 101 project scheduled to be completed in 2017 and future projects planned by the JPA to replace two other bridges, and widen the channel upstream of Highway 101 will increase potential downstream flows to 7,400 cfs. Proposed project conditions consider increased conveyance at Highway 101, projects currently in the planning stages upstream of Highway 101, and the widened channel, floodwalls and levees within the proposed project reach. The proposed Project is designed to protect properties and infrastructure between East Bayshore Road and San Francisco Bay from 100-year fluvial flood flows occurring at the

same time as a 10-year tide that includes projected sea level rise through 2067. Although planned upstream projects will only increase downstream flows to 7,400 cfs, the proposed Project is designed to convey 9,400 cfs under these conditions to accommodate future conditions and to avoid the need to perform disruptive channel maintenance for minor changes in channel capacity resulting from transient, temporary sediment deposition associated with individual storm events.

- Total project site: 58 acres
- Length of flood walls: 5,650 feet
- Length of levees: 5,869 feet
- 100 year Recurrence Interval (R.I.) flood 9,400 cfs: original model performed HEC-RAS runs with tide elevations set at 4.0 feet, 7.1 ft, and 9.6 ft NAVD88
- Final modeling results reported at MHHW (7.1 ft) at request of RWQCB
- 30 year R.I. 7,500 cfs
- 8 year R.I. 4,200 cfs
- Palo Alto Pump Station maximum discharge 300 cfs
- O'Connor Street Pump Station maximum discharge 300 cfs

1.1.2 Design Data

1.1.2.1 Flood Depths and Velocities

Between floodwalls downstream of Highway 101

- 5,000 cfs, average water depth of 12.3 feet; deepest water depth of 14.2 feet, and 4.6 fps maximum velocity
- 7,400 cfs, average water depth of 14.1 feet; deepest water depth of 16.1 feet; and 5.6 fps maximum velocity

Downstream of the floodwall to Friendship Bridge

- 5,000 cfs, average water depth 12.4 feet; deepest water depth of 12.8 feet, and 3.2 fps maximum velocity
- 7,400 cfs, average water depth 14.1 feet; deepest water depth of 14.6 feet, and 4.3 fps maximum velocity

Friendship Bridge Bend

- 5,000 cfs, average water depth 12.3 feet; deepest water depth of 12.5 feet, and 3.0 fps maximum velocity
- 7,400 cfs, average water depth 14.1 feet; deepest water depth of 14.3 feet, and 3.3 fps maximum velocity

1.1.2.2 Created Marshplain Range of Widths within Creek Channel

- Near Highway 101 (station 77+62 - 75+00): 50 -100 ft
- Baseball field area (station 68+00 - 60+00): 120 -160 ft
- Near center of golf course (station 53+00 - 36+00): 130 -180 ft
- Friendship Bridge area (station 32+00 - 28+00): 110 - 170 ft
- Station 20+00 along Faber marsh (existing): 110 ft

- Creek Mouth (station 10+00 – 0+00) (existing) 300 -1,280 ft

1.1.2.3 Tidal Marsh Mitigation, Restoration, and Creation (from MMP)

- 3:1 levee side slopes and erosion control grasses
- "High Marsh": 7.63 acres
- "High Marsh Transition": 7.51 acres
- Total 15.14 acres

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 andto 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.

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.

Post-project maintenance activities will be performed in accordance with the SCVWD Stream Maintenance Program 2014-2023, its updates and revisions (SMP). The SMP manual is in Appendix D, but will be revised and updated periodically. Field crews shall verify the current version of the manual by contacting SCVWD Stream Maintenance Program Unit, (408) 265-2600, before beginning work. Some maintenance activities may 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.

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	Diana Liang, Postmaster diana.l.liang@u

					sps.gov
Santa Clara County	Easement and Fee	International School of the Peninsula	151 Laura Lane Palo Alto, 94303	008-01-050	Nic Guedenet (650)251-8500
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	Special Use Permit	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 Maintenance of Hydraulic Performance

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

2.2.1 Triggers for Sediment Removal or other measures to preserve conveyance capacity

Excessive sediment deposition in the low-flow channel or instream marsh would reduce conveyance capacity and impair the ability of the Project to function as designed. It may also reduce habitat values of the instream marsh created by the

Project. Sediment removal may be triggered if sediment deposition impedes fish migration, including within the footprint of in-stream refugia.

Excessive sediment deposition is not anticipated under normal conditions, and tolerances have been included in the Project design to accommodate a return of historic sediment loads to the Project reach. Upstream bank failure or an action taken by another entity that mobilizes stored sediments could present sediment depositional conditions beyond the tolerances included in the design for reasonably foreseeable change.

> 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 or other action as described in Appendix J.

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 2014-2023 Stream Maintenance Program, sediment removal, if recommended, will not exceed 300 linear feet for an individual work project.

2.2.1 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, or otherwise as described in Appendix J if future conditions trigger adaptive management.

3. MAINTENANCE

Maintenance activities will take place upon identification of any of the project triggers shown in Table 3-1, below. Some triggers depend on observations during annual inspections and shown in Attachment C. Some are based on regularly scheduled maintenance, and some are based on any report by staff or the public.

Table 3-1 Maintenance Triggers			
Maintenance Element		Trigger	Section
3.1 Vegetation Maintenance			
	Removal of undesired or non-native vegetation on in-stream benches	n-value > 0.055 or observed during monitoring	3.1.1.1
	Removal of undesired or non-native vegetation on Faber Marsh benches and refugia Islands	Observed during monitoring	3.1.1.2
	Erosion control grasses	Annual schedule of mowing	3.1.2
	Removal of woody vegetation for inspection at base of levee toe for inspection	Woody growth (trees and saplings) observed within 15 ft of outboard levee toe	3.1.4.1
	Removal or pruning of all vegetation encroaching within project right-of-way	Ground cover obscures inspection	3.1.4.2
3.2 Maintenance of Flood Protection Structures			

	Levee damage from erosion, scour, slumps, and sags	Erosion of levee crown or slopes; scour activity that undercuts banks, or impairs channel flow by causing turbulence or shoaling	3.2.1.1 and 3.2.1.2
	Control of burrowing animals or animal damage on levee	When animal burrows or the animals are observed during inspection or as reported	3.2.1.3 – 3.2.1.4
3.3 Floodwall Maintenance			
	Floodwall coating damage	Observed damage to coating allowing steel contact with water	3.3.1
	Floodwall sheetpile damage	Observed	3.3.2
3.4 Creek Channel Maintenance			
	Downed trees	Trees will not float out without cutting	3.4.1
	Sediment in Low Flow Channel	Sediment blocks flow	3.4.2
	Scour holes	If conveyance or slope stability affected	3.4.3
	Unwanted vegetation on benches	Herbaceous growth > 4 ft high	3.4.4
	Rock slope protection	Damage to structural integrity, rock missing	3.4.5
	Trash and debris	Obstruction or habitat degradation observed	3.4.6

3.5 Maintenance Ramps and Roads			
	Access damage or obstruction	Surface damage, vegetation growth, vegetative obstruction to access	3.5.1
3.6 Outfalls, Flap Gates, Valves			
	Assess pipe culverts and flap gates and provide maintenance	Annual inspection or when sediment or vegetation that could impact flap gate operation or discharge is observed	3.6.1 – 3.6.4
	Outfall slope protection	Annual inspection or when woody vegetation is observed, when rock slope protection is damaged or rock missing, when foundations damage may cause undermining, scour, or slope failure	3.6.5
3.7 Specialty Maintenance			
	Stop log flood gate	Gate leaks significantly when closed or doesn't operate. Gate and Appurtenances have damages which threaten integrity.	3.7.1

	Homeless encampment	As observed under guidance by Cities of East Palo Alto or Palo Alto	3.7.2
3.8 Miscellaneous maintenance			
	Fence, signs, graffiti	When observed	3.8.1
	Unauthorized encroachments	When observed	3.8.2
	Authorized encroachments	When reported by owner	3.8.3
3.9 Friendship Bridge and Boardwalk			
	Friendship Bridge Boardwalk	Debris and scouring or undermining at the foundation which impacts structural integrity	3.9.2 – 3.9.3

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). These documents are subject to revision. Field crews shall verify current versions with SCVWD Vegetation Field Operation Unit, (408) 265-2600, before beginning work.

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

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 to be included in natural resource agency permits (see Appendix D).

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. 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 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 blocks flow and reduces conveyance or impedes fish passage.

3.4.3 Fill and repair scour holes in channel

a. Scour hole repairs are required if conveyance or slope stability 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, or degrades habitat.

b. When significant amounts or size of trash are observed in channel the JPA will be notified to coordinate trash removal activities with public agencies and private groups. Ongoing trash abatement measures to be implemented are described in the Post-Construction Stormwater Management Plan prepared for the Project.

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 or when observed)

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 or when observed)

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 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 Specialty Maintenance

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 stop log 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 once 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.

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

a. 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.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.

Prospective Adaptive Management Scenarios for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project, SF Bay - Highway 101

Appendix J to the Operations and Maintenance Manual

Table of Contents

1) Introduction

2) Adaptive Management Process

3) Potential Changes to Project Features
   a. Channel – Hydraulic Performance
   b. Managed levee between San Francisquito Creek and Faber Tract
   c. Faber Tract Marsh

4) Monitoring and Reporting

5) Future Actions by Others

1. Introduction:

This document describes the long term monitoring of, and a process for determining future actions to, Project features that are not specifically designed for flood protection or as mitigation for environmental impacts. Inspection and maintenance of engineered levees and other flood protection features is described in the body of the Operations and Maintenance Manual. Monitoring and maintenance of mitigation features is described in the Mitigation and Monitoring Plan.

This document discusses expected changes over time that will facilitate project performance keeping pace with changing conditions, catalogues potential changes over time that may compromise the project's performance, quantifies how much change can be accommodated by the project design, and finally, identifies potential remedial actions that may be taken to restore project performance.

Adaptive management by definition is intended to deal with unpredicted changes, sometimes using science or techniques that weren't known or in practice at the time a project was completed. This document will be used to initiate discussion of potential actions if a particular scenario arises by providing a suite of potential remedial actions. Future managers may have a larger toolbox to work from than we have today.

It's also important to note that the "solution" to changing conditions may not be to restore project features to their designed function. External conditions, such as the need to restore a fluvial sediment source to a marsh for sea level rise resilience, may cause future managers to decide to make changes that best meet emerging needs.

2. Adaptive Management Process

The SFCJPA will coordinate a decision-making process to optimize the long-term implementation of flood protection measures for San Francisquito Creek and adjoining habitats. The objective of adaptive management is to ensure that hydraulic performance, ecological functions and habitat values created by the Project are maintained. Key components of adaptive management are identifying indicators for ecological functions and habitat values, monitoring the indicators, setting measurable objectives (numerical and descriptive goals) for the indicators, and planning and implementing remedial actions. The adaptive management process provides a mechanism by which remedial actions can be implemented if a measurable objective is not achieved or project performance diminishes due to changing conditions.

Project Feature Monitoring:
The SFCJPA will monitor the project area and features as described in the Operations and Maintenance Manual for levees and other flood protection features, the Mitigation and Monitoring Plan for habitat created or enhanced by the Project, and as described in Section 3, Potential Changes to Project Features, below.

Performance Triggers:
Determining tolerances to change for some Project features, landscapes and habitats is more achievable than for others during the design and construction of a project that must consider complex pre-project hydrologic and hydraulic conditions, predictable but not yet ground-truthed post-project conditions, and reasonably foreseeable but not precisely predictable future environmental conditions. For example, hydraulic performance of a channel can be measured and assessed over time through periodic channel surveys and hydraulic modeling, while marsh viability requires observation of less quantifiable indicators. As such, it is important to establish performance triggers as a baseline for determining when future environmental conditions warrant close observation and discussion of potential adaptive management actions. This document attempts to establish reasonable performance triggers, which if realized, would set in to motion a process for determining appropriate action. In some cases, no action may be the best alternative, depending on situational realities at the time.

Adaptive Management Conference:
Should a currently defined or future performance trigger be realized, the SFCJPA will host an Adaptive Management Conference with participants from local, State and Federal agencies, as well as subject matter experts who may be able to provide professional insights on the specific project objective or set of objectives that may be experiencing a decline in performance. The intent of the Adaptive Management Conference will be to determine a process for decision making that leads to a recommended action, and set up an Adaptive Management Steering Committee to carry out that process.

Consensus Based Deliberations:
The Adaptive Management Steering Committee will employ a consensus process in its deliberations and strive to resolve all differences. The guidelines for this consensus process will be developed prior to establishment of the Adaptive Management Steering Committee. Upon agreement via the consensus process, and if an action is prescribed, the SFCJPA will recommend such actions and any additional measures required be added to the Operations and Maintenance Manual.

3. **Potential Changes to Project Features**

a. Channel – Hydraulic Performance

Potential Change: Establishment of Large Woody Vegetation on Levees

Monitoring Method: Visual inspection and updating of Manning's N value for channel roughness. HEC-RAS modeling runs if channel constriction is suspected.

Trigger for initiating adaptive management conference: HEC-RAS outputs showing hydraulic capacity at less than 8,000 cfs during a 9.6 NAVD (10-year) tide. *(Design conveys 9,400 cfs; maximum flow that can be delivered from upstream is 7,400 cfs)*

Potential Remedial Actions
1) Do Nothing – Determination may be made that the impacts of taking an action outweigh the benefits of that action.
2) Remove Vegetation
3) Initiate Vegetative Management Plan – Include tree trimming in O&M.

Potential Change: Aggradation of Sediment in Channel

Emerging science suggests that the aggradation of fluvial and tidal sediments within and along the perimeter of coastal marshplains will be a key factor in that marsh's resiliency to future sea level rise. Similarly, the newly created in-channel marsh would benefit from the gradual accumulation of fluvial and tidal sediments to calibrate its elevation and keep pace with sea level rise. San Francisco Bay water surface elevation and tides set the downstream boundary condition and will control the change of channel elevation equilibrium over time. After all SFCJPA-planned projects upstream of the Project reach are completed, a maximum of 7400 cfs will pass to the Project reach during extreme events. The Project has been designed to accommodate 9400 cfs, with additional conveyance capacity to accommodate 26 inches of sea level rise, plus 3 feet of freeboard.

While aggradation to keep pace with sea level rise is an expected and beneficial change over time, accelerated aggradation due to poor channel design, as had been observed resulting from the 1958 channel design in the Project reach, would diminish flow conveyance and overlay marsh habitat. To avoid making the same mistake twice, an innovative project design has been developed to optimize sediment transport to

safeguard against unwanted accumulation of fluvial sediment within the project reach over time. The widened channel will be graded at 1%, from an average elevation of 8.0 NAVD88 at the inboard toe of the new levees down to an average elevation of 6.0 NAVD88 at the outboard hinge point of the low flow channel. The low flow channel invert will be set at 0.0 NAVD88. Absent fluvial flows, daily high tides will inundate the newly created in-channel marsh, but energetic tidal action that could mobilize bedload materials will be contained within the low flow channel. As large fluvial events subside, diminishing water surface elevations within the channel will be contained within a continually narrowing channel cross section to maintain stream energies needed to effectively transport excess fluvial sediments through the project reach to San Francisco Bay.

Monitoring Method: Channel cross-section surveys 2 and 4 years after construction, then every 5 years thereafter; HEC-RAS model runs to determine conveyance capacity if constriction suspected

Trigger for initiating adaptive management conference: HEC-RAS outputs showing hydraulic capacity at less than 8,000 cfs during a 9.6 NAVD (10-year) tide. *(Design conveys 9,400 cfs; maximum flow that can be delivered from upstream is 7,400 cfs)*

Potential Remedial Actions

1) Do Nothing – Determination may be made that the impacts of taking an action outweigh the benefits of that action.
2) Add elevation to the tops of Project features to increase freeboard
3) Degrade levee between Creek and Faber Tract to reduce in-channel water surface elevations during high flow events
4) Remove sediment from channel

b. Managed Levee between San Francisquito Creek and Faber Tract

Potential Change: Erosion/scour or settlement lowers the top of levee

Monitoring Method: Visual inspection after large flow events, LiDAR 2 and 4 years after construction, then every 5 years thereafter.

Trigger for initiating adaptive management conference: Scour marked by loss of vegetation, or LiDAR results indicating settlement greater than 2 inches in elevation.

Potential Remedial Actions

1) Do Nothing; future managers may decide that gradual depletion of the levee is a reasonable way to slowly restore the fluvial sediment source to the marsh.
2) Repair or fill levee to restore it to design dimensions

c. Faber Tract Marsh

Potential Change: Daily inundation due to sea level rise

Monitoring Method: Observation of tide levels, protocol surveys of indicator species

Trigger for initiating adaptive management conference: Sustained decline in indicator species over two monitoring periods

Potential Remedial Actions
1) Restore fluvial sediment source by removing levee between Creek and marsh. Increasing fluvial sediment deposition will likely aide the aggradation of the marsh and improve sea level rise resilience.
2) Improve coastal levees to maintain flood protection. Current research indicates that levees built with a gradual inboard gradient (30H:1V) provide valuable transitional ecotone habitat while reducing the severity of wave run up, which his advantageous for both marsh health and flood risk reduction.

4. Monitoring and Reporting

The SFCJPA will conduct annual visual inspections of all project features and environs.

LiDAR and cross-sectional surveys will be conducted in years 2 and 4 after construction, and every 5 years thereafter. More frequent surveys would likely be an indicator of seasonal or event-based transient depositional patterns that will reach equilibrium later in the year after subsequent storm events. Adaptive management needs to consider the change in channel and marsh equilibrium over time, not geomorphic fluctuations resulting from seasonal conditions.

Changes in Marsh elevation will occur in the future due to sea level rise, and are not an effect of the Project. We would anticipate, and hope, that the Marsh would aggrade to keep pace with sea level rise. Suspended Bay sediments that contribute to this aggradation are not influenced by the Project and are not appropriate for the SFCJPA to monitor. Success rates of the native plant species and wildlife inhabiting the marsh is a better indicator of marsh health than elevation.

Protocol level surveys for Ridgway's Rail in coordination with DENWR will be conducted every 2 years in the Faber Tract marsh as an indicator of marsh and habitat health. Sustained decline over two survey periods (4 years) will trigger an Adaptive Management Conference to investigate the apparent decline, identify potential causes, recommend remedial actions to be taken, and identify the appropriate agency to take such actions.

5. Future Actions by Others

While adaptive management is most often associated with changes in conditions resulting from unknowable environmental factors, changes to the Project reach could, in the future, result from a future action or set of actions by another entity within the watershed. At present time, the most identifiable potential future action by others is the future management of Searsville Dam and Reservoir.

Searsville Reservoir, located in the upper watershed of San Francisquito Creek, has been filling with sediment since its construction in 1896, and currently is nearly full. Stanford University, which owns and operates Searsville, has assembled a Steering Committee of key stakeholders and subject matter experts to evaluate potential alternatives for future management of Searsville Reservoir.

Any future action or management strategy will have implications for the downstream environment. Should Stanford choose to leave the dam in place and manage the established marsh behind the dam as critical habitat, the dam and reservoir will eventually fill completely and will no longer trap sediment, resulting in the return of historic sediment loads to the downstream environment. The SFCJPA project has been designed to assume this future scenario, and includes tolerances to accommodate the historic sediment load. Should Stanford decide to implement a change at Searsville that would result in the mobilization of stored sediments behind the dam to the downstream environment, Stanford will be required under the California Environmental Quality Act to mitigate for those downstream impacts.

Should Stanford make a decision to take an action at Searsville Reservoir that causes changes in downstream conditions beyond the return of historic sediment regime that is imminent even with no action at Searsville, the SFCJPA would partner with Stanford to develop models to understand what those downstream impacts are, and augment this document or create a new document to outline adaptive management practices that may be incorporated. Stanford would be responsible for implementing those practices, and the SFCJPA and its member agencies will provide access to the Project site and the upstream reaches of the creek channel to Stanford to allow them to mitigate for the impacts of their action, as long as mitigation activities result in conditions consistent with the objectives of the SFCJPA project. Future mitigation activities by Stanford will be subject to review by the Adaptive Management Steering Committee, if deemed necessary by the SFCJPA or the resource agencies.

Since future actions to implement adaptive management strategies cannot be identified now, they are not covered under existing Project permits and would require separate regulatory permitting, if applicable.